

A guideline for reviewing a clinical research paper

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Peer review is one of the most fundamental principles of high-quality scientific publication. Like our democratic justice system—in which a fair trial is received with a jury of one's peers—medical journals and many funding institutions rely on peer review to assess the scientific quality and novelty of manuscripts and research work. In turn, we look for it to be a seamless endeavor resulting in a perfect final outcome. Often, however, it is not. Peer review is thought to be an essential tool for advancing science and medicine, despite the fact that peer review can be inconsistent, prone to bias, and has limited evidence of its effectiveness.^{1,2} Moreover, few guidelines exist on how to critique a paper and how to manage the inherent flaws of the review process. Herein we present our recommended systematic approach for reviewing clinical research papers, highlighting the inner workings of our *Gastrointestinal Endoscopy* (GIE) review process, and emphasizing what we expect from reviewers and how we measure a quality review.

SYSTEMATIC APPROACH FOR CRITIQUING A MANUSCRIPT

Reviewing the manuscript

Read the manuscript as a skeptic but approach it objectively from a bird's-eye view, letting go of your preconceived dogmas to allow the evidence to unfold before you. In other words, beware of your own cognitive bias. As you read the manuscript, you do not have to go from front to back; in fact, many seasoned reviewers advise against this because it hinders efficiency. It is also almost impossible to read the manuscript only once and expect a thorough, even-handed critique. A survey of our top GIE reviewers revealed that it takes an average of 3 hours to create a thorough review. Even experts in the field

routinely survey the medical literature before forming their opinions. It is recommended that you read the manuscript at least twice.

The first pass. The main objective of the study must be clearly stated. Remember, many respected medical journals insist on a single primary endpoint. Take a look at the overall picture. Are there flaws in how subjects were selected? Were subjects excluded from the analysis, and if so, does it over-inflate the final outcome? Are the main results of the analysis clearly stated? Are the conclusions justified by the results?

Perform a brief PubMed search of the topic to see whether articles have been published on this topic and to consider how this manuscript might add to the current literature. *GIE* and other similar journals make this easy by providing links directly to search engines using the key topics of the manuscript. If there have been similar and recent publications on this topic, then *GIE* will likely reject the submission early in the review process. Often, this might occur by a preliminary review from the assigned Associate Editor, which would eliminate the process of peer review altogether. Another reason for early rejection is detection by the Associate Editor of obvious flaws in the study design or overall scientific methods.

The second pass. This is a good time to pause, to envision what the study should look like, and to ask yourself: is it clear what the investigators are doing, and is the entire manuscript consistent and focused? Appraise the rationale of the study, results, and conclusion.

Writing your critique

Summarize the manuscript in 2 to 4 well-written sentences. This may seem like a waste of time, but encapsulating the study *in your own words* not only shows the authors that you actually took the time and effort to read their

Abbreviations: CONSORT, Consolidated Standards of Reporting Trials; GIE, Gastrointestinal Endoscopy; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; STROBE, Strengthening the Reporting of Observational Studies in Epidemiology.

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work, it will also serve as the basis of your evaluation, making it easier for you to build on your observations. It should include study design, patient selection criteria, main outcome measured, and a highlight of the results. An example of a well-written review, with comments, can be accessed online.³

Divide your critique into major and minor comments. Reserve elements that have no major bearing on the study, such as syntax or grammar and quality of tables and graphs or figures, for minor comments. We encourage international submissions, and if needed we have copyeditors to address grammatical errors. Like most international journals, we acknowledge that only a portion of our writers have the luxury of being raised in the Mother tongue of our journal. Make every effort to judge a manuscript on its science. Bad grammar is fixable. Bad science is not. For the major comments, ideally present your critique in orderly sequence as follows

