



EDITORIAL

Preprint servers and neurosurgical publications**James T. Rutka, MD, PhD, FRCS**

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SINCE its inception in 1944, the *Journal of Neurosurgery* has adhered to traditional academic publishing rules that stipulate that any manuscript under consideration for publication in the Journal has not been published elsewhere, in whole or part, and is not currently under review at another journal. Until recently, the Journal also demanded that submissions could not be previously posted to a preprint server.

What are preprint servers? They are repositories of information in the form of preliminary or fairly well-formed manuscripts that have not undergone formal peer review. In many cases, the information on preprint servers has not undergone any form of significant textual editing or type-setting. At most, editorial staff of the preprint journals will assess the content of manuscript submissions for offensive language and for overt evidence of plagiarism before the information is made available in the public domain. Typically, preprint server papers precede those submitted to peer-reviewed journals, but they can also be published simultaneously. Upon submission to a preprint server, manuscripts will receive a digital object identifier (DOI), which is a unique alphanumeric string assigned by an agency to persistently link the information to a location on the internet. Except under extreme circumstances, the DOI is fixed and cannot be removed.

Preprint servers have been embraced by numerous scientific groups and associations. For example, physicists frequently submit their works to the preprint server known as “arXiv” (<https://arxiv.org/>). As of 2019, more than 1.5 million articles have been posted on arXiv.¹ A number of other preprint servers have since been formed, all with the nomenclature of “xiv” in their titles. For researchers in the biological sciences, a popular preprint server is “bioRxiv,” whereas for those in the health sciences, “medRxiv” is the most popular. Such preprint servers now exist in psychiatry, chemistry, social sciences, and the geological sciences (Fig. 1, Table 1).

Several journals have published editorials on their policies against prior submission of works to preprint journals, including the *Journal of Orthopaedic Research* and the

Journal of Bone and Joint Surgery.² The reasons for not considering manuscripts that have resided first on preprint servers include the possibility that readers will consider the preliminary work as solid evidence for the authors’ findings; that researchers in surgery or medicine will be unlikely to benefit from the same degree of prepublication dialogue as that which takes place in the physical or chemical sciences; and that, for most information that is published in the health sciences, the difference of a few months to publication is unlikely to shape or change the field in the same way as perhaps occurs in the basic sciences or other disciplines.² To this latter point, there is concern in some journals that there could be a real risk for patient harm should results from clinical trials be taken directly to patients before thorough vetting through a well-defined peer-review process.

But there are some clear advantages to enabling preliminary data and first-draft manuscripts to be posted on preprint servers. It has been stated that science works faster if the data are made available sooner; for example, halving the delay to share research can double the speed at which research progresses.³ In addition, posting a manuscript on a preprint server enables a researcher to establish primacy on a given theory or concept.² A variety of granting agencies, such as the NIH and the European Union Research Committees, are greatly in favor of considering work posted first to preprint servers. Information on preprint servers can be “crowdsourced,” thus improving the authors’ approach to a given scientific problem. Authors frequently wish to demonstrate productivity on their grant proposals prior to grant deadlines, and this can be accomplished more rapidly on a preprint server. These days, faculty going forward for promotion at their institutions can include their papers on preprint servers as evidence of their recent productivity. Negative studies, which are often difficult to publish in peer-reviewed journals, can be posted on preprint servers. Lest there was some concern, it is interesting that the majority of works hosted on preprint servers will ultimately be published in traditional peer-reviewed journals in due course. Interestingly, there are

