Basics of writing a scientific manuscript for publication in a peer-reviewed journal

Ekanayake L*

Preamble

Drafting a good research paper is a difficult and demanding exercise. For a manuscript to be accepted for publication in a peer-reviewed journal, researchers need to adhere to certain basic rules when drafting a research paper. This article discusses the basics of writing a good research paper for publication, common mistakes made by authors, how to avoid them, and matters related to authorship.

Introduction

Dissemination of research findings is the last step of the research process. To have an impact on one's discovery in the wider scientific community and to contribute to the advancement of knowledge, the findings need to be disseminated. The dissemination process involves writing up the findings, submission of the written manuscript to a journal for peer review, evaluation by the experts, following which it would be recommended for publication, revision, or even rejection. Of the different steps in the research process, writing the manuscript for publication could be the most daunting task, particularly for novice researchers. The phrase "Publish or Perish", first coined by Coolidge (1) in 1932, emphasizes the importance of publishing which has now become a reality, particularly for academia. However, in today's context conducting research and publishing are also relevant and necessary for clinicians for several reasons; it is a learning process, helps in clinical decision-making, provision of better care for patients, for career advancement,(2) and in the Sri Lankan setting for financial incentives in terms of the research allowance. Therefore, knowledge of the basic steps in drafting a research manuscript and adherence to these steps, will increase the likelihood that it will be accepted for publication in a peer-reviewed journal.

When conducting and publishing research, there are two essential factors that any researcher should bear in mind. First, even a piece of innovative research, if not written scientifically, will not be accepted for publication. Second, even a scientifically written manuscript will not be accepted, if there are methodological flaws. What makes a manuscript worthy of publication? A good research paper should address a specific research question (3) and FINER criteria (Feasible, Interesting, Novel, Ethical, and Relevant) developed by Cummings et al.(4) could be considered to formulate a good research question. If the research is based on a clearly defined research question and provides answers to the question, then writing will be easy.

Helpful tips to prepare for writing:

Scientific papers are read at various levels; some refer to the title only while others read the title and the abstract. If the title and the abstract are of interest to the reader, the full paper will be read for better understanding. Therefore, the ability to effectively communicate methodology, findings, and explanation for the findings according to readers' expectations is the primary skill required for scientific

*Correspondence:
Lilani Ekanayake
Professor Emeritus
Faculty of Dental Sciences
University of Peradeniya, Sri Lanka
E-mail: lilaniekanayake36@gmail.com

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writing which necessitates considerable thought and planning. If a manuscript is to be accepted for publication, it should be a well-designed study, free of methodological flaws that convey a useful, and exciting scientific message, clearly written with a logical flow so that the reader can follow it easily.(5)

**Structure of a research paper**

The IMRAD format is widely followed in scientific medical writing.(6) The acronym IMRAD stands for Introduction, Methods, Results, And Discussion.

**Introduction:**

The purpose of the introduction is to inform about the background, basis, and relevance of the topic/problem. In other words, it should provide answers to the question “Why was the study done, why is it important?” Writing a good introduction is important because it sets the stage for the manuscript. It should convince the reader about the importance of the work and be strong to hold the attention of the reader. The introduction should include the following:

i) Importance of the research

ii) What is already known about the topic; (original and important work should be cited, including recent systematic reviews. Consideration should only be given to previous research that directly relates to the researcher's work)

iii) What is not known or gaps in the current knowledge related to the topic

iv) How is the new information useful?

The introduction should not be too long, limited to about 3-4 paragraphs and should conclude with a statement of the aim/hypothesis of the study. The aim/hypothesis should be related to the information gap associated with the topic mentioned in the introduction.

**Method:**

Of all parts of a research manuscript, the methods section is the easiest to write as this would involve merely stating what was done to answer the research question. In other words, “How was it done- when, where, and what was done?” It should give a clear, detailed description of the methods followed so that the reader could use it in future studies if needed, judge the scientific merits of the research, understand and interpret the results. This section should include the following: study design, study setting, study period, description of the study population, the formula used to calculate the sample size and the size of the sample calculated based on that formula, description of the sampling technique, inclusion/exclusion criteria, data collection instruments and procedures followed in data collection, description of an intervention where applicable, pilot test, investigator training, outcome measures, outline of the methods of data analysis including statistical tests and software used. It is also mandatory to mention ethical issues, for instance, whether informed consent was obtained from participants and other administrative requirements such as obtaining permission from relevant authorities. The research proposal should have been approved by an ethics review body and a statement to that effect should be made in the methods section.

**Results:**

The purpose of this section is to present the answers to the research questions. Tables and figures are used for this purpose. Data presented in a table should not be visualized again in a figure and vice versa. The findings should be reported in this section but do not try to interpret the results here. Tables and figures should be self-explanatory and have clear titles. They should indicate all salient details necessary for a reader to understand the findings without referring to the text.

