

ORIGINAL ARTICLE

# Guide for scientific writing: how to avoid common mistakes in a scientific article

Erika Aparecida Silveira<sup>a,b</sup>, Amanda Maria de Sousa Romeiro<sup>c</sup>, Matias Noll<sup>a,d</sup>



<sup>a</sup>Universidade Federal de Goiás, Escola de Medicina. Programa de Ciências da Saúde. Rua 235, s/n - Setor Leste Universitário, CEP: 74605-050, Goiânia, Goiás, Brazil.

<sup>b</sup>University College London, Department of Epidemiology and Public Health. Gower Street, WC1E 6BT, London, United Kingdom;

<sup>c</sup>Universidade de Estado de Goiás, Campus Itumbiara. Avenida Modesto de Carvalho, Distrito Agro Industrial, CEP: 75536-100; Itumbiara, Goiás, Brazil;

<sup>d</sup>Instituto Federal Goiano, Ceres Campus. Rodovia Go-154, Km 03, s/n, CEP: 76300-000, Brazil.

**Corresponding author**  
erikasil@terra.com.br

*Manuscript received: may 2021*  
*Manuscript accepted: december 2021*  
*Version of record online: october 2022*

## Abstract

**Background:** scientific writing is a process requiring dedication, knowledge, and skills from different scientific fields. However, the authors, especially young people starting graduate studies and scientific careers, are likely to make some mistakes when writing, which often goes unnoticed.

**Objective:** This study describes common mistakes in scientific writing and how to avoid them.

**Methods:** Mistakes can occur in the writing process before and during the act of writing, as many authors are not familiar with or skip important steps to be considered beforehand. To prepare the manuscript, it is essential that authors master the study subject matter and that research results are supported.

**Results:** During writing, the author often misuses the necessary items in each section, losing the logical sense of research data and making the article difficult to read. Before the writing process begins, it is, therefore, necessary to plan each paragraph and use textual techniques that ensure cohesion and coherence between paragraphs.

**Conclusion:** This study describes the main mistakes in the process of writing scientific articles, aiming at improving techniques, optimizing researchers' time to develop an appropriate, clear, and elegant text.

**Keywords:** publication, scientific communication, science literacy, scientific skills, scientific writing.

**Suggested citation:** Silveira EA, Romeiro AMS, Noll M. Guide for scientific writing: how to avoid common mistakes in a scientific article. *J Hum Growth Dev.* 2022; 32(3):341-352. DOI: <http://doi.org/10.36311/jhgd.v32.13791>

## Authors summary

### Why was this study done?

We carried out this study considering that researchers, especially young individuals starting graduate studies and scientific careers, are likely make some errors in writing they are not aware of.

### What did the researchers do and find?

This study describes common mistakes in scientific writing and how to avoid them. At a deeper level, it examines the writing steps and procedures that must be performed prior to writing and during planning, and considers the most common mistakes, thus bringing new and relevant contributions to researchers from all fields of knowledge. Much of what is shared here stems from years of authors' experience in improving the scientific writing process with a focus on publishing in high-impact journals, and courses held in Brazil and abroad. It also reflects methodological clarity regarding the types of clinical and epidemiological studies that the authors' field of research and solid training in epidemiology brought along their journey.

### What do these findings mean?

Researchers will improve their scientific writing skills only if they consistently strive for a better quality of the text, with scientific insights and pertinent interpretations. Practice, self-criticism, editors' and reviewers' feedback, and the desire for improvement are fundamental in this process. The topics presented in the current article may be useful for beginner undergraduate researchers, master's and doctoral researchers, and researchers who already publish and seek to improve to publish in journals that have a greater impact and international visibility.

## INTRODUCTION

Writing a scientific text is not an easy task, and it involves a series of skills. This writing style requires mastery of language and technical-scientific knowledge, in addition to knowledge of various techniques and recommendations about what can and what should be avoided. Writing well requires the analysis of appropriate techniques and skills that will be developed and improved as the researcher continues to write. In addition to knowing their scientific field, it is also necessary to be familiar with different scientific writing procedures and regulations. Therefore, researchers will improve only if they increasingly strive for the quality of the text, with scientific insights and pertinent interpretations. Practice, self-criticism, editors' and reviewers' feedback, and the desire for improvement are fundamental in this process<sup>1,2</sup>.

