

Education

An Introduction to Reviewing Research Articles for Academic Journals

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Abstract

Description

Among the pillars of science is the galvanizing process of peer review. Editors of medical and scientific publications recruit specialty leaders to evaluate the quality of manuscripts. These peer reviewers help to ensure that data are collected, analyzed, and interpreted as accurately as possible, thereby moving the field forward and ultimately improving patient care. As physician-scientists, we are given the opportunity and responsibility to participate in the peer review process. There are many benefits to engaging in the peer review process including exposure to cutting-edge research, growing your connection with the academic community, and fulfilling the scholarly activity requirements of your accrediting organization. In the present manuscript, we discuss the key components of the peer review process and hope that it will serve as a primer for the novice reviewer and as a useful guide for the experienced reviewer.

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Introduction

One of the principal characteristics of science is that sound data can withstand sound criticism. The critique is one way science differs from anecdotal evidence, pseudo-science, or reliance on authority. Data obtained using the scientific method should not only be subject to scrutiny, but our trust in scientific progress requires a close examination.¹ Internal and external scrutiny creates a natural selection-like development² of theory and practice in which “good” data are collected, scrutinized, used to support or discredit current theory, or used to support a new theory. Data interpretations that do not instill confidence are rejected. Yes, all data are flawed; however, sound data are central to this evolutionary process.

Who decides which data and their interpretation are “sound” or worthy of wide dissemination and influence? Fundamental to this system

of scrutiny is the peer review process. When researchers share data and their theoretical and/or conceptual models to explain the logic and interconnectedness of the key components and outcomes of their research, they must engage their peers. A peer is a physician/scientist with expertise in the subject area who is willing to invest the time required to provide an honest, unbiased decision on the suitability of the manuscript for publication and invest the further effort required to improve the manuscript before it is published.³ Specifically, these peers volunteer their time to make certain that data were collected, analyzed, and interpreted as objectively as possible.

As physicians/scientists, we have the opportunity and privilege of participating in the peer review process and also benefiting from our participation. These benefits include 1) exposure to novel, cutting-edge research that

can inform and improve our practice and our scholarly activity, 2) participation in Accreditation Council for Graduate Medical Education (ACGME)-approved scholarly activity, and 3) make meaningful contributions to science and medicine, furthering science, and ultimately improving patient care.

The expectations for reviews can differ by journal; however, we present general peer review guidelines for both the novice and experienced reviewer. While we did not attempt to provide an exhaustive list of every element of a peer review, we have provided sufficient detail and structure to guide you, the reviewer, toward creating a constructive review. In our estimation, a constructive review provides actionable feedback in a professional and respectful manner, which can be used to improve the overall quality of the manuscript.

The Structure of a Review

Peer reviews of scholarly submissions usually consist of 3 primary components. The first is a summary paragraph that includes an overview of the manuscript, including principal findings and the contribution of the findings to the field. This summary paragraph may also highlight some of the key concerns identified by the reviewer. To some, a summary paragraph may seem redundant, but it is helpful for both the authors and the editor because it illustrates the reviewer's understanding of what was done and provides an appropriate context for the review.

In the second component, the reviewer details the major concerns (general comments) they have with the manuscript. These concerns might include neglected content areas in the introduction/literature review, flaws in methodology (eg, sampling, data collection), concerns with data analyses, potential misinterpretations of the research findings, inadequate presentation of the results, omission of key limitations, or an inability of the authors to capture the relevance of pertinent literature.

The final component of the review provides a space for the reviewer to identify minor issues (specific comments) in the manuscript, such as contradictions or factual errors, mismatches between the narrative and data, or writing clarity. Copy editing — correcting grammar or

spelling — can be helpful, but it need not be the focus of the review. When identifying both major and minor issues, it is very helpful for the reviewer to provide the specific page and line numbers so that the authors can easily locate and address the reviewer's concerns.

