

Tips for Writing and Publishing an Article

Milap C Nahata

Peer reviewed publications are necessary for dissemination of research and scholarship. No discipline can thrive without creating new knowledge to solve existing or emerging challenges. All healthcare professions must strive to improve the health and wellness of our society, and pharmacists play a crucial role in enhancing the quality of pharmacotherapy. We improve outcomes through research, education, and patient care, and our experiences are shared with the global community primarily through peer reviewed research papers, review articles, and case reports.

I wrote my first research article for publication during the completion of a clinical pharmacy residency in 1977. Having written a thesis for my undergraduate pharmacy degree and then for MS and PharmD degrees under the guidance of academic advisors gave me some confidence in writing, and the critical comments of my residency director on the drafts of the article were important in having it accepted for publication. I have also had opportunities to serve as a referee for articles submitted to various journals and as an editor for making decisions about acceptance or rejection of articles for publication. Through this editorial, I hope to share some of my experiences and provide some tips about writing articles for publication in peer reviewed journals, especially *The Annals*. Although the content may appear self-evident to experienced authors, it should be useful for newer writers.

Why Bother to Publish an Article?

My motivation to write articles for publication has always been the belief that they will contribute to existing

Peer reviewed publications are the primary source of important new information. This editorial provides tips for writing various sections of research papers, review articles, and case reports. Additional topics discussed include making decisions about authorship, selecting a journal for submission of an article, understanding the peer review process and expectations of editors and reviewers, and revising the article. Successful authors combine appropriate knowledge and experience, personal attributes, and effective collaborations to produce insightful and important contributions to the literature.

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knowledge and thus improve patient care. The principal reason for many is the desire to share information about which they are passionate. Sustained contributions to the literature also bring recognition to an individual and thus help advance one's career. A publication record is a key in receiving competitive grant funding and promotions and establishing one's reputation in the field. Published experts may also be more likely to be appointed to prestigious national committees and elected to national offices than are those who have not published. These experiences enrich professional development and can further strengthen the standing of the individuals within the discipline. One reason for this recognition is that published authors have defended their arguments through peer reviews and have received the endorsement of other authors and experts in the field.

What is the Key to Successful Writing?

Knowledge of the subject is essential, but the critical requirements to become a published author are strong interest or passion; drive and commitment; the ability to work effectively with, and learn from, experienced authors; and

Author information provided at the end of the text.

persistence. One must also write frequently and regularly (eg, every few weeks) rather than making one concentrated effort during each year.

What do Editors and Reviewers Expect?

Regardless of the type of article, authors must clearly justify the need for its publication. *The Annals'* submissions are reviewed for clinical significance, originality or uniqueness, accuracy, reproducibility, timeliness, quality, clarity, and conciseness. The most important questions to ask before you begin writing are, "What would this article add to existing knowledge in the literature?"; "How significant is the message being conveyed by the article to improve the understanding of pharmacotherapy?"; and "How would this information change patient care?"

Deciding on Authorship

The article's list of authors and the order in which they appear should be decided based on relative contributions to the work, not politics. Most peer reviewed journals, including *The Annals*, follow the *Uniform Requirements for Manuscripts Submitted to Biomedical Journals* (www.icmje.org) for authorship. As described in our Author Guidelines, authorship is based on the contributions made by authors to project conception/design; collection, analysis, and/or interpretation of data; drafting or revision of the article; and approval of the final version. The person listed first is considered the primary or lead author and has generally done more work than the other authors. The corresponding author is often the senior author (eg, preceptor or program director), who usually submits the article to the journal, receives correspondence from the editor, and is responsible for revision of the article and correction of galley proofs. The corresponding author is often listed either last or second among all authors.

It is critical to decide authorships and specific contributions that each author will make to the project or article before initiating the work. This does not seem to happen in many cases because it may be uncomfortable to discuss this issue, but it will be just as uncomfortable at the end of the writing process as it is at the beginning. An initial discussion about authorship should also clarify responsibilities so that the lead and senior authors can hold colleagues accountable. Failure to address this issue when the team starts work can result in unjustifiably listing some collaborators as authors, while others may not be listed when they should have been. Although most collaborations are positive experiences, I have heard a few arguments such as, "You list me in your paper, and I will list you in mine," "Let's have a rotating authorship order," "I need it more than you until I am tenured or promoted," "I deserve it because these were my patients," "I am the director," or "I am the principal investigator on the

project," even though the individual did not meet the requirements for authorship of the specific article. Support of certain individuals who have assisted, but do not meet authorship requirements, can be acknowledged in the report without them being listed as authors.