In several scientific areas, scientific production focuses on the dissemination of results through the publication of peer-reviewed articles<sup>3-6</sup>. There is a close relationship between scientific publications and the training of human resources at master's and doctoral levels. In Brazil, *Stricto Sensu* graduate programs have expanded with extensive training of masters and doctors, consequently quantitatively increasing the country's scientific production<sup>7,8</sup>. However, qualitatively, the production still needs to reach higher levels<sup>9,10</sup>, that is, increase the number of publications in high-impact scientific journals. Many studies produced in *Stricto Sensu* graduate courses are relevant and present good scientific contributions<sup>11</sup>. Many studies produced in those programs are relevant scientific contributions, therefore it requires to improve scientific writing in terms of establishing the state of the art of the research problem, its relevance, potential scientific impacts, and the practical field in which the research was conducted. These problems can make the article unclear, with no scientific connections and interpretations related to what exists and does not exist in the specific scientific field and how the results can be applied. Even if the research is relevant and the methodology has been well conducted with all the necessary care to avoid potential biases, if the writing does highlight the contributions with clarity and scientific legitimacy, the article may not be published or may be published only in low-impact journals.

There are several articles on the subject of scientific writing, mainly published in the last 10 years; however, they are aimed at a specific design, such as the writing process of a systematic review<sup>12</sup>, writing guidelines<sup>13-15</sup>, or general aspects of the IMRaD (*i.e.*, introduction, methods, results, and discussion)<sup>16-21</sup>. This article presents a deeper approach to the writing steps and procedures that must be performed before scientific writing begins, the planning of writing, and the most common mistakes, thus bringing new and relevant contributions to researchers from all areas of knowledge. Much of what is shared here is the result of years of experience in improving the scientific writing process with a focus on publishing in high-impact journals and courses held in Brazil and abroad. In addition, it includes methodological clarity regarding the types of clinical and epidemiological studies that the authors' field of research and solid training in epidemiology throughout their professional careers.

To disseminate and improve the writing of scientific articles, this study highlights the most common mistakes in the writing process and how to avoid them. The topics may be useful for beginner undergraduate researchers, master's and doctoral researchers, and researchers who already publish and seek to improve their writing to publish in journals with greater impact and international visibility.

### Mistakes in the scientific writing process

The mistakes that occur before beginning the writing step is not deciding beforehand which scientific journal(s) the article might be submitted to which leads to a lack of focus on several aspects regarding the intended audience, the area of interest and scope, which items and sub-items are requested, and other information that authors should be aware of before writing to avoid rework and misunderstandings.

Knowing the scope of the journal and whether the knowledge disseminated is from a specific area or if it has a more general focus is an important aspect. Thus, it is essential to read the journal of interest's instructions to authors to understand its focus and type of audience. This section of the journal's website presents several aspects that will help guide the writing process and also result in

presentation, such as word limit, required items, table and figure limit, abstract style, and whether it is necessary to include highlights.

Authors need to choose the journal carefully, considering the impact factor and assessing whether their study is within the journal's scope. In addition, it is also important to read recent articles published in the journal and analyze the organization of ideas within the text and the essential elements for writing the article. The careful reading and study of articles published in high-impact journals is the ideal starting point for good writing.

**Mistakes during writing**

Nowadays, it is very common for people to get involved in several activities simultaneously and think that they are being productive and efficient. This is a big mistake! Simultaneously engaging in multiple activities and using social media during the time dedicated to writing the article, reduces focus and leads to lower attention and concentration levels. This results in time being wasted, and one may feel exhausted and frustrated upon realizing there has been little progress in writing/textual production. Low production is directly linked to a lack of focus and a change of activity or subject during the writing process, such as the shift in mental attention to answer an e-mail or replying to a message on social networks, even if it is from the research group. Every time one's brain changes the subject, one loses concentration and reasoning, and once the writing is resumed, one's mind will take a few seconds to start focusing on the writing process again. Changing activities several times during a workday will

leave your mind exhausted, and the result does not meet one's expectations. Therefore, one should try to organize oneself to stay offline, not checking social networks and e-mail for a few hours to concentrate on the task of writing.

The lack of organization of thoughts and notes can be another compromising factor in the writing process. For better visualization of ideas and an intelligible reading of the references selected for the study, filing is the best option. This method consists of reading the selected articles and organizing the main topics or subjects of interest<sup>2</sup>. Thus, it is possible to save important data that the author wishes to highlight in their research, and it is easier to return to this file than open the manuscript again. Some reference managers also have programs that can help provide a more understandable reading of the articles, highlighting the main topics, and helping to organize the ideas.

Unhealthy habits are lack of physical activity, inadequate sleep, and unhealthy eating. For successful writing, it is also important to take care of one's physical and mental health. When dedicating time to writing, one should be rested, maintain a balanced and healthy diet, exercise, and keep an eye on the present. Having emotional control is of paramount importance to achieve one's goals and prevent mistakes. One should try to have moments of leisure and rest that do not distract them from the scientific focus or encourage procrastination. Feeling good about oneself and knowing how to deal with problems are helpful behaviors.

Next, we explain the steps of scientific writing and the step-by-step process for good writing to avoid major mistakes, oversights, and errors.