Tips for Review Section-by-Section

For each section of the manuscript, there are specific elements that reviewers are encouraged to evaluate. We have provided recommendations to help identify the specific elements to be assessed in a review. We also provided a checklist (**Table 1**) to help guide reviewers.

Introduction

The purpose of the introduction section of a data-driven manuscript is to provide an empirical justification for the study. The review of the literature should be presented with narrative transitions and information fusion from representative works, not a laundry list of studies. A funnel approach (**Figure 1**) is often used by the authors, starting with an introduction to the topic (eg, impact on society, health, etc) followed by a description of current research and potential missing elements, finishing with a research question and/or hypothesis. Some research may not be hypothesis-driven (eg, descriptive studies), making a hypothesis statement unnecessary.

As a reviewer, your task is to ensure that the major content areas in the introduction have been addressed and that the research question/hypothesis is justified by the literature presented. This assessment includes evaluating whether the references are current and if key areas have been addressed. While foundational or classic articles are often referenced out of tradition, other cited studies should be current and reflect the current state of the work in the specialty area.

Methods

The methods section is worthy of your most intense focus, as what was done and how it was accomplished are the backbone of every research study.⁴ As you review the methods section you may use the questions provided in **Table 1**, but we provide some additional descriptions and insights below.

Table 1. Questions to Ask During a Review

Section	Question
Introduction	Is the literature review thorough and recent? Does the introduction flow as a narrative? Does the literature review justify further study? Is the research question clearly stated?
Methods	Was a validated survey instrument used? Could you replicate the study from the description of the methods? Are inclusion and exclusion criteria described? Are compliance issues addressed? Is there IRB approval or exempt determination, if appropriate? Are the analyses justified? Was a power analysis conducted?
Results	Are the complete statistical results (eg, degrees of freedom, test value, <i>P</i> value) reported? Are effect sizes reported? Is there an interpretation of the results given beyond simply reporting the numbers? Could the inclusion of a table improve interpretation? Are figures ethically presented and are they informative and aesthetically pleasing?
Discussion/Conclusion	Are conclusions within the scope of the data? Are the results placed within the context of the larger theory/understanding? Are sufficient, relevant works cited, including contrasting findings? Are limitations acknowledged? Are future directions identified?
Overall	Was the manuscript proofread and free of errors? Do the results contribute new knowledge to the field? Was the writing style appropriate for the intended audience? Did the authors acknowledge the strengths and weaknesses of their manuscript?

The authors need to provide reasons for including and excluding patients in their study and the number of patients excluded. Patient inclusion/exclusion can be shown in a Consolidated Standards of Reporting Trials (CONSORT)-type diagram if the process is complicated. Also, look for a statement about the study design, which might include study type (open, randomized, blinded, or controlled) and whether the study was retrospective or pro-

spective.³ If this design statement is absent or lacking, it's appropriate for you, the reviewer, to request a revision as the authors should be able to frame and focus their work.

The methods should also provide sufficient methodological detail so that the study could be replicated. It's not typical that a study will be replicated precisely, but when future authors seek to explain differences between

