

Tips for Writing a Scientific Article.

Part 2: The Sections of the Article

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ABSTRACT

The skill of writing academic articles is necessary for disseminating scientific knowledge and for the professional development of those working in various disciplines. However, despite its importance, this complex skill is not usually taught systematically, which can act as a barrier for researchers to communicate the results of their work.

In the first part, the authors synthesized the main advice provided by experts in the field, adding some of their personal experiences that they consider valuable to facilitate the academic writing process and the acquisition of this skill in a collaborative context. In this second installment, they delve into the challenges of writing different sections of a scientific article and will provide advice to optimize and make it as effective as possible.

Key words: writing, medical writing, research report, scholarly communication.

Consejo para escribir un artículo científico. Parte 2: Las secciones del artículo

RESUMEN

La escritura de artículos académicos es una competencia necesaria para la difusión del conocimiento científico y para el desarrollo profesional de quienes trabajan en diversas disciplinas. Sin embargo, a pesar de su importancia, esta habilidad compleja no suele ser enseñada en forma sistemática, lo que puede operar como una barrera para que los investigadores comuniquen los resultados de sus trabajos. En la primera entrega, los autores sintetizaron los principales consejos que han brindado expertos en la temática, añadiendo algunos de su experiencia personal que consideran útiles para facilitar el proceso de la escritura académica y el desarrollo de esta competencia en un contexto colaborativo. En esta segunda entrega profundizan respecto de la problemática de la escritura de las diferentes secciones de un artículo científico y ofrecerán consejos para optimizarla y volverla lo más eficaz posible.

Palabras clave: escritura, escritura médica, informe de investigación, comunicación académica.

THE TITLE

The title is one of the most crucial sections of a scientific article¹⁻⁴. It is often the only part available online for free, along with the abstract. It plays a significant role

in capturing the readers' interest and influencing their decision to continue reading the rest of the article².

Additionally, it determines whether the article is retrievable by search engines such as PubMed or

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Google. However, despite its relevance, it is often not given enough time to optimize it to the maximum. The paper's title should be clear, concise, and use keywords that represent the content of the research. In this regard, it is advisable to avoid the use of abbreviations, empty words that do not provide information (e.g., "Study on"), and pompous adjectives (such as "new," "improved," or "validated"). The order of words also matters as it helps to emphasize which part of the text we want to highlight (Table 1)^{2,3}. Finally, although we know that it may end up getting modified later as the research team gains a deeper understanding of the topic and interprets the research results, it is advisable to define the title early on, so as not to lose focus on the work and the writing¹.

THE ABSTRACT

It is the second most read section of the article and, like the title, plays a significant role in capturing the interest of potential readers and in enabling the article to be retrievable by search engines.

According to the journal's policy, the abstract can be descriptive or informative. Descriptive abstracts are usually brief and summarize the content in general terms without providing details about the methods used or the results obtained; in contrast, informative abstracts are more extensive and detailed and often used in health science journals^{3,5}.

In general, abstracts, specifically informative ones, should be self-contained and capable of conveying the study's contributions in their own right. They represent a miniature version of the article. In this sense, they should follow the structure "Background, content, and conclusion" that we apply to the rest of the paper^{1,5-6}. We recommend writing it after completing the main text. Additionally, it is important to update the abstract and check that there are no differences or contradictions with the main text after each revision made to the latter^{1,2}. Crafting a good abstract takes time and effort as it involves condensing volumes of concepts and information into a concise space. On the other hand, it represents an opportunity and a challenge for authors to demonstrate their ability to communicate the core message of their research clearly and precisely⁵.

THE INTRODUCTION

The main objective of the introduction is to arouse the readers' interest by presenting the reasons why the work is important or relevant. In this sense, it is necessary to highlight the knowledge gap or crack, that is, what we do not know and what the work intends to answer^{1,3,4,7}.

It is advisable to start by describing the field of study and what we know about the topic, then move on to the knowledge gap and, finally, present the research question (often implicit in the previous step). This order or logical sequence sometimes appears as a cone or funnel structure, in which one moves from the most general to the most particular. In other words, there is a progression of paragraphs that increase in specificity and end up exposing the knowledge gap⁶.

A common mistake when writing the introduction is to overextend it. The introduction of an article that describes original research should not be elaborated as a monograph or pretend to have the level of depth of an exhaustive review of the available literature. Instead, it should be a brief text that briefly presents the state of the art in the area and sets the stage for the research work^{3,4,7}.

However, we recommend that any novice researcher who is planning a research project conduct a thorough review of the state of the art of the topic in question (in particular if it addresses an area of knowledge in which they have little experience) and document it in writing as a monograph or narrative review, which can then be published separately while the original research is still in progress. Finally, it is worth noting that the introduction is usually in the present tense. The introduction can end with a paragraph describing how the article will fill the knowledge gap and lead to the next section⁷.

THE METHODS

This section aims to elucidate how we conducted the study and enable its reproducibility by another research group. It should address the following questions: How, where, and when was it carried out? Who carried it out?

We should describe the procedures used without interpreting or attempting to justify them.

Unlike the Introduction, its length is a secondary concern since the Methods section should contain all the necessary information for replicating the study.

In this respect, it is helpful to think of it as an "Operations Manual" for training a new team member in research. Should the maximum length allowed by a journal be exceeded, we can use supplementary material. If we have used a method already described in detail in another publication, we can cite it; however, if we have introduced modifications, it is advisable to clarify and explain them in detail^{3,8}.

