

Publications

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Preprints: Why and how to use them

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A preprint is a preliminary version of a manuscript that is posted on an open access server without peer review.^{1,2} Preprints are intended to precede, not replace, peer-reviewed publications. Example preprint servers are medRxiv (pronounced “med-archive”) for health sciences,³ bioRxiv for biology and life sciences,⁴ and PsyArXiv for psychology.⁵

Preprint posting is increasing in medicine, life sciences, and psychology.⁶⁻⁸ However, few preprints are pharmaceutical industry-authored. For example, between January 2014 and January 2018, only 1% of approximately 19,000 preprints posted on bioRxiv reported industry-authored research.⁹ This matches my personal experiences: when I worked in academia, it was common practice to post a manuscript as a preprint before submitting the manuscript to a journal. However, since working in medical writing, I have noticed that pharmaceutical industry researchers are less familiar with the practice.

Preprints are a key part of science communication and publication strategy. Medical writers should therefore help inform authors about preprint options. In this article, I present

For more information on preprints:

- Joint position statement on medical publications, preprints, and peer review from the American Medical Writers Association (AMWA), EMWA, and the International Society for Medical Publication Professionals (ISMPP).¹⁰
- International Committee of Medical Journal Editors (ICMJE) Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals (Section III.D.3).¹¹

Arguments for using preprints

	Primacy	P
	Record	R
	Engagement	E
	Promotion	P
	Reproducibility	R
	Impact	I
	No cost	N
	Transparency	T
	Speed	S

Arguments against using preprints

	Public misinterpretation
	Revisions
	Errors
	Permanent
	Rejections
	Incompatibilities with journals
	Not peer reviewed
	Trustworthiness
	Scoping

Figure 1. Common arguments for and against using preprints

the arguments for and against using preprints and provide practical considerations when posting, disclosing, updating, and citing them.

Should we use preprints?

Arguments for and against using (i.e., posting and citing) preprints are summarised in Figure 1.

Arguments for using preprints

One of the main arguments for posting preprints is its speed in making information available to authors, other researchers, and the wider public. Preprints can be available within hours or days of posting, whereas peer-reviewed publications may take months or years to be available. Therefore, although essential, peer review can slow medical and scientific communication.¹² “The sooner a piece of work can be read, evaluated, and built upon, the faster science moves.”⁷ For example, authors can self-cite a preprint before the peer-reviewed publication is available. Citing a preprint is preferable to citing a conference abstract because the full-text manuscript is available to readers. Further, while authors wait for the peer-reviewed publication to become available, preprints can be listed on grant, promotion, and job applications.^{13,14}

Preprints are also free to post and free to read, which again benefits everyone. Typically, preprints are assigned a unique digital object

identifier (DOI), making them traceable, citable, and part of the scientific record.^{10,15,16} Authors can openly share the preprint with a wider audience, which increases engagement, inclusivity, and transparency.^{12,13,17} Authors can also obtain feedback on a preprint from the scientific community and wider public and then implement that feedback before submitting the manuscript to a journal.^{4,7,18} This additional scrutiny may improve the quality of the manuscript, which in turn may help to address the reproducibility crisis.^{19,20} However, preprint comments sections and social media posts of preprints may attract “trolls”,²¹ who deliberately try to offend people or cause trouble. Authors need to consider how comments will be tracked and appropriately addressed,²² and they should be prepared to handle the (sometimes challenging!) discourse.

Preprints can increase research impact. For example, peer-reviewed publications with a preprint posted on bioRxiv had, on average, a 49% higher Altmetric Attention Score and 36% more citations than peer-reviewed publications without a preprint.²³ Preprints do not appear to impede scholarly metrics. For example, if a study has both a preprint and a peer-reviewed publication, the peer-reviewed publication is preferentially cited in subsequent publications.¹⁴

Preprints are a key part of science communication and publication strategy.