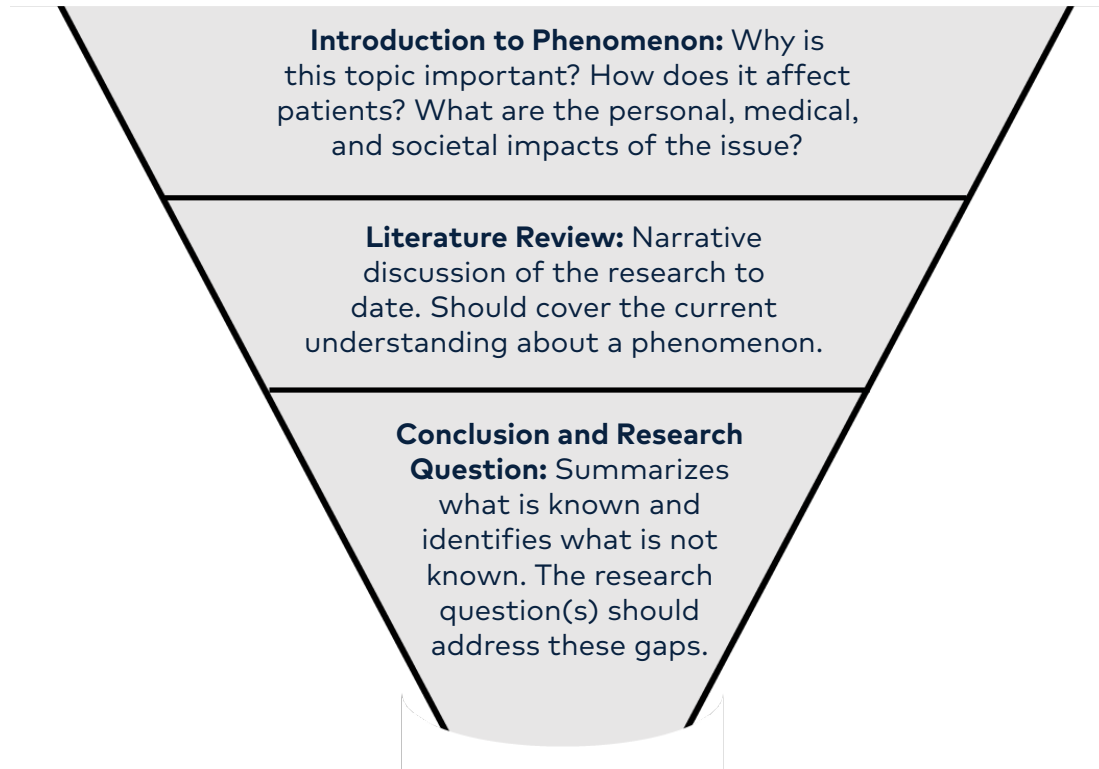


Figure 1. The funnel approach focuses on the key elements for reviewing the introduction of a research manuscript.

study outcomes, these methodological details are crucial.

There are times when the authors must create and deploy a novel survey, but whenever possible, a validated survey instrument should be used. If a novel instrument is developed, evidence of reliability and validity is necessary. Internal validity is typically assessed post hoc, using Cronbach's alpha.

Finally, assess whether statistical analyses were adequate and whether the subject number was suitable for the study conducted (determined via power analysis). It's possible that you may not have the statistical aptitude to make this assessment. If something doesn't look right, it is appropriate to ask the authors to justify their choices or to ask the editor to request a review by a statistician.

Results

In the results section, the authors report statistical findings for key outcome variables. While each test produces a unique output, key information should be reported for each test. This key information includes the test statistic, de-

grees of freedom, P value (exact or threshold), and effect size.

We would like to take a moment to explain the importance of including a measure of effect size in a data-driven manuscript, by illustrating how statistical significance is determined. Effect size helps the authors and the reader assess the importance of the magnitude of a difference. For example, a P value is determined for most foundational inferential tests by dividing the mean difference (or regression estimate) by the standard error and comparing the quotient to a critical value table. However, as the patient sample size increases, the standard error decreases, making it easier to achieve a statistically significant test value without a change in the magnitude of the differences. In studies with large sample sizes, common in medical records research, a statistically significant effect might not be clinically significant, meaning that the finding might not have any real-world value. By including a measure of effect size, the research team is providing evidence about the clinical relevance of their findings.

The reporting of results should not be limited to the output of the statistical tests. High-quality submissions also have an interpretation of the statistical values. For example, a statistically significant difference in body mass index (BMI) between men (mean BMI = 32) and women (mean BMI = 25) could yield a *t* test value of 2.21 and a *P* value less than .05. However, to make the report complete, the authors should explicitly state that this test value indicated that men reported higher BMI scores than women.

