HOW TO WRITE A RESEARCH PAPER

"HOW TO WRITE AND PUBLISH MANUSCRIPTS"

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Disclosure: No Conflicts. Currently Editor-in-Chief Emeritus, *SHOCK*

What are the reasons to write and publish – Publishing allows us to:

- Share knowledge with other investigators.
- Add to the emerging body of knowledge.
- Contribute to the growth of the profession.
- Advance career goals.
- Helps with promotion and tenure.
- Increase respect for the institution.
- Helps with the recruitment/retention efforts.
- Promote friendship/collaboration with members of the same discipline and stimulate further research.

Why Conduct Experimental or Clinical Studies?

Experimental and clinical studies are usually conducted in order to fill the missing gap in current knowledge or obtain new information of significance.

A thorough review of literature should be carried out prior to designing any clinical or experimental study so that one does not reinvent the wheel.

Thoughtful planning is the first and foremost step in scientific writing.

Iverson C *et al. Am Med Assoc Manual of Style*, 8th edition, Chicago, Am Med Assoc, 1989.

Bad research cannot be disguised by sophisticated writing because it does not support an important message.

"*Before beginning to write a piece for publication, be sure that you have something important to say*."

Zellmer WA, *Am J Hosp Pharm* 48:687, 1991.

What is a scientific paper?

It is a published report describing the results of original research.

Scientific papers include:

Original research,
Review articles, and
Descriptions of innovative approaches to routine/standard procedures.

Original Research Articles

Original research articles are usually divided into:

Full length manuscripts, and
Brief communications.

The shortest format that provides sufficient details to convey the main message is always greatly appreciated.

Sources for ideas for Publication

- New procedures, treatment, intervention techniques or diseases;
- Data on current topics in the area of clinical practice;
- Comprehensive review or update of a topic;
- Unusual or challenging patients;
- Creative and innovative ideas in clinical practice;
- Any topic that is minimally covered in the literature, but is of interest;
- New research findings.

It is important to propose a clear objective/hypothesis and plan appropriate experiments to test the hypothesis.

It is essential to obtain Animal or Human Use Committee’s approval prior to initiating any experimental or clinical study.

It is extremely important that all Animal Care and Use, as well as studies involving humans, be carried out with the highest standards, ethics and compassion, in accordance with the local, national, or international standards and guidelines.

Regarding a manuscript, getting started is half the battle. The first step is usually to identify the general idea that will become the focus of the manuscript.

Scientific papers

A good scientific paper is a finely tuned instrument of persuasion, but all too often, the result is merely a collection of disconnected facts, like a telephone directory. A paper should capture the reader's interest with the title and with each new section, encourage continued reading.

Papers must be persuasive

According to Bazeman, “With a journal service as a forum, contention *(disagreement)* grows. This contention pushes the individual author into recognizing that he/she is not simply reporting the self-evident truth of events but rather is telling a story that can be questioned and that has a meaning which itself can be mooted *(open to discussion/debatable)*. The most significant task becomes to present the meaning and persuade others of it.”

Bazerman C. “Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Experimental Science”, Madison, WI, University of Wisconsin Press, 1980.

Papers must be Persuasive

Papers in medical and scientific journals must be persuasive *(convincing)* for two practical reasons. First, competition within the profession dictates that in order to secure a publication source for their findings, authors must convince an Editorial Board that their work is credible and that they, themselves are reliable reporters of their work.

Papers must be Persuasive

Secondly, once a paper is published the reputation of the authors depends on its recognition within the professional community. When authors fail to convince a substantial readership of the worth of their research, their work is not cited in the publications of their peers and dissolves into obscurity *(being unknown or unimportant).*

Title of Manuscript

The title of a manuscript is an extremely compressed version of the abstract, which in turn is a “little” paper. It is important that the title reflects the main message of the paper.

Authorship

"The International Committee of Medical Journal Editors (ICMJE) recommends that authorship be based on the following four criteria:

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work;
- Drafting the work or revising it critically for important intellectual content;
- Final approval of the version to be published;
- Agreement to be accountable for all aspects of the work. Ensure that questions related to the integrity or accuracy of any part of the work are appropriately investigated and resolved."