Arguments against using preprints

The main argument against citing and sharing preprints is that they are not peer reviewed and therefore they are not trustworthy.²⁴ Further, journal reputation, which helps authors and medical writers to determine what to read or cite, is missing from preprints.²⁴ Some are concerned that the press and the public may fail to differentiate preprints from peer-reviewed publications and may consider them equally credible sources.⁶ Consequently, poor quality, misleading, or biased information could be shared via the media and social media, causing harm to patients.^{10,21}

A barrier to posting preprints is a fear of being “scooped”, which is when a competitor publishes research on the same topic first or without citing the authors of the original research.⁷ However, because preprints have a public timestamp, they allow authors to claim primacy of their ideas and results.^{12,16,25} Although, this point of contention may be redundant, as some argue that claims to primacy or priority in publications are unnecessary and inappropriate.²⁶

Further, posting preprints may be incompatible with peer-reviewed journals – journal policies should always be checked. Some journals use double-blind peer review, meaning authors’ and peer reviewers’ identities are hidden from each other, but this may be undermined because, in preprints, the identities of the authors are public.²⁷

Another concern for some is that preprints are permanent. MedRxiv’s policy, for example, is that preprints cannot be removed, but authors may withdraw their preprint if they no longer stand by their findings and conclusions or discover fundamental errors in the research.¹⁵ In these cases, the original preprint will remain accessible but with a “withdrawn” watermark along with a statement explaining the reason for the withdrawal.¹⁵

Posting preprints on a preprint server

Check the journal’s policy

Before posting a preprint, check the preprint policies of the target journal and any alternatives. These can be found on the journal’s website or on



Sherpa Romeo (<https://www.sherpa.ac.uk/romeo/>), an online resource that aggregates publisher policies. Most journals and publishers consider manuscripts that have been previously posted as preprints, and many actively promote preprints. For example, Springer states, “Springer journals encourage posting of preprints of primary research manuscripts on preprint servers, authors’ or institutional websites, and open communications between researchers whether on community preprint servers or preprint commenting platforms... Posting of preprints is not considered prior publication and will not jeopardise consideration at Springer journals.”²⁸

Choose a preprint server

When choosing a preprint server, consider its scope. For example, medRxiv does not accept case reports, narrative reviews, editorials, or opinion pieces.³ According to the International Committee of Medical Journal Editors (ICMJE) recommendations:

- “[Preprint servers should] clearly identify preprints as work that is not peer reviewed; require authors to document disclosures of interest; require authors to indicate funding source(s); have a clear process for preprint archive users to notify archive administrators

about concerns related to posted preprints – a public commenting feature is desirable for this purpose; maintain metadata for preprints that are withdrawn from posting and post withdrawal notices indicating the timing and reason for withdrawal of a preprint; and have a mechanism for authors to indicate when the preprint article has been subsequently published in a peer-reviewed journal.”¹¹

Some journals invite authors to post a preprint in their publisher-owned preprint servers concurrently when submitting the manuscript to the journal.¹⁶ Other journals are integrated with external preprint servers. For example, over 100 journals are integrated with medRxiv accepting “medRxiv-to-journal” or “journal-to-medRxiv” options.¹⁵ However, a disadvantage of concurrently posting a preprint and submitting the manuscript to a journal is that feedback on the preprint cannot be incorporated in the manuscript.

Write a preprint disclosure statement

Before posting the preprint, write a preprint disclosure statement on the first page of the manuscript reminding readers that caution is required when interpreting and sharing the results.¹⁰ For example:

“This manuscript is a preprint. A preprint is a preliminary version of a manuscript that has not yet been peer reviewed. Peer review is the standard procedure used by scholarly journals to assess the quality of a manuscript and its suitability for publication. Preprints should not be relied on to guide clinical practice and should not be reported in news media as established information.”