**Table 1:** Types of study and their respective guidelines for the preparation of scientific articles

Type of Study	Guidelines	Access Link
Observational studies	The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)	<a href="https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(07)61602-X/fulltext#article_upsell">https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(07)61602-X/fulltext#article_upsell</a>
Randomized clinical studies	CONSORT 2010 Statement (Consolidated Standards of Reporting Trials)	<a href="https://www.bmj.com/content/340/bmj.c332">https://www.bmj.com/content/340/bmj.c332</a>
Case reports	Case Report guidelines (CARE)	<a href="https://www.care-statement.org/">https://www.care-statement.org/</a>
Clinical studies involving animals	The ARRIVE guidelines (Animal Research: Reporting of In Vivo Experiments)	<a href="https://arriveguidelines.org/">https://arriveguidelines.org/</a>
Qualitative studies	Standards for reporting qualitative research	<a href="https://pubmed.ncbi.nlm.nih.gov/24979285/">https://pubmed.ncbi.nlm.nih.gov/24979285/</a>
Systematic review studies	Preferred reporting items for systematic reviews and meta-analyses: The PRISMA	<a href="https://doi.org/10.1371/journal.pmed.1000097">https://doi.org/10.1371/journal.pmed.1000097</a>

**Where to start**

Many people think they should start writing from the introduction; however, surprisingly, it will be the last part written.

To start writing a scientific article, one must first clearly state the objective(s)<sup>22</sup> and check whether the methodological development and statistical analysis meet the objectives proposed by the research. If this is not done, it will be necessary to modify the statistical approach, considering that methodological modifications will often

no longer be possible, except if one returns to the data collection step. Changes to the statistical approach are the most likely aspect; therefore, it is essential to have a clear objective to plan the analysis and identify which tables and figures agree with the objective(s) proposed.

A paper should start with the objective, which will be your main guide to writing the article. The objective should be written first as it provides a clear direction. Objectives are usually described in the last paragraph of the introduction. The objective always starts with an

infinitive verb (e.g., to describe, to verify, to analyze). A good dictionary could be consulted to check the meaning and appropriateness of words.

Before starting to write paragraphs, items, and sub-items according to the specifications of the selected journal, it is important to have tables and figures that correspond to the proposed objectives.

After selecting the journal, having ensured your objective(s) is clear, and tables and figures ready, a meeting should be held with all the authors to discuss, interpret, and write the results and discussion. It is important to write down the main ideas discussed at this meeting as a guideline when writing the discussion and for scientific interpretations. At the end of the meeting, the first author should make a note of the study conclusion(s).

**Use guidelines for writing scientific articles**

There are several popular scientific article writing guidelines<sup>14,23-27</sup>. They assist in the writing of articles according to their methodology, leading the researcher to describe the main aspects to be highlighted in their work according to the type of study. A list of some of the main guidelines and where to access them is presented in table 1.

**Article outline**

Outlining is a resource used to plan the central theme and complementary ideas of each paragraph. For better organization of ideas, it is recommended to separate each outline according to IMRaD topics, to keep focused

and avoid redundancies. One should remember to meet with the senior author and analyze if this plan is adequate to meet the research objectives<sup>28</sup>.

To have a concise outline to help the writing process, the author should first write the central theme (the general subject) of each topic of the article. Next, it should be defined which aspect(s) of the topic will be addressed in each paragraph. Then, the objectives of each paragraph should be identified and the ideas that will be discussed should be developed, such as comparisons, arguments, and all the resources that support your viewpoint. Only start writing each paragraph after finishing the outline and check if the sequence is logical, with coherence and cohesion.

**Organizing each paragraph**

During the scientific writing process, it is important to pay attention to the line of reasoning to keep focused on the theme of research. As in the case of the article, the paragraphs must have a beginning, development, and conclusion to improve the understanding of the topic and the conclusion of ideas. To be logical, the opening sentences of a paragraph need to prepare the reader for its central topic. After the opening, it is necessary to present supporting sentences that will support the discussed topic. Finally, the closing sentences must provide specific and impactful information. As a suggestion and to make it clearer, examples of original and improved paragraphs are presented in table 2.

**Table 2:** Examples of paragraph improvement before and after rewriting

Before	After	Comments
The results obtained in this study corroborate our hypotheses. A study that investigated the nutritional status of patients with depression showed that they had low consumption of fruits and vegetables and low intake of some B vitamins, in addition, serum levels of vitamin B12 and folic acid were significantly lower in these patients.	The results of this study corroborate our hypotheses. The DietBra, characterized by a healthy eating pattern with consumption of vegetables, fruits, meat, and low consumption of processed foods, reduces depression symptoms. Our results were similar to those observed in cohort studies that evaluated the Mediterranean diet (DietMed). A study that investigated the nutritional status of patients with depression reported that they had reduced consumption of fruits and vegetables, and low intake of B vitamins, in addition, serum levels of vitamin B12 and folic acid were significantly lower in these patients. Thus, a healthy eating pattern, whether using the DietBra or DietMed, rich in fruits and vegetables and consequently providing a series of vitamins, may indicate a close relationship with reduced depression symptoms.	In the original paragraph, the ideas presented were insufficient for a full interpretation of the subject, making it incomplete. After the review, all the necessary ideas and scientific arguments have been elaborated with greater clarity, coherence, and cohesion.