The results section should begin by giving the number of participants in the sample based on the calculated sample size, the number participated (response rate) followed by the participant characteristics. Then a logical sequence should be followed based on the tables/figures to answer the research question. Even nonsignificant associations should be presented. Only the salient findings from a table/figure should be mentioned in the text.

**Discussion:**

The discussion is the heart of the manuscript and the most difficult section to write. Its purpose is to interpret and explain the significance of the results. All relevant results should be discussed, not only the significant findings. Restating the results in detail in the discussion is a common mistake made by authors. The discussion should begin with a brief overview of the main findings. Explanations for the findings should be provided next, followed by whether the findings of the study are consistent with published research on the subject. If different, the possible reasons should be given. It is important to indicate the strengths/limitations of the study in the discussion. The discussion should end with conclusions based on the major findings. Do not extend the conclusions beyond what is supported by the results which is a common error found in many papers submitted for peer review. Also, indicate policy/practice implications of the results and
recommendations for future work.

Writing the main body of the manuscript based on IMRAD has been discussed so far. However, a manuscript should also include the list of references cited, title, abstract, and acknowledgments where necessary. The two commonly used referencing styles in medical journals are the Harvard and Vancouver systems. Yet the style of referencing depends on the journal to which the paper is submitted and therefore, it is necessary to refer to author guidelines when preparing the reference list and citing references within the text.

The title is an advertisement for the article, and as it is read first, it should attract the attention of the reader. It should be specific, informative, concise, and accurately reflect the research. The study population and study setting should be included in the title. Avoid using terms such as ‘a study of’, ‘investigations into’, ‘observations on’ in titles and also abbreviations and jargon. In my view, an author should have an idea of the title at the commencement of writing the manuscript, but it could be modified and revised later.

After the title, the abstract is the most often read part of a research paper. It should give a summary of the paper and be clear, concise, and stand on its own. Many journals now request a structured abstract with a specific word count and distinctly labeled sections; aims, methods, results, and conclusions. The abstract should be written last, after drafting the full paper, and always written in the past tense.

The first step in drafting a paper is to prepare the tables and figures that are relevant to answer the research question. Many recommend writing the results followed by methods, introduction, discussion, and finally the abstract.(7)

Plagiarism

An author should be mindful of plagiarism when drafting a manuscript. According to the Oxford English Dictionary, plagiarism is the “action or practice of taking someone else’s work, ideas, writings, thoughts, and passing it off as one’s own”. It is intellectual theft and a serious crime. The following are the most common types of plagiarism seen in medical and dental literature: use of ideas/ thoughts of others in their entirety and presenting as one's own without giving credit to the original authors, copying a portion of text from another source, failing to put quotation marks around that direct quote and not giving credit to its author, changing a few words here and there but copying the sentence structure of a source without giving credit, and self-plagiarism which involves submission of the same paper to more than one journal or reusing parts of a previously written text while authoring a new paper. (8) There are several ways to avoid plagiarism; always cite the source, have quotation marks around direct quotes, paraphrase - rewrite the idea in the researcher's own words, without changing its meaning, and cite the original source and plagiarism software could be used to check one's work prior to submission.

Publishing research is not easy even for experienced researchers and manuscript rejection by editors and peer reviewers is common in academic writing. Rejection could be due to editorial and technical flaws in the manuscript. According to the editors of the Australian and New Zealand Journal of Public Health, around 600 manuscripts are submitted to their journal annually, and nearly 50% are not sent for peer review by the editors and of the reviewed manuscripts 80% are rejected. In an editorial titled “The seven deadly sins of rejected papers” they have described the seven reasons. They include i) a topic not relevant to the scope of the journal ii) overall lack of focus iii) methodological flaws iv) poorly structured results v) inappropriate or insufficient interpretation of results in the discussion vi) inadequate attention to study implications vii) weak scientific writing or presentation style.(9) If due attention is paid to the above factors when drafting a manuscript, it will increase the chance of being sent for peer-review by the editors and even accepted for publication.

Authorship

A researcher should also be concerned about authorship as it is a contentious issue in research ethics. Authorship is important because it gives credit and carries responsibility and accountability to the published work.(10) According to the International Committee of Medical Journal Editors (ICMJE) authorship should be based on four criteria (10):

1. Made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
2. Drafting the work or revising it critically for important intellectual content; AND
3. Final approval of the version to be published; AND
4. Agree to be accountable for all aspects of the work so that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
Further, ICMJE has stated that all designated authors should meet all four criteria for authorship, and those who do not meet all these criteria should only be acknowledged. It is noteworthy that many journals now have an authorship policy.(11)

In conclusion, drafting a good research paper is a tedious and demanding exercise. A good manuscript cannot be produced at the first attempt. It is necessary to edit and revise the draft several times before the final product. Remember editors and reviewers are human. The presence of spelling, language, referencing, and formatting errors could put them off. Therefore, check and recheck for such errors prior to submission. Refer to “Author Guidelines” to confirm that all requirements of the journal are addressed. It is important to decide on one journal and do not submit the same manuscript to multiple journals concurrently as it is an unethical practice.

References


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