Tables and Figures

Authors are encouraged to employ tables and figures to summarize their results and improve the interpretability of their data. Tables can be used to effectively report demographic and statistical modeling results. One benefit of tables is that they allow the authors to discuss only key findings in the narrative section of the results and include the full results in their tables. This practice can help alleviate congestion and improve readability. Doing so will also allow the author to focus more on the interpretation of the statistical analyses, not the numeric test results.

Figures are used to summarize and illustrate complex relationships. Figures should be simple, easily interpreted (ie, not requiring a lot of text to be understood), aesthetically pleasing, and should aid in the interpretation of the statistical findings. Figures should also be ethically presented. For example, the scale of a figure's y-axis should be reasonable so as to not minimize (axis limits are too large) or maximize (axis limits are too small) a visual difference. The reviewer's clinical expertise is essential in evaluating the ethical presentation of the data.

Discussion/Conclusion

The discussion section of the manuscript is where the previous elements are tied together. In the discussion section, the authors should summarize their findings, and contextualize and interpret their findings within the framework of the existing literature (including references to research presented in the introduction). The authors should also use the discussion to acknowledge the limitations of their study, how those limitations influenced the strength of their conclusions, and also

provide directions for future research.⁴ Logical inferences from the results should be within the scope of their findings, and while some speculation is appropriate, conjectures not supported by the data should be made with caution or left out entirely.⁴ Look for obvious omissions of seminal works in the subject area or a reluctance of the authors to include references to works with results in opposition to their findings.³

Overall Manuscript Quality

An important part of your review is your overall assessment of the manuscript's quality, scientific value, and clinical impact. As a reviewer, you expect the submission was thoroughly proofread and edited. Minor grammatical corrections can be included in a constructive review without impacting your overall decision. However, multiple errors or blatant disregard for writing quality could negatively influence your decision. Ultimately, your role as a reviewer does not include the role of copy editor.

As a reviewer, you are asked to assess the scientific and clinical relevance of the findings. Does the manuscript meaningfully contribute to our understanding of a medical phenomenon and does it provide useful information for medical practitioners?

There is a delicate balance between the need for replication in science and pushing science forward. As a reviewer, you determine whether the scientific contributions of the manuscript warrant publication. Nevertheless, your critiques should be reasonable with the understanding that all data are flawed to some degree due to practicalities of time or budgetary constraints. Reviewers need to have realistic expectations but should also be able to discriminate between fixable problems with data interpretation and data that cannot be meaningfully interpreted because of fatal flaws.

Clinical Relevance

The clinical relevance of the manuscript's findings takes center stage, particularly for journals whose target audience is predominantly practicing physicians. As you evaluate the clinical relevance of an article, ask yourself the following questions:

1. Does the research question and goal of the study provide a clear and direct link to medical practice? This question is less relevant for basic science-focused publications.
2. Are the methods and results presented in a way that community physicians, who may not have extensive research training, can understand and interpret?
3. Did the researcher present a clear path for how these findings could be applied to everyday medical practice?

Explanation of Decisions

The decision categories can differ by journal. We highlight three common outcomes, which are also used by the *HCA Healthcare Journal of Medicine*.

1. **Reject** – reject the article without an invitation to resubmit. This option should be reserved for manuscripts with methodological flaws that cannot be fixed and call into doubt the validity of the findings. Articles without appropriate clinical relevance may also fall into the reject category. Finally, this option can also be reserved for manuscripts that are so poorly written and edited that it reflects a blatant disregard for the journal editor’s and reviewers’ time or makes the reviewer question the validity of the findings. A constructive critique should accompany a reject decision so that the authors may improve their work for subsequent submission to another journal.
2. **Major Revisions** – essentially reject the article in its current form and provide suggestions for major revisions, with the author permitted to resubmit after completing the revisions. This decision is for manuscripts with promising/valuable findings but significant flaws in presentation, such as issues with the background literature review, statistical analyses, data interpretation, or conclusions. However, if you select this option, you should have confidence that these flaws can be adequately addressed. If it is not likely that they can be addressed to your satisfaction, a reject decision is more appropriate. Thus, the major revision decision is the most common for initial submissions that will eventually be accepted and you will likely be asked to re-review the article after the authors complete their revisions. Authors often assume

a major revisions decision is an accept pending revisions decision. Your task as a reviewer is to clearly delineate the changes required to improve the manuscript, with the ultimate decision of accepting or rejecting left to the journal editor.