**Continuation - Table 2:** Examples of paragraph improvement before and after rewriting

Before	After	Comments
In order to make an early diagnosis of sarcopenia, given the high prevalence of this condition, the use of practical and easily applicable tests such as the SARC-F allows the selection of older people receiving primary care with a high risk of adverse effects, who would benefit from confirmatory diagnostic assessment, referral to specialized services, and specific early interventions, in addition to reducing public health costs with avoidable tests. The components evaluated in the SARC-F are those related to impaired muscle function.	To make an early diagnosis of sarcopenia, considering its high prevalence, the use of practical and easy-to-apply tests can enable the identification of older people with this condition, mainly those treated in primary health care units. The SARC-F is a test based on a questionnaire to assess muscle function and that has these characteristics. Sarcopenia can lead to increased health risks for older people, so they would benefit from an early diagnostic assessment and could be referred to specialized services to start specific interventions.	In the previous paragraph, it is possible to verify the lack of planning in the excerpt, with confusing central and complementary ideas on the approached subject. The purpose of the paragraph is unclear, that is, what is the purpose of the information provided? It is necessary to conclude the ideas in the last sentence.

The most common mistakes found in paragraph writing are verbiage, words or connectors, and redundancy when the author unnecessarily repeats the same idea. These mistakes make the text confusing and tiresome, discouraging the reader to continue reading and, consequently, devaluing the scientific work. Authors should establish a connection between the paragraphs so that one idea represents the sequence of the other<sup>29</sup>. Long sentences and paragraphs can affect the meaning of the text. Indefinite pronouns, such as “some,” “none,” and “every person,” should be used sparingly, and the excessive use of the passive voice and the same adverbs and conjunctions in a sentence should be avoided.

After writing the paragraph, it should be read several times, preferably aloud. This technique can help

the author understand or consider other forms of writing. It is also interesting to ask for other people’s opinions to confirm that the paragraph is intelligible.

**Conciseness, clarity, and connecting elements**

Conciseness can be used as a textual tool to provide clear information. Clarity, in contrast, improves the understanding of this information. For a coherent and cohesive text, the use of linking elements is of paramount importance. One should be careful with the use of conjunctions and know the difference between adversative, additive, conclusive, alternative, and explanatory conjunctions. Some examples of linking elements and how they can be used are presented in table 3.

**Table 3:** Linking elements and their respective examples used in sentences

Types of Connecting Elements	Examples
Addition: and, more, moreover, by the way, also, moreover, also, because	These are subjective and personal concepts because every individual has their own interests and satisfactions about life in its physical, political, moral, social, environmental, and spiritual dimensions.
Comparison and similarity: likewise, as, as well as, as such, likewise, equally, similarly	With the onset of the pandemic, the Brazilian population was faced with a completely atypical situation, like the rest of the world population.
Cause: it is evident that, of course, certainly, since, therefore, consequently, in fact, thus, due to	The successful implementation of the NP relates to the competence, skills, and necessary experiences that develop the full potential of nurses; thus, nursing professionals should have knowledge about the definitions of the main diagnoses used.
Opposition/Restriction: but, however, although, nevertheless, nonetheless, neither, on the other hand, though, except	However, more studies need to be conducted to better understand such difficulties during and after the SARS-CoV-2 pandemic.
Reaffirmation: in short, in that way, in this sense, in that perspective, that is, in other words, in summary	In this sense, research on QoL in this population is important and may contribute to the perception of current living conditions during the pandemic.

**Continuation - Table 3:** Linking elements and their respective examples used in sentences

<b>Types of Connecting Elements</b>	<b>Examples</b>
Temporal connection: currently, after, before, then when, until, rarely, since	After data analyses, they underwent statistical treatment.
Conclusion: therefore, soon, so that, concluding, finally	Therefore, the importance of primary health care for the promotion, prevention and rehabilitation of individual/family/ community health should be highlighted.
Proportion: according to, in agreement with, in accordance	According to the WHO, the prevalence of these mental disorders in Brazil is equivalent to 5.8% of depression cases in the world (11.6 million) and 9.3% of anxiety (18.7 million) cases, being higher in women.
Condition or hypothesis: if, whether, eventually	However, no previous research sought to determine whether Pilates has beneficial effects on the quality of life and mental health of resistance exercisers.
Doubt: maybe, it is likely, it is not certain, possibly, probably	In the assessment of QoL, due to issues in the data, it is not certain that the GPM obtained the highest scores in all domains compared to the other groups.
Certainty and emphasis: certainly, surely, most certainly, undoubtedly, unquestionably, without doubt, for sure, undeniably	It is undoubtedly necessary to implement new public policies that permeate the safety and well-being of the entire community.

