

Pre-publication Peer Review – A Proposal for Change

Stephen Pritchard, Chair – Division of Information Services  
and Director of Library Services, University of Wales College of Medicine,  
Heath Park, Cardiff, CF14 4BL, UK.  
pritchard @cardiff.ac.uk

1. Peer Review and the Biomedical Literature

The pledge taken by all new graduates at the University of Wales College of Medicine begins “The best inspiration is Truth”. This rubric should guide all our endeavours in biomedicine and healthcare and not least the attempts to ensure the quality of the published research literature. Peer review has been a principal tool in efforts to disseminate ‘good’ science at the expense of ‘bad’ science since the Royal Society of London established the “Committee on Papers” to review manuscripts submitted to its “Philosophical Transactions” over 300 years ago<sup>1</sup>.

The definition of “peer review” has occasioned much debate but a simple working definition states “peer review is the assessment by an expert of material submitted for publication”<sup>2</sup>. More extensive definitions and, indeed, valuable consideration of many aspects of the peer review system are to be found in Weller’s recent monograph<sup>3</sup>.

2. Pre-Publication Peer Review

The literature of peer review reveals every shade of opinion from those defending it strongly to those who consider it to have no value at all. Defenders of the system assert that it helps to ensure that published research is: important; original; timely; appropriate to the journal; technically reliable; internally consistent; well presented and has benefited from guidance by experts<sup>2</sup>. A larger, indeed combative, defence states that its “underlying strength... is the concerted effort by large numbers of researchers and scholars who work to assure that valid and valuable works are published and conversely to assure that invalid or non-valuable works are not published” - all of which arises from “a foundation of trust”<sup>3</sup>.

There is a voluminous literature recording the weaknesses in the way pre-publication editorial peer review works. Some authors have dismissed the system with barely disguised relish as an “enormous waste of scientist’s time (because of its) absolute, ineluctable bias against innovation”<sup>4</sup>. Others, perhaps with a greater degree of resignation, have commented “mention peer review and almost every scientist will regale you with stories about referees submitting nasty comments, sitting on a manuscript forever or rejecting a paper only to repeat the study and steal the glory”<sup>5</sup>.

Distinguished work rejected by eminent journals on the advice of referees includes Krebs’ work on the citric acid cycle, Urey’s on heavy hydrogen, Fermi’s research on beta-decay, Jenner’s account of the first vaccination against smallpox and, the description of radioimmunoassay by Yalow<sup>2, 6, 7</sup>.

Weaknesses and abuses attributed to the peer review system as currently practiced include: the suppression of novelty; restricting the dissemination of information; bias; delay; loss of confidentiality; plagiarism; fraud; intentional or unintentional errors of judgement; carelessness; and a lack of guidelines and standards to guide reviewers<sup>2, 12</sup>.

### 3. Can Peer Review be Improved?

Despite the sense of crisis that has pervaded the systems for decades it is probably accurate to conclude that “the current consensus is that peer review is better than any alternative”<sup>8</sup> A more optimistic view regards peer review as potentially “...the ideal scientific interaction. The system gives us access to our most competent colleagues, whose responsibility is to read our work in detail and make constructive criticism to improve its quality”<sup>9</sup>.

A cogent warning, that will resonate with researchers whose search for the gold nuggets in the literature is already seriously hampered by the avalanche of low grade publications, reminds us that “...there are those who suggest that... editorial peer review... be eliminated. If eliminated there would be no system of quality control and this important point should not be lost on those who want an open, non vetted system of communication”<sup>3</sup>.

The resilience of peer review, or, perhaps, the resignation with which it is viewed, has produced many proposals for change and improvement. A brief selection includes: posting submitted papers online to enable a commentary session to take place where scientists can debate the work or simply offer help<sup>10</sup>; the possibility of double blind reviews<sup>11</sup>; the recommendation of codes of good practice for reviewers<sup>12</sup>. An indication of the flux in which the system is wallowing is the apparently conflicting results of experiments where the names of reviewers were revealed to authors. While one report concluded that “signed reviews were of higher quality... than unsigned reviews”<sup>13</sup> another found that revealing the reviewer’s identity had no effect on quality<sup>14</sup>.

A novel attempt to improve the understanding and practice of the peer review system has been reported from the University of Virginia where the course Cell and Molecular Biology for Engineers teaches undergraduates the full scientific publishing process including anonymous peer review as part of writing a “term paper”<sup>15</sup>.

Given the apparent lack of a viable alternative to peer review – it is significant that e-journals are currently tending to adopt peer review albeit while exploring different models<sup>16</sup> – we should take seriously some powerfully expressed opinions of its importance. For example “...soon all UK doctors will undergo revalidation. It is not unreasonable to expect that the process of peer review should, like other aspects of medical practice, be able to demonstrate its objectivity and value”<sup>8</sup> and - “It is critical to verify that the system authenticating the integrity of the biomedical literature is itself sound”<sup>2</sup>.

#### 4. Post-Publication Peer Review

Given the generally rather grudging or reluctant acceptance of pre-publication peer review it is, perhaps, surprising that it has not been recognised that there exists already in medicine and healthcare a fully-fledged and proven methodology for post-publication peer review. In essence this is the systematic evaluation and appraisal of published primary literature by peers which supports the evidence-based healthcare movement. Indeed it could be argued that evidence-based healthcare needed to develop because of the failure of pre-publication peer review to assure the quality and reliability of the published literature.

A number of published comments, however, have drawn attention to the requirement that published work should consider systematically the results of other studies addressing the same or similar questions and that reviews of submitted manuscripts should be logical, objective and constructive<sup>10, 17</sup>.

Now would seem an opportune time to test whether the tenets of the post-publication evidence-based movement - systematic reviewing, critical appraisal and the classification of primary papers according to an objective hierarchy of evidence - can be employed effectively at the pre-publication stage.

#### 5. A Proposal

It has been observed that “developing an instrument to measure manuscript quality is the greatest challenge”<sup>18</sup>. It is suggested that the process of pre-publication peer review could be improved and become a more reliable indicator of manuscript quality if reviewers were trained in, and subsequently applied systematically, critical appraisal skills and the use of a hierarchy of evidence to classify submitted articles being reviewed. This strategy might then provide a bridge to the structured abstract approach which a number of journals are adopting. The training programmes should be supported by online and written guidelines for reference and updating purposes.

A way forward would be to conduct a pilot experiment with one journal or a small group of journals and to measure the quality of articles published pre and post the adoption of evidence-based pre-publication peer reviewing.

The potential benefits might be expected to include: improved quality and reliability of published articles; a reduction in the publication and dissemination of “bad” science; greater effectiveness and efficiency in identifying and applying “good” science. The potential beneficiaries would include scientists and researchers, reviewers, publishers, practitioners and - most importantly - patients.

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