3. **Accept with Minor Revisions** – conditionally accept the manuscript pending minor edits. This decision is most common after major revisions have been made but may be applied to an exceptional initial submission. When this option is selected, the revisions can be easily addressed and the authors’ changes may be evaluated by the editor or editorial staff prior to rendering a final decision.

After the reviewer’s concerns have been addressed, the editor can accept the article for publication (**Figure 2**).

Tone and Thoroughness of the Review

As a reviewer, you may be asked to review a manuscript that has been poorly edited, is packed with methodological flaws, or most egregious, one in which the authors have neglected to cite your work. Reviewers are often asked to review manuscripts in their area of expertise, but with extensive options available as literature sources, you should not take it personally if your work was not cited in the manuscript. Irrespective of the type of emotional response that a manuscript engenders, reviews should be written respectfully and cordially.^{5,6} Additionally, if you cannot objectively review the manuscript, due to having either a positive or negative relationship with one of the authors, you may have a conflict of interest.⁴ Any potential conflict of interest should be disclosed to the editor, who can make the final call on assigning the review. Disclose potential conflicts promptly to not delay the review if the work needs to be sent to another reviewer.⁴

We encourage reviewers to be constructive, using language such as, “The authors should check their conclusions to make sure they reflect their findings,” instead of, “The authors’ conclusions are absurd.” In addition to being insulting, the second example does not provide actionable feedback for the authors.⁶

More nuanced is the suggestion that the reviewer engages the authors in a more con-