One should read what he or she has just written carefully to ensure coherence and cohesion in the text. In addition, elements of sequence should be employed to ensure a logical connection between sentences. The repetition of verbs, nouns, and adjectives is a very common mistake in writing, therefore, having a broad vocabulary is an essential skill. The placement of different technical terms that represent the same item is also a frequent mistake that can affect the reader’s interpretation of the subject.

**Editing figures and tables**

Different types of visual elements can be used in scientific articles. To correctly select figures, tables, and graphs, it is necessary to analyze the study data and define which model will be used to represent the results. The norms of the journal and the number of figures and tables allowed should be checked, as well as their formatting process.

Formatting these data is a process that requires special attention. The titles of the tables and figures should be written in a short, self-explanatory way to allow the reader to understand the contents without having to refer back to the text. Particular care should be taken when creating graphs. Graphs/figures should be prepared to catch the attention of the journal reviewer and future readers, making relevant information clear. Careful formatting is essential. For example, the y-axis must not exceed the highest value of the axis, that is, it must not be far from the highest result obtained in the study. The paragraphs in the results section must follow the same order as the tables and figures so that everything is well organized and in a logical order. Number the tables consecutively in the order of their first citation in the text<sup>30</sup>.

**METHODS**

The research method demonstrates all the methodological rigor of the study, and special attention

is essential when writing it. The researcher must be clear about the study design and the procedures used in the research. In addition, the population and sampling procedures should be carefully described, as well as the inclusion and exclusion criteria for research participants. It is often the case that the main researcher did not participate in all phases of the research. In this context, the steps in which the main researcher was not directly involved should be written by the researcher who participated in these steps, thereby helping prepare the article (table 4).

A suggestion for writing the methods section is to use specific guidelines<sup>14,27,31,32</sup> and epidemiology books to clarify possible questions according to the study design. Unless specified by the journal, the methods section should be written in the past tense<sup>33,34</sup> and one should not forget to adapt it to the journal norms and standards.

**RESULTS**

This item mainly contains graphs, tables, and figures that illustrate the results derived from the research. The textual part is very succinct, highlighting the main results reported in each table or figure. One should be careful not to repeat the contents of tables/graphs<sup>35</sup>. The results section contains more numbers and figures/tables than words.

Some mistakes are common, such as not presenting the data mentioned in the methods, using complex and incomprehensible tables and graphs, and presenting inadequate statistical analysis (table 4). Other very common mistakes are to start the discussion (interpretation) and conclusions about the data and refer to the data expressed in graphs/tables with action verbs, for example: “the table shows”, “the graph analyzes”.

In the statistical analysis, both the analysis and the results should be guided by the objective of the study. Thus, it is necessary to have previous statistical planning of the tables and graphs that will help guide the research focus.

**Table 4:** Main mistakes made while writing a scientific article

<b>Location (IMRaD)</b>	<b>Common Mistakes</b>	<b>How to Avoid Them</b>
Introduction	Exceptionally long, including excerpts that could be better used in the discussion	Write a logical sequence from general aspects to specifics. It is advisable to write three to five paragraphs.
	Excessive details in the description of previous studies	Focus on what is essential to inform the reader about existing studies.
	Confusing terminology	Standardize technical terms.
	Old or insufficient references to demonstrate a current problem	Choose references that are as current as possible, no older than 5 years.
	Raise problems that are not addressed by the article	Focus on the research problem and what the studied variables can help to answer.
Methods	Not writing the methods in a logical, standardized order	Use writing guidelines for specific types of studies that provide the topics that should be covered in each paragraph of the methods. The ideal order, in general, is the order in which the study is conducted.
	Not making the outcome variable clear, how it was collected, and what its definition and classification cutoff points are	Make the outcome variable and all related information clear.
	Insufficient description of the statistical analysis carried out or unclear text	Describe all tests, variables, and comparisons performed in detail.
Results	Not describing the sample included percentage of losses to follow-up, or refusals	Use the first paragraph to present the general characterization of the study sample. If there are losses, explain the reasons.
	Incomplete, very complex, and/or incomprehensible tables and figures	Write the titles succinctly. Avoid too many columns in tables. Make sure that the results presented on the y-axis do not exceed the highest values in the study.
	Data repetition in the text, tables, and figures	For each table/figure, include only a highlight of the most important things you observed.
	Not presenting the promised data in the methods session	It is important to present results for all variables; write in the text or supplementary material what cannot be shown as a table/figure.
	Inappropriate statistical analysis for the purposes of the study	Talk to research team members and discuss the best statistical analyses to meet the proposed objectives.
Discussion	Repeating the introduction and results	The discussion is for the interpretation and comparison of the data already expressed previously in the results section, and there is no need to repeat them or the elements of the introduction.
	Discussion not based on study purposes or results	Focus and discuss your research findings. Entire paragraphs of literature review cannot be used without making a counterpoint to the research results.
	Failure to clarify the theoretical and practical implications of the results	At the end of the discussion, it is important to present the implications of the results for the field of knowledge as a possible practical and/or theoretical application for the development of new research.

