

1 Introduction

The practice of reviewing manuscripts for publication has been around for nearly 300 years, since the Royal Societies of Edinburgh* and London started seeking the advice of their members in the early to mid-18th century to help them select articles for publication.¹ Gradually, a number of other scientific and professional societies adopted the practice, but procedures developed in a rather haphazard and ad hoc way. Peer review, the process by which material submitted for publication is critically assessed by external experts (see Box 1.1), was introduced into different journals at different times and in different ways, often dependent on the chief editor at the time. It is only since the middle of the 20th century that it has become generally widespread and reasonably standardized. Excellent accounts of the origins and evolution of editorial peer review can be found in the articles by Kronick¹ and Burnham,² respectively.

Two main factors led to the spread of peer review. Firstly, until the relatively recent past, editors frequently had to struggle to find enough material to publish and so did not need to be selective. Over the past 50 years this has changed, to the point where submissions to scientific journals are burgeoning and editors need to be highly selective in what they publish in their journals. Secondly, as scientific areas expanded and became increasingly specialized and sophisticated, editors were no longer able to be experts in all areas. They needed to seek the opinion and advice of others. Today, peer review is used almost universally by scientific journals, and a peer-reviewed journal is generally considered to be 'one that submits most of its published research articles for outside review', i.e. by 'experts who are not part of the editorial staff' (as defined by the International Committee of Medical Journal Editors, ICMJE³).

Scholarly publication is the means by which new work is communicated, and peer review is a vitally important part of the publication process. It is the quality-control

Box 1.1 Definition of peer review

'Peer review is the critical assessment of manuscripts submitted to journals by experts who are not part of the editorial staff.'

International Committee of Medical Journal Editors (ICMJE). Uniform Requirements for Manuscripts Submitted to Biomedical Journals.³

* The Royal Society of Edinburgh was created in 1783 from its forerunner, the Philosophical Society of Edinburgh. This was originally founded in 1731 as the Society for the Improvement of Medical Knowledge but changed its name in 1737 to reflect broadening interests.

mechanism that determines what is and what is not published, and in most scientific disciplines work will not be considered seriously until it has been validated by peer review. It also acts as a filter for interest and relevance. Publication is of central importance in both academic promotion and the allocation of research funds. It is the means by which scientific discoveries are attributed to individuals. In some areas, this establishment of priority can lead to very significant commercial and financial rewards. Since so much hinges on peer review and it is so central to what and where things are published, it is essential that it is carried out well and professionally, and that it is viewed with confidence and respect. There has, however, been a growing movement, particularly in biomedical publishing, to highlight its shortcomings.^{4,5} Critics of peer review cite examples that point to its failure, because of its conservatism, to recognize important and innovative papers; its failure to spot errors; its lack of consistency and objectivity; its poor record in detecting fraud; its openness to abuse and bias; and to it being labour intensive, expensive, and often slow, with resulting delays in publication. These critics of peer review suggest there is little evidence to support the use of peer review as a mechanism to assure the quality of research publications, and frequently state that it is only the lack of an obvious alternative that keeps the process going. There have been calls for funding for large-scale research programmes to look into the effectiveness of peer review and potential alternatives.⁶

Despite all the criticisms and reputed failings of peer review, it is inescapable that it is very extensively used in scholarly publishing. Many editors are, in fact, very pro-peer review and would agree with Laine and Mulrow,⁷ who have stated (page 1038), 'We cannot imagine getting along without peer review', and who 'salute' the individuals who review for them. Five surveys carried out between 1999 and 2005 have confirmed the importance with which peer review is viewed and the widespread feeling that the accuracy and quality of material that has not been peer reviewed cannot be trusted.⁸⁻¹² The surveys have also, however, brought to light considerable dissatisfaction with reviewing standards and the peer-review process, especially regarding its quality and fairness, and about the delays that can occur.

Peer review is, therefore, extremely important and is likely to be around for quite some time. Various modifications have been suggested and new systems are being tested, but 'traditional' peer review remains the method practised by the great majority of scientific journals. There are clearly, however, concerns about the quality and speed of peer review and there is, therefore, scope for improvement.

What should peer review do?

What should peer review do? Ideally, it should:

- prevent the publication of bad work – filter out studies that have been poorly conceived, designed or executed

- check that the research reported has been carried out well and there are no flaws in the design or methodology
- ensure that the work is reported correctly and unambiguously, with acknowledgement to the existing body of work
- ensure that the results presented have been interpreted correctly and all possible interpretations considered
- ensure that the results are not too preliminary or too speculative, but at the same time not block innovative new research and theories
- select work that will be of the greatest interest to the readership
- provide editors with evidence to make judgements as to whether articles meet the selection criteria for their particular publications
- generally improve the quality and readability of a publication (although this is more a by-product of peer review).

