

# Tips for Writing a Scientific Paper. Part One: The Practice of Writing

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## ABSTRACT

Academic writing is essential for scientific knowledge dissemination and the professional development of those working in various disciplines.

Yet, however important this complex skill is, it is not usually taught systematically, a fact that can act as a barrier for researchers to communicate the results of their work. In this first part, we synthesize the main tips provided by experts in the field, adding some of our personal experiences that they consider relevant to facilitate the process of academic writing and develop this skill in a collaborative context. In a second article, we will go deeper into the problem of writing the different sections of a scientific article and offer advice on ways to optimize it and make it as effective as possible.

**Key words:** writing, medical writing, research report, scholarly communication, artificial intelligence.

## Tips for Writing a Scientific Paper The Practice of Writing

### 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 esta primera entrega, sintetizamos los principales consejos que han brindado expertos en la temática, añadiendo algunos de nuestra experiencia personal que consideramos útiles para facilitar el proceso de la escritura académica y el desarrollo de esta competencia en un contexto colaborativo. En una segunda entrega profundizaremos respecto de la problemática de la escritura de las diferentes secciones de un artículo científico y se ofrecerán consejos para optimizarla y volverla lo más eficaz posible.

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

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Received: 05/12/23 Accepted: 11/1/23 Online: 12/29/2023

DOI: <http://doi.org/10.51987/revhospitalbares.v4.276>

**How to cite:** Terrasa SA, Sguiglia Schütz SA. Tips for Writing a Scientific Paper. Part One: The Practice of Writing. Rev. Hosp. Ital. B.Aires. 2023;43(4):219-222.

## INTRODUCTION

The writing of academic articles is a necessary skill for scientific knowledge dissemination and professional growth of researchers<sup>1,2</sup>. However, despite its importance, this complex skill is not usually taught systematically in universities, with the result that many researchers encounter difficulties in writing and getting their work published<sup>3</sup>.

The writing and publishing process involves different actors with different interests. For authors, it is important to reach the maximum number of readers possible and, additionally, to convince experts that their findings are credible. Readers want to understand quickly the article's contribution to decide if it is worth delving into a more detailed reading. For journal editors, the article must represent a significant contribution within their field to optimize the positioning of the publication they represent, while for peer reviewers, the conclusions should justify the results derived from an appropriate methodology. Effective communication helps meet the interests of all parties involved in this process<sup>1</sup>.

## GENERAL TIPS

### Write with the reader's experience in mind

Our main objectives are to engage potential readers in the topic and to make the article's content easily understandable. In this regard, it is important to reflect on who the potential readers of the article are, what they know and do not know about the topic, what they want or need to know, how they will interpret and use the research results, etc.<sup>1,4</sup>. In particular, it's worth noting that we write for readers unfamiliar with our work and may not have specialized knowledge on the subject. This fact may also vary depending on the journal in which the article is finally published (different journals have different audiences). Additionally, we emphasize that our first author of the manuscript is likely one of the individuals most familiar with the thematic focus communicated, making them less suitable to accurately judge the comprehensibility of their writing from the reader's perspective<sup>1</sup>.

Good communication should captivate readers about the topic, enable them to understand and verify the research contributions and integrate them contextually. Additionally, it should be understandable, credible, and easy to remember<sup>1</sup>.

For easier comprehension by the readers, it is necessary to describe the problem addressed in our article and its significance. Define the technical terms you will use and avoid acronyms or abbreviations (except when the acronym is more frequent than the whole word, such as DNA instead of deoxyribonucleic acid)<sup>1,2,5,6</sup>.

### Focus on a central message

It is essential to structure the article around a central idea or message that represents the main contribution of our work to the research field. This message should be presented early (in the title or

abstract), and we recommend reminding the reader of it frequently throughout the article. Articles attempting to communicate many ideas simultaneously tend to be less clear and convincing, weakening the power of the main message and making it more difficult to remember<sup>1,2,4,5</sup>.

### Optimizing the logical flow of the narrative

It is important to develop only one theme at a time and to approach related ideas or themes consecutively. Although we recognize that the maturation of understanding a topic and the development of research by the research team tends to have zigzagging and back-and-forth paths, we recommend avoiding zigzagging or going back and forth between article contents. We should only reiterate the main idea or message of the article<sup>1</sup>.

The use of parallelism facilitates text comprehension: for example, it is advisable to use similar sentences for similar ideas and to repeat the word that best represents a concept instead of resorting to synonyms, remembering that, unlike in literature, in scientific writing, we tend to favor clarity and simplicity of writing over rich vocabulary<sup>1,2,4</sup>.

On the other hand, using connecting sentences is another strategy that increases readers' comprehension. It is important to correlate the different sections of our article; for example, the experiments or analyses described in the results section have been previously developed in the methods section and focused on meeting the stated objectives of the research, as well as not including results in the discussion that have not been previously commented on in the corresponding section<sup>2,5,6</sup>.

