Critical review of a scientific manuscript: a practical guide for reviewers

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Peer reviewers have significant responsibilities toward authors, editors, and readers, providing some measure of “quality control” for published research using a fair and transparent critical assessment of the research. The reviewer can detect bias, unsatisfactory study design, and ethical problems that may threaten the research, and provide feedback to the authors. The critical assessment of the evidence and validity of the scientific publication enables the editor to accept, reject, or revise the manuscript, minimizing the authors’ complaints if the paper is rejected. Even in those cases, the appropriate revision gives the author the chance to reorganize the article to resubmit it to another journal.

Challenges of the peer-review process are: 1) the increasing need for reviewers due to an increasing number of peer-review requests, because promotions are obtained based on the number of publications or “publish or perish” syndrome and due to various online and hard copy publishers; 2) increasing demands from the reviewers’ primary jobs, related to clinical demands, financial constraints, or more time spent on their research program; and 3) heterogeneous quality of reviews and different methods used to analyze the manuscript, sometimes because of insufficient training. Most journal reviewers acquire the skills and knowledge to perform a manuscript review through their clinical expertise and their own experience in critically appraising the literature. If an individual performs an inadequate review, it is likely that his or her service will not be requested again. Sometimes an inadequate review is not the reviewer’s fault, but is due to insufficient formal training provided by the journals to establish standard methods to analyze the manuscript, or due to lack of information.

Even if the reviewers analyze the manuscript as though they themselves were submitting it, sometimes there is a lack of a comprehensive set of guidelines for all aspects of the review process, leading to an unsupported decision. To minimize this problem, the art of reviewing manuscripts should follow systematic scientific methods to enhance the quality and reduce the time spent on this practice. Systematic guidance minimizes the revision errors while the reviewers improve their practice.

The aim of this paper is to develop a practical method for reviewing a manuscript, explaining how the topics need to be evaluated, and not just provide a checklist. We will focus on the peer review of research manuscripts submitted to scientific journals.

Systematic Method for Manuscript Review

A confusing or uninformative critique is not helpful to either the authors or the editor. If the reviewer disputes a point made by the authors, he or she should provide explicit justification for his or her argument. A critical justification for the strengths and weaknesses of the manuscript depends not only on the clinical expertise in a given subject area and the time available for the review but also on the use of standard guidelines during the revision process. Without a standard and systematic revision, there is a risk of missing important parts of the manuscript. The consequence can be a superficial review, with no real justification and support for the editor’s decision.

In the introductory section of the manuscript, the reviewer will immediately develop an idea of the clinical question of the study to be validated. The introduction justifies the study and describes the objectives. It identifies current knowledge gaps and anticipates how the study results may close those gaps. The methodology used and
the diagnostic hypothesis should also be described in this section. The hypothesis or superiority trial represents the objective of the study to reject the null hypothesis ($x = y$) in favor of the alternative hypothesis ($x \neq y$).

Validating the Clinical Question

The reviewers can promote a general evaluation of the proposed research question by using the FINER criteria: Feasible, Interesting, Novel, Ethical, and Relevant. They must verify closely the research question or objective (aim) of the study because it is the most important part of the entire project. All the components of the study are strictly structured based on a clinical question: type of study, methodology applied, population studied, sample size calculation, time available, equipment, funding, instruments or questionnaire to measure the primary and secondary outcome or endpoint, and implementing the work. The questions that need to be answered by the reviewers are the following: 1) is there a clear, focused, and answerable study question; 2) is the study question innovative or relevant; 3) does the manuscript present an updated literature; 4) has the question already been answered in the literature; 5) does the study have the potential to advance scientific knowledge, influence clinical management and health policy, or provide some directions to future research; 6) does it matter; 7) what relevant information will the study add to the literature; and 8) is the paper clearly written and well organized?

Methods

The methods section of the article is the study design. A well-elaborated methods section may convince the reviewers of the validity of the study design, the reliability and competence of the research team, and thus the reproducibility of the results. If other researchers apply the same methods under the same conditions, the results should be similar.

This section is the fundamental part of the paper where the reviewer will analyze the internal and external validity of the study. To do that, the reviewer needs to understand the specific aspects of the methodology with greater refinement and precision using PICOT (Patient, Intervention, Comparative, Outcome, Timing, and Type of study), complemented with a verification of regulatory approval, examination of sample size, quality of patient allocation, maintenance of treatment, and presence of masking techniques. The systematic review suggested in the methods section is: patients (P), regulatory approval, sample size calculation, allocation, intervention group (I), control group (C), maintenance, outcome (O), blinding techniques, time of study (T), and type of study (T).

Patients or Population

In this section, the reviewers should verify the eligibility criteria for inclusion and exclusion of the participants and establish the clinical or radiological characteristics of the patients who will become part of the study. The reviewer must identify if the group is homogeneous, if the characteristics of the patients are representative of those in the clinical question, and if it is acceptable to extrapolate the study data to the clinical question when the characteristics are not similar.

The authors have to describe how the confounding factors were controlled (exclusion criteria). For example, some of the variables controlled could be: demographic characteristics (age and sex), habits (smoker, drinker), use of medications (steroids), comorbidities (diabetes mellitus, morbid obesity, neoplasm), general conditions of quality of life (unemployed), pregnancy, previous surgeries, degree of severity of the disease, and early or late presentation. The adequate description of eligibility criteria allows the reproducibility of the study. The questions that need to be answered by the reviewers are the following: 1) are the eligibility criteria for inclusion and exclusion broad and clearly stated; 2) is the condition used in the selection clear, such as tests, scores, signs, and symptoms; 3) is the group homogeneous; 4) are the characteristics of the patients representative of those of the clinical question; 5) are the baseline characteristics reported; and 6) were patients similar at baseline in terms of demographics and comorbidity?

Regulatory Approval: Reporting of Informed Consent and Ethics Committee Approval

The reviewer should remember that there is no clinical study without disclosure of ethical protection, committee approval, and the patient’s informed consent. Sometimes the journal requires that the clinical study be entered into a registry to be published. The best-known registry is probably www.clinicaltrials.gov, but there are other registries such as www.anzctr.org.au. By registering the study the authors undertake the commitment to avoid the situation in which if the results of a trial are negative, a decision has to be made to either not publish the results or delay publication for an unspecified time. Conflict of interest, funding information, and other support should be reported, if they exist. The reviewers need to answer the following: 1) if humans are studied, or human tissues or animals are involved, has ethics approval been obtained and is the study ethical; 2) is the paper in agreement with the standards of medical ethics; 3) is informed consent applied; 4) is the study registered; and 5) are there any conflicts of interest involving the authors?

Sample Size Calculation

Once the eligibility criteria for patients or a sample of the population has been described, it is necessary to examine whether the sample size of the study has been calculated. Sample size calculation is usually a requirement for ethics committee approval of a prospective study.

The studies that perform sample size calculation provide a clear indication of methodological quality, diligence, reasoning, and an increase of study power. The reasons for this are the need to recruit enough patients into the study to detect the anticipated effect, to minimize the chance of the study results being erroneous, and to use resources efficiently because every patient recruited into the study costs money. There is no guarantee that the statistically significant findings really represent true results in a prospective study without a sample size calculation. The conclusion