So, fundamentally, peer review maintains standards and ensures reporting is as truthful and accurate as possible. It helps the layperson or non-expert assess what to believe and what to view with scepticism. With the advent of the World Wide Web, arguments abound that everything should be published and be available to everyone for them to make their own evaluations. But how can non-specialists evaluate and make judgements about things they know nothing about? It is difficult enough for scientists outside of their fields of expertise to assess the merits of competing claims, and so almost impossible for the layperson. This has led to the argument that what is needed is more, not less, quality control and the involvement of the best and most expert individuals to ensure there is genuine review by peers.¹³

The peer-review process needs to be handled efficiently and effectively. It must help journals provide the type and quality of material they are aiming to publish for their specific audiences. Reviewers need therefore to understand the quality and scope of the journals they review for. They need to be provided with guidelines on this. Authors need to be 'trained' to recognize the scope and standard of paper that is required for a particular journal. Editors need to select the most appropriate reviewers, taking care not to overload them. Editors are responsible for ensuring the quality of their journals and that what is reported is ethical, accurate and relevant to their readership (see Golden Rule 1).

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What does peer review assume?

The peer-review process depends on trust and requires the goodwill and good behaviour of all the participants, i.e. the authors, reviewers and editor. It assumes certain things. It assumes that authors are submitting original work that has been honestly carried out, evaluated and reported. Journals cannot be expected to detect fraud at the laboratory experimental level – that is not their role. It assumes that reviewers assess submitted papers to the best of their ability in a courteous and expeditious manner, respecting the confidentiality of submitted material and disclosing any potential conflict of interest. And it assumes that editors evaluate all the information available to them and make decisions on whether to publish material or not as fairly and transparently as possible. It is important to remember that it is not the reviewers who decide what will or will not be published. They assess and advise, commenting on quality and suitability and alerting editors to flaws and problems, but it is the responsibility of editors to decide what will be published in their journals. In making these decisions, it may be helpful for them to bear in mind something very wise that Stephen Lock, a former editor of the *BMJ (British Medical Journal)*, wrote in his seminal book on peer review, 'A Difficult Balance', in 1985 (page 129)¹⁴:

Peer review does not, and cannot, ensure perfection: scientific journals are records of work done and not of revealed truth. If they were to insist on absurdly high standards science would suffer more than it would gain, purchasing reliability at the expense of innovative quality.

What is this book trying to achieve?

Given that peer review is used by the vast majority of scientific journals, the fundamental role it plays in scholarly publishing and the great importance with which it is viewed, it should be carried out to the highest possible standards. Peer review is a very powerful tool if used correctly, but as in every area of life, the whole spectrum of quality exists, from very poor to excellent. It is also rather an 'amateur' activity in that there is usually no formal training, with most people learning 'on the job'. My aim is therefore to provide guidelines for good practice that will be useful to journals of all sizes, in many scientific disciplines. Although the book is primarily for people in science, there is much that will be applicable to other scholarly areas, as the general principles and many of the procedures are the same.

Editorial offices range from organizations where one person does everything to those where many people are employed. Some journals, particularly large ones, have central offices that remain through changes of editors and in which a large body of expertise has been built up over time. They are frequently overseen by a managing editor or equivalent. For others, the office moves every time there is a change in editor-in-chief. As editors are usually appointed on the basis of their academic

standing and expertise, and frequently for their visionary aims and aspirations for their journals, it is highly likely they may have no direct practical experience of running a peer-review system, and certainly may never have had to set one up from scratch. It is not unusual for assistants appointed to have no or very little idea what to do. Yet, the filing cabinets, computers, and so on may arrive one day at a new location, and the office will be expected to be up and running the next.

This is a basic 'how to' guide for people involved in editorial peer review – journal editors, editorial office staff and publishers; a handbook that can be dipped into as required or read in entirety without too much effort. My hope is that the contents of this book will be of help to the newcomer to peer review, as well as acting as a refresher and useful reference for those with experience but who may have gaps in their knowledge or want to review their current practices. All the practical aspects of peer review are covered: from how to set up and run an efficient peer-review system to dealing with unusual and sensitive situations, from manuscript submission to final decision. Scientific review and publication can get caught up in political, ethical or moral questions. I hope the book will provide help to editors and editorial office staff to make things more straightforward and reduce the impact such issues might have on peer review and decisions on whether or not to publish.