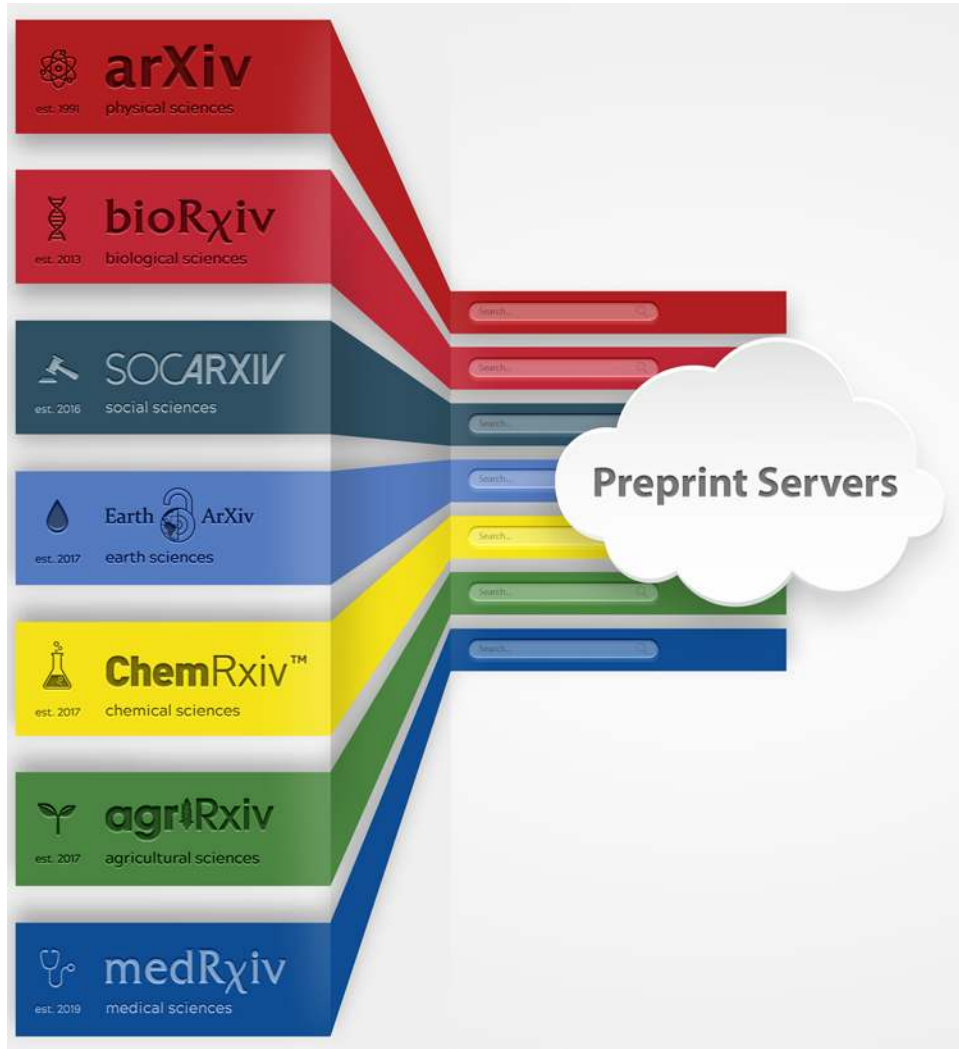


FIG. 1. Graphic depiction of a selection of preprint servers in the sciences. Most articles in the medical sciences will be submitted to medRxiv or bioRxiv. Figure is available in color online only.

software programs that will now enable direct submission of articles from preprint servers to peer-reviewed journals.

At times of major global disruption, as with the COVID-19 pandemic, there can be a rapid rise in publica-

tions in a focused area of interest. At the time of writing of this editorial, there have been 6335 preprints published on COVID-19 in medRxiv and 1304 in bioRxiv. These are published with a disclaimer that they are preliminary reports that have not been peer reviewed and should not be regarded as conclusive information on which to base clinical decision-making. This is in comparison to 30,819 primarily peer-reviewed articles that have been published on PubMed, all since January 1, 2020. Clearly, there will be interplay between these two sources of information, and each will inform the other.

When I first joined the editorial board of the Journal in 1995, the peer-review process was composed of sequential reviews that were typically handwritten on paper. We have come a long way since that time, with our fully automated, computer-based peer-review system. The speed of peer review is now determined by the reviewers' schedules and the push of the "send" button. We have had to accommodate and adjust to innovations and advances in the world around us. Accordingly, with this editorial, I am pleased to promulgate our new policy regarding the submission of

TABLE 1. Partial listing of available preprint servers

Preprint Server Name	Host of Server	Specialty Area
arXiv	Cornell University	Physical sciences
bioRxiv	Cold Spring Harbor	Biological sciences
ChemRxiv	American Chemical Society	Chemical sciences
SocArXiv	University of Maryland	Social sciences
agriRxiv	Open Access India	Agricultural sciences
medRxiv	Cold Spring Harbor	Medicine and health sciences
EarthArXiv	Center for Open Science	Geosciences/earth sciences

TABLE 2. JNSPG preprint server policy

The JNSPG will consider for publication manuscripts that previously were posted on preprint servers; however, certain conditions must be met, specifically:

- 1) On submission, the authors must state that their work has been deposited on a preprint server. They should provide the name of the preprint server, as well as accession numbers and DOIs for all versions of the manuscript. URLs should also be provided.
- 2) The preprint server must be clearly marked as not peer reviewed.
- 3) Authors may not update the preprint version of the manuscript to show any changes made in response to JNSPG peer review.
- 4) If the preprint version of the manuscript carries an open access license, the authors must agree to the purchase of an open access license if accepted for publication. For some JNSPG journals, the open access option incurs no cost.
- 5) If the manuscript is accepted by a JNSPG journal, the corresponding author is responsible for ensuring the creation of a link from the preprint to the published article.

manuscripts from preprint servers to the Journal (Table 2). In the end, we strive to balance our wish to avoid undue delays in publishing research work for our patients with our wish to avoid the harm of posting preliminary results that have not been vetted through peer review. With our new policy, I believe we have been able to accomplish that and, at the same time, be responsible to our authors, reviewers, and patients.

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Disclosures

The author reports no conflict of interest.

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