INTERNATIONAL COMMITTEE OF MEDICAL JOURNAL EDITORS

- "Author Responsibilities – Conflicts of Interest
- A conflict of interest exists when professional judgment concerning a primary interest (such as patients' welfare or the validity of research) may be influenced by a secondary interest, such as financial gain.
- Perceptions of conflict of interest (COI) are also important as actual COI.
- Financial relationships, such as employment, consultancies, stock ownership, honoraria, patents, and paid expert testimony) are the most easily identifiable conflicts of interest and the most likely to undermine the credibility of the journal, authors and science itself.
- Personal relationships or rivalries, academic competition, and intellectual beliefs can also occur.
- Authors should avoid entering into agreements with study sponsors, both for profit and non-profit, which interferes with authors' access to all the study's data, or it may interfere with their ability to analyze and interpret the data and to prepare and publish manuscripts independently when and where they choose."

Abstract/Synopsis

It is extremely important to give significant attention to writing the Abstract/Synopsis - some readers decide from reading the abstract whether it is worth their time to read the subsequent article.

In addition, many readers browse through the Abstract, the Introduction and the Conclusion, to obtain an overview of research in a field.

Summary/Abstract

Should contain:

- A short introduction and the aim of the study.
- How the study was conducted.
- What are the main Results.
- Brief summation and Significance of the study.
- Conclusion.

Structured abstracts often consist of a sentence or two for each of the main sections of the paper.

Introduction

The quality of the Introduction often commands whether the paper will be published/read. For instance, if the Introduction is too short, people may not read the paper because of perceived shallowness. On the other hand, if the Introduction is too long, readers may view the paper as dull and annoying.

Introduction

- Should not be too long.
- Should clearly state the problem and the reason for the investigators' approach to the problem.
- Should provide background or justification for the study, i.e., why the research was conducted and what hypothesis is being tested.
- Should refer to earlier work that is relevant to the study.
- May end with a description of the study design.

Materials and Methods

- Describe study setting, equipment, subjects, experimental groups (age and gender), materials and methods.
- Provide information about reagents used including the vendor/vendor location.
- Describe the assay procedure in detail if it is new or modified.
- Briefly explain and cite references if the assay procedure is already established.
- Provide sufficient details to enable reader to reproduce methods/experiments and validate the results.
- Include interventions, outcome measures and methods of data analysis.
- List the statistical analysis used in the study.

Materials and Methods (cont.)

- In a clinical study, it is important to state whether written consent was obtained from the patients or volunteers.
- Include the inclusion and exclusion criteria, the planned sample size and the handling of dropouts should also be specified.
- Information on interventions should include randomization procedures used and drug(s) administered.

It is important to explain the approaches taken so that you convey readers of the validity of the main message.

Statistics

Most biomedical journals have adopted strict policies to ensure that the statistical tests used by the authors are appropriate for the study and correctly carried out.

Results

- Please organize the data is logical sequence.
- Please be brief in describing the results.
- Please limit the presentation to the results obtained – not interpretation.
- It is usually better to include Tables and/or Figures showing the means ± SE or SD.
- Please explain the data presented in Tables or Figures.
- Please do not amplify, overstress or simplify the data.