I wanted to avoid swamping readers with references, especially as most editors and editorial office staff are very short of time, so only those that are useful or important are given. Two books have been published which will be of interest to readers wanting to find out more about specific aspects of peer review and the research that has been done and is going on. In her book on editorial peer review, Ann Weller reports the results of a systematic review of published studies on the editorial peer-review process, covering all English language studies published between 1945 and 1997 (she was not able to locate any studies published before 1945).¹⁵ The book on peer review edited by Fiona Godlee and Tom Jefferson goes into many aspects of peer review in the health sciences and is a great source of information.¹⁶ It is also very readable. There have been five International Congresses held on peer review since 1989, where research, rather than opinion, relevant to peer review has been presented. The Congresses were initiated by the *Journal of the American Medical Association (JAMA)* following an article by Bailar and Patterson in 1985,¹⁷ in an attempt to bring the rigours of scientific enquiry to peer review. Papers presented at the first four Congresses appeared in *JAMA*.^{18–21} Summaries of the presentations given at the latest Congress, held in 2005, can be found on the Congress website.²² Papers based on the presentations will be published in a number of places.

Chapter 2 starts with the basics – it describes the peer-review process and how to go about setting up a peer-review system from scratch, or how to improve an existing one. It gives some thought to the people involved as well as to the systems and procedures that are needed. The third chapter deals with the first stage of the peer-review process, a pre-review stage really, but crucial to achieving a successful and thorough review – manuscript submission, and the checks and evaluations that need to be carried out to ensure manuscripts are complete and suitable for a journal. If they are and they make it past the initial assessment, they will go into the full review

process. This is dealt with in Chapter 4, which covers the whole process: identifying, selecting and contacting reviewers; sending them manuscripts and all other necessary material; monitoring the review process and chasing up reviewers; receiving and checking reviews. This chapter describes the checks that need to be made at each stage and the sorts of problems, or unusual situations, that can arise and how to deal with them. Answering enquiries from authors (and others) is also covered, as this is not always as simple as it seems and there are pitfalls to be avoided. In Chapter 5 we move on to the decision-making step. The organizational structure for this will vary from journal to journal, and will depend partly on journal size and complexity and partly on practical considerations. The various possibilities are discussed, along with the range of editorial decisions that can be made and the factors to take into account when making decisions, including dealing with dual-use research. Communicating decisions to authors is covered and there is consideration of revisions, resubmissions and the final acceptance stage, along with rebuttals and appeals.

Good practice in peer review is system and business-model independent, so the guidelines given throughout this book apply to both paper-based and online systems, and to both subscription and author-side-payment business models. Special considerations that are relevant to either paper or online are given whenever appropriate. Online submission and review is an important and relatively new area. Moving to online working and making a successful transition are covered in Chapter 6. This includes information on how to go about choosing an online system, how to prepare for the move to online working and how to implement a new system. It also describes what journals can expect after the move and the problems that may be encountered, with suggestions on how to deal with them.

Peer review could not survive without reviewers – they are truly a precious resource, and Chapter 7 gives guidance on how they should be treated and offers some suggestions on ways to compensate them for the time and effort they give to journals. Authors, reviewers and editors all have obligations and responsibilities, and ethical standards to which they should adhere. These are described in Chapter 8, along with conflicts of interest and certain moral dilemmas editors may find themselves facing. Chapter 9 covers the various forms of misconduct in scientific research and publishing, many of which, unfortunately, seem to be on the increase. It includes advice on how to handle cases of alleged or suspected misconduct, and on where editors and journals can turn for help. Measures that need to be taken to correct the literature are also described.

I've drawn up a list of 14 basic principles for peer review and called these 'the Golden Rules'. As well as being numbered and highlighted in the text (the first Golden Rule has already appeared, on page 3 of this chapter), they are listed in Appendix I. This appendix also contains the Peer-Review Good Practice Checklist. Here, important information from the book is summarized into Key Points and grouped under various headings. There are three more appendices: examples of various checklists, forms, guidance and editorial letters are given in Appendix II; a list and description of websites of relevance or interest appears in Appendix III; a brief description of alternative models of peer review is provided in Appendix IV, along

with details of where to go to find out more about them. Readers are also alerted throughout the book to things that may be problematic or where they should be cautious; these are labelled 'Beware!' and appear in boxes.

As already mentioned, peer review can be a very powerful tool. It is hoped that the guidelines in this book will help editors and others achieve the highest standards of reviewing practice, to the benefit of both their own journals and scholarly publishing in general.

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