

Ethical Use of Artificial Intelligence: Guidelines for Peer Review

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Isaac Asimov's Three Laws of Robotics are a fictional ethical framework for robots, stating:

- "1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law."

Introduction

Peer review is a key component to the success of scientific articles. High-quality peer review ensures reliable information, improves the efficiency of communication, and facilitates the interpretation of findings for better applicability of the data presented in studies. Recently, with the increasing availability of artificial intelligence (AI) tools, especially large language models (LLMs), several scientific journals have published policies and guidelines regarding their use in the peer review process.¹ LLMs are generative AI tools capable of producing text, figures, and other forms of content based on the datasets on which they have been trained. Their use in scientific publications has gained prominence in improving the quality of scientific writing, translating texts, reformatting references, and supporting peer review. There are still no clear guidelines on the use of LLMs in peer review. In 2024, Li et al. reviewed the editorial practices of 100 high-impact medical journals and found that 78% had clear guidelines on the use of AI in peer review. Among these, 59% (46 journals) explicitly prohibited the use of AI in generating reports, whereas 32 journals (41%) allow its use in a limited manner, provided that confidentiality was maintained and copyright protected.² The objective of this article was to present a review on this topic and to propose a rationale for implementing AI in accordance with best practices in ethics and scientific integrity.

Keywords

Scientific Publication Ethics; Artificial Intelligence; Peer Review.

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Foundations of peer review

The history of peer review in medicine³ demonstrates the scientific community's ongoing commitment to accuracy and integrity. From its origins in the seventeenth century, driven by the need to establish and regulate scientific knowledge in emerging societies such as the Royal Society of London and Edinburgh, to its formalization and widespread adoption in the twentieth century, the peer review process has undergone continuous adaptation. Currently, according to the International Committee of Medical Journal Editors (ICMJE), peer review remains the essential "heart" of scientific journals,⁴ serving as a crucial filter and quality control mechanism.

Peer review can be conducted in several formats: open; anonymous to authors; or anonymous to authors and reviewers. Each of these formats has advantages and disadvantages, and there is an increasing trend in the number of journals with open peer review, given that it increases the transparency and integrity of the process.⁵ The preparation of a robust technical report requires a systematic approach that goes beyond a superficial reading. Even before accepting the invitation, reviewers must judiciously assess fundamental pillars,^{5,6} including their own technical expertise on the topic, the absence of potential conflicts of interest, and their time availability for in-depth analysis.

Discussions regarding the sustainability and quality of the peer review process are a constant in the scientific community. The increasing number of manuscript submissions has generated considerable pressure on reviewers and editors, raising the question of the need for standardization in order to ensure high-quality reports.

In this context, the emergence of AI tools has introduced the prospect of enhanced efficiency and productivity in the peer review process, allowing time-consuming tasks, such as report preparation and scientific language editing, to be carried out more quickly. Nonetheless, this potential gain comes with new dimensions of complexity, posing ethical issues that require clear regulation. It is important to develop proposals for more clearly defined protocols on the use of AI in peer review, regarding both the quality of critical assessment of manuscripts and the ethical implications related to the use of AI, while reinforcing the notion that final responsibility remains undeniably human.

Structural assessment of manuscripts

Before accepting an assignment, reviewers must weigh whether they have available time, whether the manuscript is within their area of expertise, and whether there are any

conflicts of interest that would prevent them from fulfilling their task impartially. Subsequently, they must prepare a structured report with the following elements:

1. Synthesis and contextualization: The report should begin with a concise summary of the objectives, methods, and main findings of the study, written by the reviewer, in order to make the content of the article clear, including the main methodological characteristics and findings for the editors.

2. General analysis: This is the most critical section of the report. The assessment should focus on the following three central axes: originality (Does the hypothesis address an existing knowledge gap?), validity (Are the methods, the sample, the statistical analysis, and the interpretation of the outcomes adequate?), and relevance (Is the contribution of the study to the field significant?). Is the article able to answer the question it proposes? Further analyses of the data may also be suggested.

3. Specific analysis: Reviewers should concisely and objectively list any formal errors, methodological inconsistencies, flaws in data presentation (figures and tables), and eventual omissions. This section should also point out any phrases that are unclear and the need for improvements in the textual format. They may also suggest references that would strengthen the manuscript.

4. Comments to the Editors: These comments should be technical, objective, and conclusive. This is the appropriate forum to express editorial recommendations (accept, reject, or request revision).

Artificial intelligence in peer review

The integration of AI tools into the peer review process has generated intense controversy,^{7,8} pitting the potential optimization of tasks against the violation of fundamental ethical principles. Some journals have policies that completely prohibit the use of LLMs in the peer review process. Others have taken a more permissive approach. It is worth weighing the arguments on both sides.

1. Absolute confidentiality: The use of generative AI tools, especially those with public access, represents a significant risk of loss of confidentiality, which is central to the peer review process. When a reviewer inserts a manuscript's text, tables, or figures into a LLM to facilitate synthesis or grammatical correction, they are, in practice, feeding a third-party database that will be used in other future situations.⁹ The confidentiality of the review process is violated when AI stores this information for future training. Reviewers have an obligation to protect the information in the manuscripts entrusted to them by not sharing it with their colleagues, collaborators, or LLM platforms.