This helps readers to not confuse preprints with peer-reviewed publications when they are downloaded or taken out of context.²⁹

Post the preprint

Post the preprint to one preprint server only and before submitting the manuscript to a journal. For medRxiv, the process is similar to journal submission and involves:

- Creating an account and signing in;
- Selecting the subject area;
- Entering the title and abstract, author approval statement, competing interests statement, declarations (author assent, ethical declarations, participant consent, trial registry, legal responsibilities, and reporting guide-

- lines), data availability statements and link, funding statement, and clinical protocol link;
- Completing the author information and distribution/reuse options (license option);
- And uploading the manuscript file. Upon approval by medRxiv, the preprint will be timestamped and assigned a DOI.

Share the preprint and incorporate feedback

Authors can share the preprint via social media, email, and other channels, and they can invite feedback. If authors receive constructive feedback, the manuscript can be updated before journal submission.

Disclosing preprints to the journal

Check the journal's policy

When submitting a manuscript, the target journal should be informed that the manuscript has been posted on a preprint server, and the DOI should be provided.¹¹ Check the target journal's instructions to authors for how and where preprints should be disclosed. Journals usually require a clear statement with the preprint DOI in the cover letter, the online submission system, or the manuscript itself. To improve transparency, the DOI should link to the full history of the preprint, even versions that were previously rejected by another journal.

Updating preprints

Add new versions

New versions of a preprint may be posted if the original manuscript was previously rejected by a journal. However, the final published version and interim versions that are produced during peer review should not be posted on a preprint server.¹¹

Link the preprint to the publication

Once a manuscript is published, the preprint should be linked to the peer-reviewed publication via a DOI.¹⁰ Directing readers to the peer-reviewed publication helps ensure that they are cited in subsequent publications instead of the preprint and increases transparency. On some preprint servers (e.g., medRxiv), the link is automatically generated.¹⁰ On others (e.g., PsyArXiv), the publication DOI needs to be manually added to the preprint. Some journals also expect the peer-reviewed publication to be linked to the preprint via a statement in the manuscript. For example, "A preprint of this article before peer review by *Addiction* can be found at [URL and DOI]."²⁹



Citing preprints in a manuscript

Identify preprints

Preprints are indexed in various places such as Google, Europe PubMed Central, and OSF preprints.^{15,25}

Cite preprints

Although a joint position statement by the American Medical Writers Association (AMWA), the EMWA, and the International Society for Medical Publication Professionals (ISMPP), and the ICMJE recommendations agree that the word "preprint" and the DOI should be included when citing preprints, they disagree on whether preprints should be included in the reference list. The AMWA-EMWA-ISMPP position statement states: "Preprints should not be used as references in any medical publication unless these are cited in the manner of a personal communication, that is, as an in-text reference (using the preprint link, DOI, or both) rather than as bibliographic references. It should be clearly disclosed that the source is a preprint."¹⁰

The ICMJE recommendations, in contrast, state: "When preprints are cited in submitted manuscripts or published articles, the citation should clearly indicate that the reference is a preprint...Journals should include the word "preprint" following the citation information in the reference list and consider indicating that the cited material is a preprint in the text. The citation

should include the link to the preprint and DOI if the preprint archive issues DOIs."¹¹

The AMWA-EMWA-ISMPP position statement was challenged by Richard Sever, co-founder of bioRxiv and medRxiv, who argued that preprints should be "included in the reference list as this is essential for citation indexing by services such as Google Scholar."³⁰ AMWA-EMWA-ISMPP's response can be found online.³¹

If a preprint is cited in a manuscript draft, authors and medical writers need to keep an eye on when the preprint article gets published. As recommended by the ICMJE, "When a preprint article has been subsequently published in a peer-reviewed journal, authors should cite the subsequent published article rather than the preprint article whenever

appropriate."¹¹ Usually, the last opportunity to update a citation is when the manuscript is accepted and the corresponding author receives the proofs.

Conclusions

Posting and citing preprints have pros and cons, which should be weighed up. Medical writers should make authors aware of preprints so that authors can make informed decisions. If authors choose to use preprints, medical writers can support them with the processes of posting, disclosing, updating, and citing preprints.

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