**Continuation - Table 4:** Main mistakes made while writing a scientific article

Location (IMRaD)	Common Mistakes	How to Avoid Them
	Presentation of new data	Do not include new data in the discussion; these data should be included in the results.
	Literature review alone is not discussion	The paragraphs cannot have only information of previous studies without comparing or interpreting the results of the current article.
	Unsubstantiated speculations	It is not appropriate to speculate on the results without having previous studies that allow you to make such statements or launch possible hypotheses, as long as they have an appropriate theoretical basis.
	Recommendations not based on results	Do not exaggerate the interpretations of your findings and compare them with the findings of studies on similar themes.
	Repetition of results and discussion	Avoid making generalized recommendations that are unrelated to the results of the study. On recommendations, the author should be specific.
Conclusions/Final Considerations	Not responding to the objectives proposed in the article	Remember that the conclusion must respond to the objective of your article outlined at the end of the introduction.

**DISCUSSION**

The first paragraph of the discussion often includes mistakes such as starting the presentation of the main outcome variable by comparing it with other studies, rephrasing the study objective or repeating the introduction and results, not clarifying the theoretical and practical implications of the results, comparing results with studies using different populations, not explicitly discussing hypotheses, repeating the literature review, writing unfounded or exaggerated speculations, and making recommendations not based on the results (table 4).

To avoid these mistakes, it is necessary to plan each paragraph before writing, including the central and secondary themes (outline). The paragraph should be started by stating the central idea, that is, the study result(s). Then, write the arguments and interpretations of the results based on other studies. Suggested paragraph order:

- 1<sup>st</sup> Answer the research question, highlight the main result: novelty in the research area, explain its relevance, and if a knowledge gap has been filled.
- 2<sup>nd</sup> Interpret and contextualize the most important results, comparing them with results obtained by other researchers. A few paragraphs are needed for the development of this part, so establish the logical sequence as presented in the results section.
- 3<sup>rd</sup> The possible limitations, together with the strengths of the study should be outlined in the penultimate paragraph of the discussion.
- 4<sup>th</sup> The last paragraphs should address the generalization of the study in practice (how the results can be used) and recommendations for future research to improve knowledge on the subject.

The conclusions should respond to the study

objectives. Therefore, nothing new should be included in this item. As the reader has already read the results and discussions, writing should be concise and direct. Most journals that follow the IMRaD standard present the conclusion in the last paragraph of the discussion.

In scientific writing, creativity is an important element to bring originality to research, providing scientifically stimulating reading and going straight to the research objective or problem. Brainstorming is a recommended and very useful technique, in which all authors must participate. In this technique, it is important to interpret the results and define the main focal topics of the discussion, as well as a very useful for writing the introduction topic. A meeting with all authors is recommended to discuss the article and collect elements and ideas to help the first and second authors in writing the topics.

**Introduction**

The introduction should be the last section to be written. Thus, authors will have greater objectivity in the relevant subjects to introduce the research topic. It should introduce the subject and provide reasons to justify the objective and relevance of the study. The introduction also presents the research problem and demonstrates knowledge gaps. A logical sequence should be established from the most general to the most specific aspects of the study (inverted triangle)<sup>36</sup> (table 4).

Mistakes in this section are more related to a very long introduction when the logical sequence of the text and the real problem to be highlighted by the research are lost. Another common mistake is to raise issues that will not be covered in the article. Excessively detailing what was observed in previous studies makes the text tiresome to read and loses its introductory characteristics. Citing



current situations using old references is also a recurrent mistake in scientific studies.

An interesting method to assess the quality of the introduction is to remove the objective of the study and ask a person in the field to read it and tell you what the objective is. If the reader can correctly identify the proposed objective, it means that the introduction is in accordance with the proposed theme and well written.

The introduction must contain:

- 1) Scenario (general information establishing the field of study)
- 2) Background (presentation of relevant previous studies)
- 3) Knowledge gap
- 4) Research question (concise definition of objective/hypothesis)

### Abstract

The abstract should be written during the completion of the academic work since the authors have the main topics and the content prepared. This should be considered as important as the others, as it is through the abstract that readers will become interested in reading the entire article. Thus, the definition of the objective, design, and outcome of the study are essential<sup>34,37,38</sup>.

The main topics to be included in the abstract will depend on the norms of the journal where the article will be published. The excessive use of abbreviations should be

avoided and only the most important study results should be presented; if research has a new statistical analysis, it should be described. Regarding the results, only the main results and most prominent ones should be presented in the abstract. The word limit specified by the journal should be kept in mind.