2. Human responsibility and duty to disclose: Even if AI is used for restricted purposes that do not violate confidentiality, for example, improving the clarity of the review, the responsibility for the content generated rests entirely with the reviewer. Errors, inaccuracies, or biases produced by the tool are, by extension, human responsibility. The underlying issue is that, if a reviewer lacks the expertise to judge the quality of information generated by AI, they

should not use it, given that the production of reliable reviews is fundamental to the progress of science.

3. Intrinsic limitations and associated risks: AI does not substitute a specialist's critical judgment. In addition to its significant technical limitations, generative AI introduces additional risk factors that can compromise scientific integrity.

3.1. Inaccuracies and "hallucinations": AI tools can generate unfounded or incorrect criticisms of complex methodologies. "Hallucination" represents a direct threat to patient safety and the credibility of journals. By mimicking non-existent evidence to support clinical decisions or diagnoses, AI not only "hallucinates" but also compromises the ethical-scientific framework of the editorial process.^{10,11} Incorrect information can compromise not only the accuracy of a scientific manuscript but also of all future articles that cite that incorrect information.

3.2. Algorithmic bias: Models can perpetuate biases present in their training data, resulting in unfair evaluations of certain topics, methods, or groups of authors. As noted by Checco et al. in 2021, automation in peer review can perpetuate systemic biases present in training datasets, thereby compromising equity in science.¹²

3.3. Lack of critical reasoning: Manuscript assessment requires the interpretation of nuances and an understanding of scientific contexts. These capabilities currently remain beyond the scope of AI. Although AI can assist in detecting plagiarism and verifying compliance with guidelines, it fails to replicate the intellectual synthesis required to validate medical innovation.⁹

Current policies of cardiology journals on the use of artificial intelligence

We are currently going through a transition period that is reshaping the way peer review is conducted. Seeing that some scientific journals have adopted more permissive approaches, we have conducted a review of these policies in the leading journals in the field of cardiology (Table 1).

As shown in Table 1, there are conflicting positions among cardiology journals. Although many journals are concerned about ethical issues, conducting high-quality peer reviews involves substantial challenges.²⁰ If a responsible and ethical approach to using LLMs for this purpose can be established, we will be able to improve the entire scientific communication process. As a means of addressing this issue, one proposal is to conduct scientific studies on the use of LLMs and their impact on scientific publications.

Conclusion

It is necessary to adopt a rigorous and ethical approach to the peer review process. Well-structured protocols can improve the quality and fairness of editorial decisions. Moreover, guidelines on the use of AI are clear: the confidentiality of submitted manuscripts must be maintained, and the responsibility for critical, deliberate, and accurate analysis must be exclusively human. Nevertheless, provided that confidentiality is not compromised, the use of LLMs to support the peer review process is considered a promising strategy and

Table 1 – Peer review policies of selected cardiology journals

Journal/publisher	Summary of policy	Permits LLM-assisted peer review report
<i>Nature Reviews Cardiology</i> (Springer Nature) ¹³	Reviewers are prohibited from uploading manuscripts into generative AI tools to protect confidentiality and copyright.	No
<i>Circulation</i> (American Heart Association) ¹⁴	Reviewers are strictly prohibited from using LLMs/AI to generate or edit peer review reports or from uploading manuscript content, due to confidentiality and non-disclosure policies.	No
<i>JAMA Cardiology</i> (JAMA Network) ¹	Reviewers are prohibited from uploading manuscripts or review summaries into AI tools due to confidentiality. Use of AI to support the review process is allowed provided that transparency is maintained; however, its use should be restricted to improving report drafting, and reviewers remain responsible for the result.	Yes
Elsevier Journals (general policy) ¹⁵	Reviewers are prohibited from using generative AI/AI-assisted technology to assess manuscripts or from uploading any portion of the manuscript or review report into AI tools, citing confidentiality and proprietary rights.	No
<i>Circulation Journal</i> ¹⁶	Reviewers are prohibited from uploading manuscripts into AI tools that do not guarantee confidentiality. Prior permission is required for AI use, and reviewers are warned regarding potential inaccuracies or bias of AI.	Yes
<i>Arquivos Brasileiros de Cardiologia (ABC Cardiol)</i> ¹⁷	Reviewers are prohibited from uploading manuscripts into generative AI tools. Cautious use of AI to support the review process is allowed, provided human responsibility is maintained.	Yes
<i>International Journal of Cardiovascular Sciences (IJCS)</i> ¹⁸	Reviewers are prohibited from uploading manuscripts into generative AI tools. Cautious use of AI to support the review process is allowed, provided human responsibility is maintained.	Yes
<i>Revista Interamericana de Cardiologia (RIAC)</i> ¹⁹	Reviewers are warned regarding AI use that may violate confidentiality. Reviewers are required to obtain explicit permission from the editor-in-chief before using AI tools during peer review of manuscripts.	Yes

AI: artificial intelligence; LLM: large language model.

has been increasingly adopted by journals, including those published by the Brazilian Society of Cardiology.

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