The TOP (Transparency and Openness Promotion) Approaches/Challenges

	Level 0	Level 1	Level 2	Level 3
Citation Standards	Journal encourages citation of data, code, and materials, or says nothing	Journal described citation of data in guidelines to authors with clear rules and examples.	Article provides appropriate citation for data and materials used consistent with journal's author guidelines.	Article is not published until providing appropriate citation for data and materials following journal's author guidelines.
Data Transparency	Journal encourages data sharing, or says nothing	Article states whether data are available, and, if so, where to access them.	Data must be posted to a trusted repository. Exceptions must be identified at article submission.	Data must be posted to a trusted repository, and reported analyses will be reproduced independently prior to publication.
Analytic Methods (Code) Transparency	Journal encourages code sharing, or says nothing	Article states whether code is available, and, if so, where to access them.	Code must be posted to a trusted repository. Exceptions must be identified at article submission.	Code must be posted to a trusted repository, and reported analyses will be reproduced independently prior to publication.
Research Materials Transparency	Journal encourages materials sharing or says nothing	Article states whether materials are available, and, if so, where to access them.	Materials must be posted to a trusted repository. Exceptions must be identified at article submission.	Materials must be posted to a trusted repository, and reported analyses will be reproduced independently prior to publication.
Design and Analysis Transparency	Journal encourages design and analysis transparency, or says nothing	Journal articulates design transparency standards	Journal requires adherence to design transparency standards for review and publication	Journal requires and enforces adherence to design transparency standards for review and publication.
Preregistration of studies	Journal says nothing	Journal encourages preregistration of studies and provides link in article to preregistration if it exists	Journal encourages preregistration of studies and provides link in article and certification of meeting preregistration badge requirements	Journal requires preregistration of studies and provides link and badge in article to meeting requirements.
Preregistration of analysis plans	Journal says nothing	Journal encourages preanalysis plans and provides link in article to registered analysis plan if it exists	Journal encourages preanalysis plans and provides link in article and certification of meeting registered analysis plan badge requirements	Journal requires preregistration of studies with analysis plans and provides link and badge in article to meeting requirements.
Replication	Journal discourages submission of replication studies, or says nothing	Journal encourages submission of replication studies	Journal encourages submission of replication studies and conducts results blind review	Journal uses Registered Reports as a submission option for replication studies with peer review prior to observing the study outcomes.

Discussion

- It may be better to begin by answering research question(s) that are posed/asked in the Introduction.
- Discuss the results in reference to studies reported in the literature – if previously published data contradicts your conclusion, thoroughly review your findings.
- Stress the important finding(s) of the study.
- Avoid overstating and oversimplifying the findings.
- Emphasize the significance of the study.
- Discuss potential limitations of the study and what remains to be determined.
- One may recommend future investigation.
- Please end with a concluding statement regarding the potential implications of the study.

Acknowledgments

Please acknowledge:

- Technical help.
- Colleagues and peers who offered suggestions and criticisms of the manuscript if they are not included as authors.
- Granting agency and/or other financial support.

Tables/Graphs/Illustrations

- Should contain enough information to be easily understood without going back to the text.
- The data should be presented clearly.
- Tables should show statistical variations and the significance of analysis.
- Must provide an abbreviated legend of methods and analysis used.
- Graphs/Illustrations should be easy understood.
- Legends for illustrations should include a summary of the experiment and the statistical significance.

References

- Cite references accurately and only those that are included in the text.
- Cite a review article if there are many references for an observation.
- Limit the number of references according to the journal instructions.
- Please follow the journal format.

Submission of manuscripts

- It is important that the same manuscript is not simultaneously submitted to different journals.
- Some authors have submitted the same manuscript to two different journals at the same time by modifying the title a little, changing the sequence of author names, switching the x- and y-axes in graphs, and use of different language. This is not ethical.

Factors involved in the selection of a journal

Although many factors are involved in selection of a journal for potential publication, frequently the factor that affects journal selection is the desired level of prestige.

An official society journal is usually more prestigious and widely read.

Journal Selection

* Subject area and readership.
* Impact Factor – reflects the number of times a journal's papers are cited by other authors.
* Suitability of the study for the journal.
* Page limitation.
* Time between submission and printing/PubMed.
* Submission charges.
* Page charges.
* Reprint costs.
* Open Access vs. Pseudo or traditional publication.

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Suggestions

Since manuscripts are peer-reviewed by 2-3 referees who are experts in the field, the following important items/issues should be considered.

1. Write in simple sentences that are easily understood.
2. Check spelling and grammar carefully.
3. A thorough literature survey is very helpful.
4. Please do not make wrong assumptions/false claims.
5. Since the purpose of research is contribution towards advancement of knowledge, please re-examine your study's contribution before submission.
6. The main thing is that it should be a clear and well-structured presentation that is well written.