Preparing an Outline

Once a topic has been selected, the first step should be to prepare an outline of sections and subsections of the article. This should be done in consultation with an experienced author and is extremely helpful in defining the article's scope and focus and organizing the content. Experienced authors can envision the finished article before they begin writing it, and this serves as a guide to new writers.

Writing an Introduction

In this section, *The Annals* expects you to clearly present the rationale and justification for the study to improve patient care. In 1–2 pages, you must answer questions such as why the subject is important, what has been done in key published studies or articles, what the gaps are in current knowledge, what your rationale was for undertaking this project, and what your specific objectives were for the study or article. A hypothesis should be presented for a research study. Similarly, the need for a review article or a case report, given what has already been published in the area, should be articulated in this section. Failure to do so leads one to assume that this is just a "me, too" article, and this dampens the enthusiasm of a reviewer and editor.

Writing Methods, Results, and Discussion Sections of a Research Article

A basic principle of science is that findings must not be due to chance and should be reproducible. This requires a complete description of the methodology, types of patients enrolled, tests, procedures, interventions, analyses, and outcomes used in the study. Common major problems of a research paper's Methods section are: it is incomplete, sample size (number of patients or observations) is too small, accuracy and precision (reproducibility) of measurements are not documented, methods or tests used for data collection or analyses are unclear or inappropriate, and definitions of outcomes (eg, cure, improvement, failure) are vague. Special mention is needed regarding the sample size. Reviewers expect that the researcher has included a power estimate to increase the likelihood that statistically significant findings will result from the study. Also, observational studies that use existing databases should adjust for treatment selection. Of course, institutional review board (IRB) approval of the project should be documented.

The Results section may suffer from incomplete or inappropriate presentation of all relevant data and incorrect attributions or correlations of data. If the lead or senior authors do not have a statistical background, a statistician must have been consulted for both design and analysis of data. Tables and figures are often more effective than a long text narrative to present certain data, and duplication between data presented in text and tables/figures should be minimized. Statistical testing of significance such as p values, confidence intervals, odds or hazard ratios, or relative risks should be included as appropriate.

In the Discussion section, one should not present results again, but rather interpret the results, compare the data with those in previous studies, highlight the clinical significance of the results, and reach defensible conclusion(s). However, reviewers will not be impressed if the authors over-interpret the data and fail to consider the study limitations. Finally, the authors should briefly indicate what future studies may be undertaken to advance the knowledge in the area.

Writing a Review Article

One must decide the scope of a review article, such as “treatment of hypertension” versus “treatment of hypertension with angiotensin-converting enzyme inhibitors in patients with type 2 diabetes.” The authors must also ask questions including, “Why is a review article needed?”; “How will this review article be unique in comparison with other published articles?”; and “Would you, along with coauthors, be able to critically review and interpret the literature and apply current knowledge to patient care?” Criteria in selecting articles for review, such as research studies alone or research studies plus meta-analyses, should be clearly explained; the inclusion of case series or case reports should be justified. After collection of the literature, I suggest thoroughly reviewing each article, highlighting the key findings with a yellow marker or underlining, interpreting the results, and then writing a brief paragraph about its impact on practice.

The next important step before writing the text should be to prepare table(s) of existing studies. Preparing tables before writing the text allows for an overview of the existing literature. Tables should include demographic data on patients, sample size, study design, drug regimens, concurrent drugs and diseases, and efficacy and safety outcomes data along with p values or confidence intervals. The text should complement tables by interpreting the data and highlighting the main findings; trends observed; strengths, weaknesses, and differences among studies; and their impact on patient care. The text should be divided into sections to improve readability and comprehension. For example, an article on a new drug may have sections on introduction, data sources, pharmacology, pharmacokinetics,

clinical trials, adverse effects, drug interactions, precautions and contraindications, dosage and administration, cost, and summary. Limitations of the literature should be discussed.