Another good tip to ensure that the methods are comprehensive is to refer to reporting standards for each design, such as the CONSORT guidelines for randomized clinical trials or STROBE for observational studies. We highlight that guidelines for optimizing the reporting of various research designs are available on the EQUATOR collaboration website (Enhancing the QUALity and Transparency Of Health Research: <https://www.equator-network.org>) to enhance communication of several research designs. The Methods section should be in the past tense and strive to maintain the chronological order of events. Depending on the journal's style for which the manuscript has to be submitted, one may choose between passive voice or active voice (usually in the first-person plural), or alternate between both to avoid monotony in writing.

THE RESULTS

The objective of this section is to convince readers that the main idea we are conveying is logical and supported by data. In this regard, it should contain a sequential description of objective facts supported, for example,

by figures and or tables. One proposal for organizing this section is to write an initial paragraph summarizing the overall approach of the research and begin each subsequent paragraph with a sentence (or subtitle) explaining the question that this paragraph will address, concluding it with its answer. Like in the Methods section, avoid any interpretation of the results. A guiding rule derived from the US judicial system is: “Tell the facts, all the facts, and nothing but the facts.” In other words, you should report all the results obtained from the research,, making an intentional effort not to omit any relevant data found and not including any content in this section that belongs to the Methods or Discussion sections. Lastly, in the Results section, it is recommended to use the past tense.

The figures and tables in this section are a fundamental element of the paper. They present the most salient and objective data supporting the assertions made in the study. In addition, these appear to be the third thing the reader looks at after the title and the abstract. Therefore, it is essential to devote time and effort to prepare them as best as possible^{3,4,11}. Graphs are uniquely useful when representing trends or patterns (the “big picture”) of what is happening or showing differences between two or more data sets. They are a fundamental support for readers to understand and remember research results. Readers are referred to two rich multimedia resources to enhance data visualization^{12,13}. The tables, on the other hand, make it possible to provide more detailed information, which in many cases would be hard to communicate in the text. Both types of support should be clear and understandable for themselves, meaning they can convey the results without resorting to text. It is necessary to avoid overlapping information between the figures or tables and the main text. In some cases, though, it is convenient to use the latter to synthesize or explain the essential data contained in the figures or tables^{3,4,11}.

THE DISCUSSION AND CONCLUSIONS

The objective of the Discussion is to present how the research findings address the knowledge gap and how they translate in the broader context of the field of study. In this sense, the section appears to have an inverted cone structure, where, unlike the Introduction, it progresses from the most specific to the most general. Ideally, the first paragraph should contain an overview of the research results and how they address the knowledge gap outlined in the Introduction (it is helpful to restate the latter in summarized form to facilitate reading).

The subsequent paragraphs of the Discussion should include an acknowledgment of the limitations of the work. That allows for presenting a balanced view of the study, and it also anticipates peer review comments. On the other hand, it is also important to integrate the results with previous works, trying to diplomatically explain discrepancies. Finally, we recommend discussing the work’s strengths, implications for practice, and potential future research.

It is essential to provide a good concluding sentence to the article. The most recommended approach is to restate in one or two sentences the central contribution of our research, that is, what we want the reader to take away, and avoid “weak” phrases like “More studies are needed” (unless this is the main conclusion of the research, as could occur in a systematic review due to the scarcity or low quality of the original studies from which it drew). Finally, the same recommendations regarding the Introduction apply to the Discussion section, concerning avoiding the temptation to develop an extensive monograph on the topic, remembering that it is a section that should focus exclusively on discussing the research results and their implications.

Table 1. Tips for optimizing the manuscript

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- Avoid using acronyms and abbreviations (except when the abbreviation is more commonly used than the full name, for example, HIV instead of human immunodeficiency virus or DNA instead of deoxyribonucleic acid).
 - Carefully choose the word order in the title. For example, a title like “Sensitivity of a fecal occult blood test for colorectal cancer screening” does not have the same effect as “Colorectal cancer screening: sensitivity of a fecal occult blood test,” even if the words used are the same.
 - Review each table and figure (caption, footnotes, and abbreviations).
 - Review the abstract after each change in the main text.
 - Ensure that the sum of absolute numbers matches the totals and that percentages add up to 100%.
 - Remove comments and “track changes” mode.
 - Check for consistency in font type.
 - Correct grammatical or typographical errors. (Do not expect or assume they the editors will correct them).
 - Check the format of each bibliographic reference.
 - Have the manuscript read by a native speaker of the language in which the paper is to be delivered
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MANUSCRIPT OPTIMIZATION AND FINAL COMMENTS

Before submitting an article to a scientific journal, it is necessary to carefully review and “polish” it, as a messy manuscript reflects poorly on the research team and raises doubts about the rigor of the research. Table 1 summarizes some tips for carrying out this manuscript optimization.

It is crucial to take the time to select the most appropriate journal to submit the work to and carefully read the publication requirements, as failure to adhere to these is a common cause of rejection. Finally, it is necessary to understand that the rejection of an article is an expected event in a researcher's life and is part of the manuscript writing and optimization process. We direct our readers to other published articles on this topic.

There are undoubtedly other resources available to improve scientific communication (including the bibliographic references cited in this article), and each author develops their style over time that deviates to some degree from conventional methods; however, we believe that the ideas presented in these pages will help guide our readers in the process of writing a scientific article and improving the effectiveness of their writing.

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