Scientific Writing

The directives to the scientific writer have not substantially changed in the last 300 years. According to the *Journal of the American Medical Association*, "The primary purpose of medical and scientific writing is communication of scientific knowledge to other scientists and physicians" and therefore, "Information must be presented with accuracy and clarity in a manner that can be read easily and rapidly."

Barclay WR, et al. "Manual for Authors and Editors." Am Med Assoc, p. 9, Lange Med. Pubs., Los Altos, CA, 1981.

Style

According to Aristotle, "*It is not enough to know what to say - one must also know how to say it.*"

For the scientific writer, style is especially important, not only author familiarity with conventional scientific style, but also, according to John Ziman, "Appropriate use of such a style has the effect of identifying a piece of writing with knowledge already accepted in the field - effectively begging the question of significance by creating the impression that what is argued is already known."

Ziman J, *Public Knowledge: An Essay Concerning the Social Dimension of Science,* p. 97, Cambridge University Press, Cambridge, MA, 1968.

Prior to Submission

- Ask a colleague who is knowledgeable about science and the official language of the chosen journal to review the manuscript.
- All authors listed in the manuscript must be sure that the results provided are accurate and that all authors have contributed significantly to the design, execution, and/or writing/revision of the manuscript.
- If all these factors are considered and addressed thoroughly, the chances of acceptance of a manuscript are significantly enhanced.

Material presented was taken from The International Committee of Medical Journal Editors (ICMJE) recommendations and also from the following publications:

- P.K. Rangachari. The word is the deed: The ideology of the research paper in experimental science. *Adv Physiol Educ* 12:S120, 1994.
- J.Z. Segal. Strategies of influence in medical authorship. *Soc Sci Med.* 37:521, 1993.
- A.G. Apley. So you want to get it published. *J Royal Soc Med.* 86:6, 1993.
- M.R. Ventura. Guidelines for writing for publication. *J NY State Nurses Assoc.* 23:16, 1992.
- A.W. Hamilton How to write and publish scientific papers. *Am J Hosp Pharm* 49:2477, 1992.

Statements from Referees

"Thank you for asking me to see this manuscript…
I do not think that the senior author read it through."

"Unfortunately, I cannot make any suggestions
to the authors which will enhance this paper
to the point of being acceptable."

Statements from the Referees (continued)

"Is this a test to see if I really read these papers prior to providing reviews? Am I on Candid Camera?"

"Terrible paper…..unacceptable by any standard. Language, design, experiments, discussion, are all primitive."

Statements from Referees

(continued)

"There is no hypothesis here, but there is a lot of overdone pseudoscience with standard deviations (often exceeding the value of the mean) and inappropriate or meaningless comparisons."

Statements from Referees

(continued)

"Although written in King's English and fascinating in its own way, I do not believe that it should be published."

"The manuscript exhibits syntactical redundancy, misplaced and vague modifiers, and abuse of passive voice. They should consult a grammarian and submit a revised manuscript."

What Makes A Great Paper?

* Originality.
* A Great Story - Relevant to the Field.
* Generates and/or Tests Hypothesis.
* Figures and Tables Create a Story.
* Clear, Simple and Concise Writing that is Properly Formatted.
  - ♦ Everything in the right place.

CONCLUSION

"*Writing is like having a baby; the gestation period is long and the labor painful, but in the end, you have something to show for it.*"

Apley AJ, *J Royal Soc Assoc Med* 86:6, 1993.

THANKS

- “Those who stand on the shoulders of giants see farther than mere mortals.”
- Mentors: Michael Gould, Arthur Baue, Mohammad Sayeed.
- Past Editors: Alan Lefer, William Schumer, James Filkins (*Circ Shock*).
- Colleagues and Students: A large number from whom I have learned most; including the journal’s publisher, Wolters Kluwer/LWW.
- Family: For Unconditional Support.
- You: For your kind Attention.

Thank you for your attention.

I will be happy to answer any questions you may have.