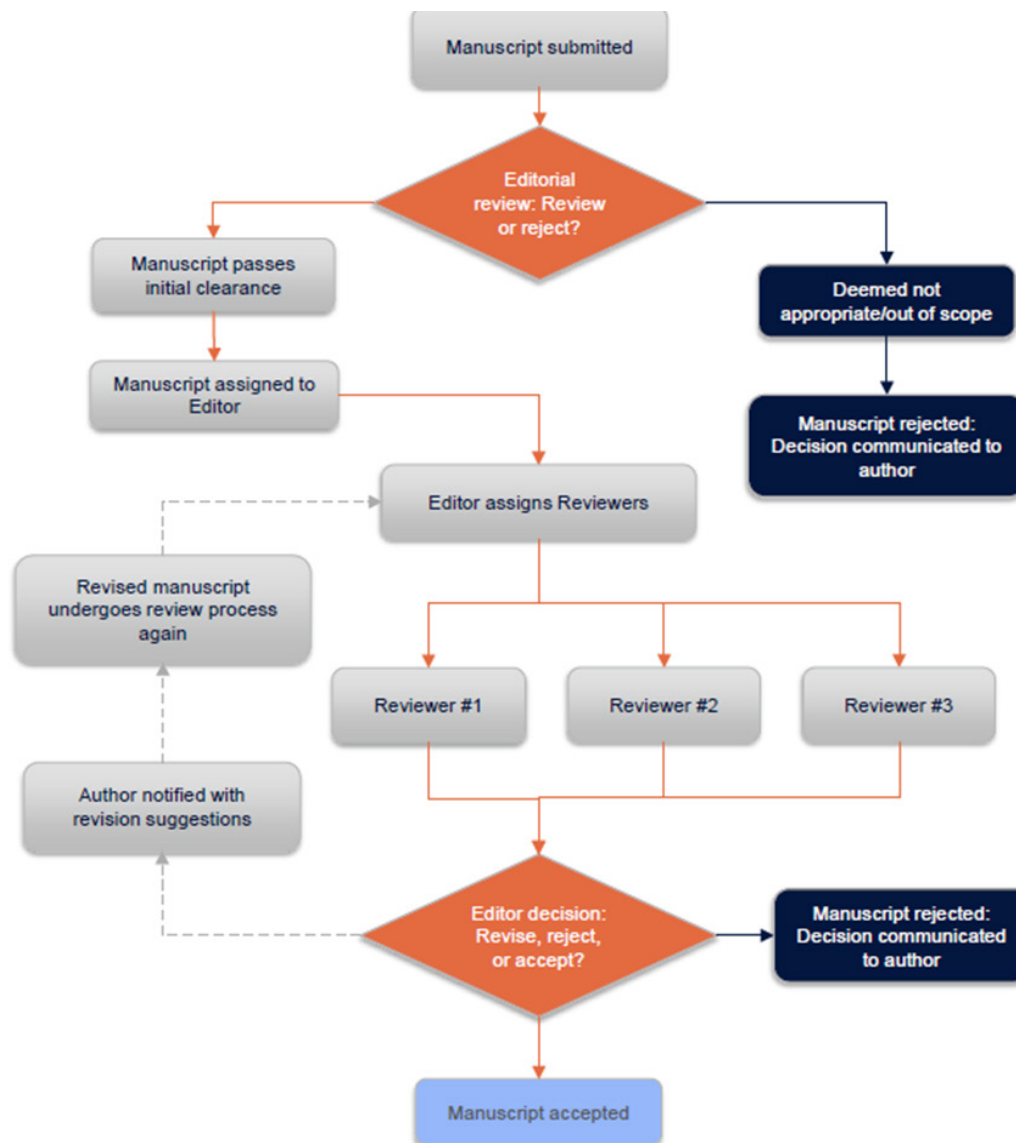


Figure 2. A flowchart shows the review process for manuscripts submitted to the *HCA Healthcare Journal of Medicine*.

versational tone. Use first and second person instead of the third person examples above. Perhaps changing that language to, “I had some difficulty matching your results with the statements in your concluding paragraphs. Perhaps you can rework it to make certain your conclusions match the key findings of the paper?”⁷ This innovative approach takes a little more time and can reduce the detachment we feel, and perhaps enjoy, when we use the third person. However, the new approach has a better chance of garnering the desired revisions and of improving the quality of the work.

It is important to remember that your contributions as a reviewer are essential to further-

ing science and improving patient care. The better the final product, the greater the article’s influence on the field. To that end, reviews should also be detailed and thorough. Off-hand remarks about the general quality of the manuscript that do not provide specific elements for improvement also do not provide a means for the authors to improve their work. As a reviewer, adhere to the “Golden Rule” for reviewers, “review unto others as you would have others review for you.”⁸

Conclusions

Reviewing is both a responsibility and a privilege, and completing a quality review is

time-consuming. The rewards for reviewing are tangible, but typically not equal to the time invested.⁴ The growth of science depends on our willingness to volunteer to provide thorough and timely reviews when given the opportunity. We hope that this article, providing the key elements of review components, will help to empower more clinicians to participate in the review process (**Table 1**).

By adhering to the Golden Rule for reviewers⁸ and willingly volunteering to review, we make lasting contributions to our programs, our field, and ultimately to the care that our patients receive. The benefits of volunteering to review are many. They can strengthen the research abilities of the reviewer and support graduate medical education as a whole. It takes effort to be a great reviewer, but great reviewers are remembered. In 2003, DeMaria⁹ wrote in the *Journal of the American College of Cardiology*, "Editors are all familiar with the names of those individuals whose critiques are consistently excellent."⁹ Strive to be a great reviewer. Enthusiasm and effort are two of the most important attributes of great reviewers and these attributes are not linked to experience.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Drs Edward Griffin, Shala Sundaram, and Brian E. Wood are employees of Lewis-Gale Medical Center, a hospital affiliated with the journal's publisher.

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