- **Title and authorship.** Does the manuscript title convey the scientific question posed in an accurate and succinct manner? Does the title describe the type of study performed (prospective randomized controlled trial, retrospective database, meta-analysis, or clinical review)? Asking questions or stating the results in the title should generally be avoided. Is the number of authors and the role of each justified for the article? Did each author contribute enough to satisfy criteria for authorship, including contribution to the study idea and design, acquisition of data, analysis and interpretation of data, drafting and/or revision of the article, and providing final approval?
- **Abstract.** We have recently adopted a more universal format, requiring only 4 abstract headings: Background and Aims, Methods, Results, and Conclusions. Are the results of the study easy to interpret and do they use the correct descriptive terms? Is the conclusion supported by the data? Occasionally, the conclusion over-reaches beyond the scope of the study and needs to be deconstructed and toned down.
- **Introduction.** What is the rationale for the study? Many investigators falter here by not clearly stating the disease burden and what is already known and, most importantly, failing to make a case for the significance or novelty of the study. If you as the reviewer do not get it, most of the general readers will undoubtedly miss it, and so the significance of the study *has* to be plainly stated. Even if you are not convinced about the significance of the study from the start, stay open-minded and continue with your appraisal. Occasionally, you will come across a study that goes against conventional wisdom, but the aim of the study is clear and dovetails to a well-executed study design. Remember, your role is to provide as much information as possible so the Associate Editor can make a decision on the manuscript. It is no doubt better to err on the side of supplying the Associate Editor more than enough evidence for or against a manuscript rather than too little. In addition, does the Introduction state the hypothesis of the study and the

aim(s)? Is the length of the introduction section appropriate or too long? A common mistake is to try to present a full review article in the Background section. The goal is to bring the reader “up to speed” as quickly and thoroughly as needed to understand why the study was done.

- **Methods.** The core principles in critiquing this most important section are to promote clarity and transparency and to minimize bias.⁴ Approval by an institutional review board and clinical trials registration, where required, should be stated. The authors should highlight the type of data collected, including patient demographics; duration of the condition; medications used; presence of comorbidities; treatments rendered including medical, surgical, radiographic, or endoscopic therapy; and duration of follow-up. This section should include a definition of outcomes, for example, explaining that the presence of anemia is defined as hemoglobin level less than 10 g/dL.

Below are reporting guidelines that are a valuable checklist to efficiently appraise various types of submissions. In our experience, we have found that although *GIE* mandates that authors adhere to Consolidated Standards of Reporting Trials (CONSORT), Strengthening the Reporting of Observational Studies in Epidemiology (STROBE), and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, we still occasionally detect deficiencies that need to be implemented.

- Randomized controlled trials: CONSORT.⁵
- Observational studies: STROBE guidelines.⁶
- Meta-analysis: PRISMA.⁷ The authors need to state how the literature search was performed and which search engines were used and should include which variables were extracted and the software program used for meta-analysis. The authors may want to show the actual search terms in an appendix. How was heterogeneity assessed and was testing for publication bias performed?
- Diagnostic tests: Standards for Reporting of Diagnostic Accuracy.⁸
- Health economic studies: *British Medical Journal* economics checklist.⁹
- **Statistical analysis.** Although you are not expected to know the intricacies of statistical analysis, you can opine on the proper approach and how bias was or should have been mitigated. Statistics can also be overused to support the conclusions in a study, such as presenting statistically significant *P* values for associations that are not clinically relevant. Another common error is the calculation of multiple *P* values in the manuscript for secondary analyses without use of the Bonferroni correction to account for multiple comparisons. Sample size estimation should be included ideally for any clinical trial, showing how it was performed to determine whether the study was adequately powered to reach the desired conclusion. The manuscript should mention the type of program used for calculations (including Microsoft Excel, Statistical

TABLE 1. Scoring system for the quality of peer review

1. Did the reviewer clearly identify the strengths of the study?	
Not at all	0
Somewhat	15
Comprehensively	20
2. Did the reviewer clearly identify the weaknesses of the study?	
Not at all	0
Somewhat	15
Comprehensively	30
3. Were the reviewer's comments constructive?	
Not at all	0
Somewhat	5
Very constructive	10
4. What was the level of detail of the review?	
Poor	0
Average	10
Excellent	20
5. Was the reviewer biased?	
Yes	0
No	10
6. Did the reviewers make distinct comments to the editors explaining why they recommended their decision?	
Yes	10
No	0

Scores are added for a total of 0 to 100, with 100 being a perfect score.

Analysis System, or Statistical Package for the Social Sciences, for example) and whether *P* values were 1- or 2-tailed and the level of significance. The authors should state the type of test used for calculations, for example, the Student *t* test for continuous variables, χ^2 testing, or Fisher exact testing for parametric variables. Studies using regression analysis should state how regression was performed. If there are any questions regarding statistical analysis, the reviewer and/or the Associate Editor can suggest the manuscript be reviewed by GIE's statistician, who will perform an independent review.

- **Results.** This section should start with a summary of the number of patients enrolled, screen failures, and the numbers included in the final analysis. Continuous variables including patient age, disease duration, and other laboratory values, for example, should be stated as mean \pm standard deviation or standard error with ranges. For clinical trials, a flow diagram should account for those who were excluded; otherwise, the effect size can be overestimated. For a meta-analysis, there should be a description of how articles were reviewed and selected. The authors should place most of the descriptive data into tables, citing key findings in the text with reference to the tables containing the primary data. There is no need to duplicate too much information in the text that also appears in the tables.