### Keywords

Choose descriptors that are not in the title<sup>38</sup>, thereby increasing the possibility of other researchers finding the article. It is important to use keywords that will include variety and make your work more easily retrievable. The keywords can be found in the Health Sciences Descriptors (DeCS), available at <https://decs.bvsalud.org>, and in MeSH, available at <https://www.ncbi.nlm.nih.gov/mesh>.

### Title

The title is the gateway to the academic work, responsible for engaging the reader. Different and creative titles should be used, such as a question or advancing results. It is also important to describe the type of study in the title, but one should check the word limit required by the journal in the instructions for authors. Titles can be descriptive when the main subject of the article is described but its main conclusions are not highlighted; declarative, when the main conclusions of the research are revealed in the past tense; and interrogative, generally used in review articles for being more attractive and triggering discussion, among others<sup>39</sup> (table 5).

**Table 5:** Examples of titles according to their characteristics

Descriptive Title:	<ul style="list-style-type: none"> <li>- Effect of Extra Virgin Olive Oil and Traditional Brazilian Diet on the Bone Health Parameters of Severely Obese Adults: A Randomized Controlled Trial<sup>40</sup>.</li> <li>- Visceral obesity and incident cancer and cardiovascular disease: An integrative review of the epidemiological evidence<sup>41</sup>.</li> <li>- Prevalence of anxious and depressive symptoms in college students of a public institution<sup>42</sup>.</li> </ul>
Declarative title (which already advances the main result):	<ul style="list-style-type: none"> <li>- The influence of family problems and conflicts on suicidal ideation and suicide attempts in elderly people<sup>43</sup>.</li> <li>- Physical Exercise Positively Influences Breast Cancer Evolution<sup>44</sup>.</li> <li>- Higher ultra-processed food intake is associated with higher DNA damage in healthy adolescents<sup>45</sup>.</li> </ul>
Interrogative title:	<ul style="list-style-type: none"> <li>- Are Shorter Article Titles More Attractive for Citations? Cross-sectional Study of 22 Scientific Journals<sup>46</sup>.</li> <li>- What are the factors associated with sarcopenia-related variables in adult women with severe obesity<sup>47</sup>?</li> <li>- What is the impact of multimorbidity on the risk of hospitalization in older adults? A systematic review study protocol<sup>48</sup>.</li> </ul>

### Cover letter

The cover letter is addressed to the editor of the desired journal. This letter is written by the main author and is intended to convince the editor that the article provides relevant scientific contributions and that the content of the study is appropriate to the scope of the journal.

The first paragraph is intended to present the study, including the title of the article, and justifying its importance for the journal and the field of knowledge. The second paragraph discusses the novelty of the study; the author can use the main results described in the first paragraph of the discussion. The third paragraph includes a statement

that the article was not submitted in any other journal or published in whole or in parts elsewhere, guaranteeing the originality of the study. Finally, conflict of interest, if present, should be stated. It should be noted that this is a suggestion of how paragraphs may be arranged, and high-impact magazines often provide cover letter templates.

## CONCLUSION

This study presents a series of scientific writing techniques and tips to avoid mistakes during the writing process. It is recommended that authors, whether beginners or already experienced in the field of scientific writing, use the methods presented herein to improve the quality of their scientific articles and, consequently, publish in higher-impact journals. The social contribution of science also implies publishing in magazines with greater visibility, thus collaborating with other scientists and society.