### Respecting the "Context-Content-Conclusion" Structure

Most easily memorable stories (e.g., a children's tale or a good song) have an introduction that establishes the context, a development, and a conclusion. In this regard, scientific research narratives are no exception. The purpose of the introduction is to provide context for our work by describing what we know and don't know about the topic and why it was necessary to conduct new research. The conclusion aims to bring closure to the article by commenting and summarizing its contribution to the research field. If well-structured, both sections prevent readers from wondering at the beginning of the article: "*Why are they telling me all this?*" or exclaiming at the end: "*They made me invest so much time as a reader to conclude this!*"

It is worth noting that, as authors, we tend to focus on the content and describe our work chronologically or autobiographically ("...first, we did this, and then we did that..."). However, adhering to the "Context → Content (objectives, methods, results) → Discussion/Conclusion" framework enhances readers' understanding<sup>1</sup>.

A potential drawback of this structure is that it requires some patience from readers to reach the

core or content of the article. However, in most scientific publications, the abstract's role is to capture the attention of more impatient readers by concisely presenting the most significant results of our research<sup>1</sup>.

### **Think of oneself as a writer and recognize that writing is a collaborative process.**

It is advisable to set aside a time and a place to write regularly, even if only in small doses (writing fifteen minutes a day is more effective in the long run than waiting for an extended block of several hours at a time)<sup>4,7,8</sup>. It is essential to plan the paper's structure and to dedicate time to sections that we often underestimate and are a vital part of the reader's experience: the title, the abstract, the tables, and the figures<sup>1,6</sup>.

Although the readability of a scientific article should be as linear as possible to optimize the reader's experience - having to go back to reread something previously explained is usually cumbersome - the process of writing a scientific article is almost always a recursive process, with many twists and turns. For example, it is all too common that during the writing of the Results section, we realize that the Methods section should explain in more depth how we arrived at the result we are reporting or that during reflection on some of our findings in the Discussion section, we realize that the Introduction had not sufficiently described the context that motivated the research<sup>1,4</sup>.

Writing can be thought of as a process of optimization. It is advisable not to hold on too tightly to the text, learn to reduce, delete (sometimes huge paragraphs or tables that we had prepared with great effort), reuse, recycle, and in some cases, even give up the work (if we realize that the results we were thinking of communicating are no longer relevant)<sup>1,4</sup>.

Some authors highlight the importance of thinking of academic writing as a collaborative process and suggest that the novice should try to develop a profile that makes other people want to write together with him or her rather than the writer's profile that tends to highlight individual values in a competitive context<sup>4,7</sup>.

As for building professional competence in academic writing, we recommend starting slowly, for example, by composing reviews and comments on original articles in a secondary publication or creating communications for conferences (posters, oral presentations, etc.) or letters to the editor. That will help gain editorial experience gradually.

We emphasize that a good writer is often a good reader. It is important to read articles by others and save those that are elegant or well-written for use as future references.

Finally, and given that we maintain that writing is a collaborative process, we recommend asking other people to review our work and also being willing to read other people's work and act as a peer reviewer of scientific

publications, not only as a way of returning the favor but also to favor our learning process<sup>4,6</sup>.

### **Use of artificial intelligence tools**

In recent years, many artificial intelligence (AI) tools have emerged and are used to facilitate the academic writing process. Their applications are diverse and range from giving writing or style suggestions to generating arguments and counterarguments on a specific topic or even the entire draft of a manuscript. In addition, they can be instrumental in translating the article into other languages, finding journals to publish it in, and for other stages in developing a research paper, such as literature search and synthesis of available published evidence. Some free tools currently available are Chat GPT, Consensus, Evidence Hunt (for literature searching), JANE (for searching academic journals), and Jenni (for article writing). However, this is a highly dynamic area, and new specialized AI tools are likely to emerge on an ongoing basis; therefore, we recommend that interested readers do a specific search on the Internet when using them<sup>9,10</sup>.

A fundamental limitation of AI tools is that, at present, they cannot distinguish between correct and incorrect information. Therefore, the content requires supervision by a human expert in the study's subject matter who can critically reflect on it. Additionally, there is emerging consensus that the use of these tools should appear in the article's Methods section, and they should not be included as co-authors since they cannot be accountable for the article's content. Finally, it is crucial to strive to cite all bibliographic sources utilized by AI tools to prevent plagiarism. As authors of this article, we currently consider it valid to use them as supplementary tools for exploring the writing process, either in the initial stages to generate a draft that we will later revise or in the final phase of manuscript review. Their usage will likely increase in the coming years, so we must learn how to use them appropriately.

### **CONCLUSION**

In this first article, we have provided some general tips for writing an original research article, highlighting the need: 1) to write with potential readers in mind;

2) to focus on the main message we want to convey; 3) to optimize the flow of the story by initially explaining the context of the research and using parallel organizational structures throughout the sections of the article.

We also commented on the importance of thinking of writing as a gradual and collaborative process and mentioned some risks and opportunities that arise from using AI tools.

In a second article, we will delve more deeply into the issues surrounding the problem of writing the different sections of a scientific article.

**Conflicts of interests:** the authors declare no conflicts of interests.

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