- **Discussion.** The discussion should highlight the key findings of the study and demonstrate how the current study adds to the current body of knowledge. It should compare and contrast the current study with other relevant studies that may agree or conflict with the results. Attempts should be made to explain or speculate on conflicting results. There should be, at the minimum, concise remarks on the limitations of the study and possible sources of bias. The discussion should highlight the key findings of the study and demonstrate how the current study adds to the current body of knowledge. Most discussions end with future research that needs to be done to continue the building process of scientific discovery. Speculation is acceptable and even welcomed when clearly stated as such (eg, "we speculate that...").
- **Tables.** Do they contain the appropriate amount and type of data, or do they duplicate what is stated in the text? Should some tables be removed? Are abbreviations appropriately defined below the table? Are raw numbers accompanied by percentages and vice versa?
- **Figures.** Do they highlight the data appropriately and are they placed correctly within the text? For a meta-analysis, are Forest and Funnel plots demonstrated? Should color be used for some figures?
- **References.** You should draw attention to relevant manuscripts that were not cited by the authors. If there are prior publications, how does this research add to the current literature? How do the current results corroborate or contradict prior studies?

Writing your comments to the associate editor

This is not meant to be a mere summary of the critique but rather a persuasive justification for acceptance or rejection, this time from an Editor's perspective. Give an impression of the overall contribution of the manuscript to the journal and the field. If you struggled with a certain part of the manuscript and need a second opinion, this is the place to ask for a statistical or pathology review.

Probably the most important question to ask yourself is this: are the methodologic flaws fixable or not? An example of a remediable concern is the authors' unwarranted or over-reaching conclusion, which can be addressed by scaling down the authors' language. On the other hand, methodologic flaws that lead to major sources of bias are generally considered unacceptable, but there are other compelling factors to consider, such as novelty and clinical impact, with the caveat that the limitations of the study are made transparent in the Discussion. Another common reason for rejection is if the sample size is too small.

Other reviewers may ask for an extension of the study if they believe the population is too small. Take note: if you believe a manuscript can be salvaged after a major revision, are you asking for something reasonable or will it entail significant time and cost? Will it *really* affect the final outcome? If not, will it be better to make a recommendation for a future study?¹⁰ Consider the perspective of

younger investigators or countries and institutions with limited resources when asking for more data.

RANKING SYSTEM

Like most large organizations, *GIE* and the American Society for Gastrointestinal Endoscopy seek to identify quality. We are fortunate to have many excellent reviewers and look to them when choosing future Editorial Board members, Associate Editors, and even the Editor-in-Chief. As such, *GIE* has developed a system to identify high-quality reviews and also programs to teach all reviewers on how to improve further.¹¹ After every assignment is completed, a score for *quality* is assigned by the Associate Editor (Table 1) and, along with *timeliness* and *diligence* (how often you accept or reject an invitation), you will be ranked among your peers. Take note that these 3 metrics are not mutually exclusive in our ranking system. For example, if you agree to review a manuscript but for a variety of reasons you were only able to give a one-liner critique, you may get a lower score. However, if you frequently reject invitations, this will also count against you. If you know in advance that you will not be able to review, it is best to block off these dates in “Update My Information” in our online editorial system. Remember that the more invitations you accept, assuming your quality scores are high, the higher you move up our ranking system.

We monitor the performance of each reviewer to provide regular feedback and recognize the best reviewers during Digestive Disease Week. And it certainly does not end there; if you look back far enough you will notice that several members of our Editorial Team have received the “Top Reviewers” award for several years.

CONCLUSION

Peer review is critical to research endeavors, but it is also among the least understood of scientific undertakings and is not immune to bias. However, we believe its inherent faults can be reduced to some degree by showing what we expect from our reviewers—our recommended systematic approach on how to review a manuscript, how to give meaningful recommendations to an Editor, and

how we objectively measure reviewers’ performance. Acknowledging that peer review calls for both art and skill, we are embarking on a mentoring program geared for the accelerated learning of young reviewers who are interested in contributing to the continued success of our journal. Another mechanism for training is our updated online Reviewers’ Course, which establishes the protocols, processes, and norms of our peer-review system.¹² We believe this framework for peer review provides a critical basis for engagement and discussion that will lead to more high-value activities for our journal.

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