Writing a Case Report

A case report should present a new, unique, or unusual observation in one or a few patients. The term “case series” is used when a group or series of patients who had received similar treatment are being reported in an article with detailed information on each patient. It should present both subjective and objective data about the patients and events of the clinical courses. The Naranjo scale for assessing an adverse event or the Drug Interaction Probability Scale (DIPS) for assessing a drug–drug interaction should be applied as appropriate to ascertain the causality between the drug and clinical outcome. Approval from the IRB should be sought if required by the institution (our medical center requires an approval for a case report because of the obvious Health Insurance Portability and Accountability Act concerns).

The Methods and Results sections that appear in a research article are combined and presented under the heading Case Report for this type of article. This section provides a chronologic account of relevant details of events and outcomes that occurred in a patient. A table or a figure may be used to effectively present the course of events. The Discussion section of a case report is similar to that of a research article.

Listing of References

The *Uniform Requirements for Manuscripts Submitted to Biomedical Journals* is a set of style and referencing standards used by most healthcare-related journals, including *The Annals*, as a basis for formatting reference lists. Common problems encountered with references include the following: important studies may have been excluded or unnecessary studies may have been included, recent references are not incorporated, references are incorrectly cited within the text or in the reference list itself, the Discussion section is unclear about which results are attributed to each reference, and primary references are not cited for factual statements or specific data. As an example, a review article may be cited for general background about a disease; however, primary references should be cited for statements comparing efficacy rates of 2 drugs to treat a disease. References cited in tables and figures should also be cited in the text. “Citing Medicine” is a free online guide published by the National Library of Medicine for citing published print documents (eg, journals, books, conference publications, scientific and technical reports, dissertations and theses, patents, newspaper articles), unpublished material (eg, “in press”

publications, papers and posters presented at meetings, personal communications), audio and visual media, and material on CD-ROM, DVD or disk and the Internet (www.ncbi.nlm.nih.gov/citingmedicine). The search of references should be repeated prior to submission of an article and throughout the manuscript review and revision period to ensure inclusion of all relevant literature. Authors have the responsibility to ensure the accuracy of content of all cited references.

Writing an Abstract

The 2 most common problems I have encountered with abstracts are: they can be too brief and not present a complete, balanced picture of the article; and the data or claims can be inconsistent with those presented in the text of the article. Those first encountering the article usually read the abstract and then decide whether to read the full article and/or use it in their own work or manuscript. In a research article, the Methods and Results sections of an abstract should comprise the majority of the material. In a review article, the Data Synthesis portion of the abstract requires more space than other sections to highlight the critical analysis and interpretation of the literature. I am often surprised to see that the Conclusions section of an abstract is larger than its Results or Data Synthesis sections. Finally, one must always confirm the consistency of data presented in the abstract, text, tables, and figures. I prefer to write an abstract after the article itself has been written.

Writing a Letter

If one can briefly describe an observation in a patient, the results of a pilot study, or comment on an important professional, scientific, or regulatory issue related to pharmacotherapy in up to about 2 pages, an author's findings may be published as a letter. A letter may also be written in response to a recently published article in *The Annals* if doing so would add a substantive comment. If the subject is extensive, it may be considered for publication as a longer commentary or a special article. The Naranjo and DIPS probability scales should be used to describe an adverse event and drug interaction, respectively.

Critically Reviewing, Revising, and Reflecting

The quality of all articles can be improved after critical internal review by coauthors and others. Being "critical" is the key; you need individuals who can set aside their study involvement and ask tough questions to improve the paper. Some authors have a tendency to submit an article prematurely, which generally leads to rejection by a journal. In instances where a revision is required, the authors should address all questions from internal reviews and highlight changes in the revised manuscript. After being completely

satisfied with the article, authors should reflect on it for 7–10 days, revise the article again, and address responses to reviewers as needed. They are likely to find additional ways to enhance the quality and clarity of the article before journal submission.

Choosing a Journal

There are many choices when deciding where to submit an article for publication. Important questions to consider are: Is the journal peer reviewed? Is it indexed in MEDLINE? Who needs to read the article to change practice (eg, if pharmacists need to read the article, select a pharmacy journal; if the article would benefit cardiologists, choose a cardiology journal)? Is the journal a good match for your article? Has the journal published related articles? How long does it take to get an article published by the journal? Is the journal well respected in its field? Unless the journal is readily accessible via common search tools such as MEDLINE or Google, the article will not be as accessible to others for use and future citations. Consulting senior colleagues and coauthors can be helpful, and personnel at *The Annals* can also address certain questions. Publication in a peer reviewed journal is critical, as you will receive comments from expert reviewers or referees and have an opportunity to improve the quality of the article. Peer reviewed articles are given more credence after publication. My articles have always benefited from the peer review process.

One objective criterion used to assess the quality of a journal is its impact factor. The most recent impact factors available for journals are for 2006. These were calculated by dividing the total number of citations to articles published in the journal during 2004 and 2005 by the total number of articles published by the journal during the same 2 year period. The higher the number, the better it is (the impact factor for *The Annals* was 1.87 in 2005 compared with 2.27 in 2006). Impact factors have important limitations, including the fact that a journal's impact factor alone does not directly indicate the value of a specific published article. However, since promotion and tenure process and grant application reviews may consider impact factors in their evaluations, authors should consider such factors when selecting a journal for publication. Choosing a specific journal early in the preparation of an article is helpful in adapting it to that journal's format.

Preparing a Title Page

Most journals require that the Title Page include a title, authors, affiliations, sources of support, conflicts of interest, running head (shorter version of a title), key words, word counts, and contact information about the corresponding author. The title and key words must be chosen

carefully so that the article can be identified by searches through PubMed, MEDLINE, or Google. If an article is not identified in a literature search, it will not be read, used, or cited by others.

Submitting to the Journal

A common problem we have encountered at *The Annals* is that authors do not always follow the Author Guidelines. Authors should make certain that the article has been prepared in conformance with the journal's requirements and ethical standards. A brief cover letter should be included with the submission highlighting the importance of the work, ensuring that the article has not been submitted elsewhere, and stating that all authors have approved the article. A copyright transfer form signed by all authors must also be submitted. *The Annals* prefers to receive all submissions electronically via its Web site except for the copyright transfer form.

The Review Process for Articles

Each article is first reviewed internally by *The Annals'* editors; those of sufficient quality are subsequently sent to 3–4 external referees. This process usually takes about a month and is the basis for making a decision to either accept the article pending revision or to reject it. In either situation, after external review, the corresponding author receives the comments from referees and the editor. When a revision is required, we request a revised manuscript within a few weeks so that the article can be published in a timely manner.

Revising the Article

Some comments from referees can be difficult to address, but all issues should be taken constructively by the authors. Here, the advice and support of more experienced authors or colleagues can be invaluable to put the reviews in context. The manuscript should be revised to address referee comments, and authors should provide an explanation of how these issues were incorporated, including any disagreement with reviewers. It is important to be respect-

ful of reviewers, as they invest their time voluntarily, and generally with significant commitment. They share our goal to publish the highest quality manuscripts to influence pharmacotherapy and to reflect favorably on both the authors and the journal.

Proofreading and Updating the Galley

After the revised article has been accepted and edited, the galley proof (edited document) is sent electronically to the corresponding author; however, all authors should review the galley and provide comments or corrections to the corresponding author. The galley text is exactly what the article will say when published, so all corrections need to be made by the authors at this stage. It is important to carefully review these documents, including the text, tables, figures, and reference citations, and answer all questions raised by the editor. Changes made by the manuscript editor to correct errors or enhance clarity should be acceptable to authors as long as the meaning of original wording is unchanged. Extensive changes to the article should not be made by the authors at this stage; however, any important new data published since acceptance of the article should be added to ensure publication of the most up-to-date article possible. These final changes should be made by the authors in a timely manner so that the article can be finalized and published expeditiously.

In summary, peer reviewed publications are essential for dissemination of important information through research papers, review articles, and case reports to improve patient care. Motivated clinicians have been successful authors through their personal commitment, effective collaboration, and attention to various steps involved in the publication process. Each subsequent publication will provide confidence and professional rewards. We invite you to consider *The Annals* for submission of your manuscripts.

Milap C Nahata MS PharmD, Editor-in-Chief, *The Annals*; Professor and Division Chair, Pharmacy Practice and Administration, College of Pharmacy, and Professor of Internal Medicine and Pediatrics, College of Medicine, The Ohio State University, 500 W. 12th Ave., Columbus, OH 43210, fax 614/292-1335.

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