## REFERENCES

1. Hotaling S. Simple rules for concise scientific writing. *Limnol Oceanogr Lett* 2020; 5: 379–83.
2. Geithner CA, Pollastro AN. Doing peer review and receiving feedback: impact on scientific literacy and writing skills. *Adv Physiol Educ* 2016; 40: 38–46.
3. Asnake M. The importance of scientific publication in the development of public health. *Cien Saude Colet* 2015; 20: 1972–3.
4. Forero DA, Trujillo ML, González-Giraldo Y, Barreto GE. Scientific Productivity in Neurosciences in Latin America: A Scientometrics Perspective. *International Journal of Neuroscience* 2019; 130: 398–406.
5. E. Valenti V, Patricio da Silva A. The effect of negationism on public health. *Journal of Human Growth and Development* 2021; 31: 189–91.
6. Castanha C, Fernando Barbosa Tavares L, Leone C, et al. Basic life support education: the impact of lecture-demonstration in undergraduate students of health sciences. *Journal of Human Growth and Development* 2021; 31: 283–90.
7. Silva RC. Postgraduate expansion in Brazil and Umesp's Masters Program within such context. *Educação & Linguagem* 2009; 12: 294–305.
8. Filho JN da S. Volume de publicações científicas sobre Educação Ambiental na base SciELO Brasil: um estudo de cienciometria. *Revbea* 2019; 14: 207–21.
9. Grupo Web of Science. A Pesquisa no Brasil: Promovendo a excelência. 2019: 1–49.
10. OCTI BA. Panorama da ciência brasileira: 2015-2020. 2021; 196.
11. Deheinzelin D, Carameli B. Produção científica, pós-graduação e a RAMB. *Rev Assoc Med Bras* 2007; 53: 471–2.
12. Pati D, Lorusso LN. How to Write a Systematic Review of the Literature. *Health Environments Research and Design Journal* 2018; 11: 15–30.
13. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *The Lancet* 2007; 370: 1453–7.
14. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med.* 2009; 6. DOI: 10.1371/journal.pmed.1000097
15. Shamseer L, Moher D, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols (prisma-p) 2015: Elaboration and explanation. *BMJ (Online)* 2015; 349. DOI: 10.1136/bmj.g7647
16. Bahadoran Z, Mirmiran P, Zadeh-Vakili A, Hosseinpanah F, Ghasemi A. The principles of biomedical scientific writing: Materials and Methods. *Int J Endocrinol Metab* 2019; 17: 1–9.
17. Bahadoran Z, Jeddi S, Mirmiran P, Ghasemi A. The principles of biomedical scientific writing: Introduction. *Int J Endocrinol Metab* 2018; 16. DOI: 10.5812/ijem.84795
18. Bahadoran Z, Mirmiran P, Kashfi K, Ghasemi A. The principles of biomedical scientific writing: Title. *Int J Endocrinol Metab* 2019; 17. DOI: 10.5812/ijem.98326

## Author Contributions

EAS conceived the idea. EAS and AMSR carried out the preparation of tables and figures. All authors contributed to developing the discussion section and writing the manuscript. MN contributed to reviewing the manuscript. EAS and MN supervised the final version. All authors read and approved the final manuscript.

## Acknowledgments

The authors thank the IF Goiano for their support.

## Conflicts of Interest

None.

19. Bahadoran Z, Mirmiran P, Kashfi K, Ghasemi A. The principles of biomedical scientific writing: Results. *Int J Endocrinol Metab* 2019; 17: e92113.
20. Bahadoran Z, Mirmiran P, Kashfi K, Ghasemi A. The principles of biomedical scientific writing: Abstract and keywords. *Int J Endocrinol Metab* 2020; 18: 4–10.
21. Iskander JK, Wolicki SB, Leeb RT, Siegel PZ. Successful Scientific Writing and Publishing: A Step-by-Step Approach. *Prev Chronic Dis* 2018; 15: E79.
22. Hotaling S. Simple rules for concise scientific writing. *Limnol Oceanogr Lett* 2020; 5: 379–83.
23. Schulz KF, Altman DG, Moher D. CONSORT 2010 Statement: Updated guidelines for reporting parallel group randomised trials. *BMJ (Online)* 2010; 340: 698–702.
24. Gagnier JJ, Riley D, Altman DG, Moher D, Sox H, Kienle GS. Die Case Reporting (CARE) Guideline. *Dtsch Arztebl Int* 2013; 110: 603–8.
25. du Sert NP, Hurst V, Ahluwalia A, et al. The arrive guidelines 2.0: Updated guidelines for reporting animal research. *PLoS Biol* 2020; 18: 9–10.
26. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: A synthesis of recommendations. *Academic Medicine* 2014; 89: 1245–51.
27. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *The Lancet* 2007; 370: 1453–7.
28. Kallestinova ED. How to Write Your First Research Paper. *YALE JOURNAL OF BIOLOGY AND MEDICINE* 2011; 84: 181–90.
29. Derish PA, Maa J, Ascher NL, Harris HW. Enhancing the Mission of Academic Surgery by Promoting Scientific Writing Skills. *Journal of Surgical Research* 2007; 140: 177–83.
30. Weinstein R. How to write a manuscript for peer review. *J Clin Apher* 2020; 35: 358–66.
31. Gagnier JJ, Riley D, Altman DG, Moher D, Sox H, Kienle GS. Die Case Reporting (CARE) Guideline. *Dtsch Arztebl Int* 2013; 110: 603–8.
32. Schulz KF, Altman DG, Moher D. CONSORT 2010 Statement: Updated guidelines for reporting parallel group randomised trials. *BMJ (Online)* 2010; 340: 698–702.
33. Bahadoran Z, Mirmiran P, Zadeh-Vakili A, Hosseinpanah F, Ghasemi A. The principles of biomedical scientific writing: Materials and Methods. *Int J Endocrinol Metab* 2019; 17: 1–9.
34. Weinstein R. How to write a manuscript for peer review. *J Clin Apher* 2020; 35: 358–66.
35. Bahadoran Z, Mirmiran P, Kashfi K, Ghasemi A. The principles of biomedical scientific writing: Results. *Int J Endocrinol Metab* 2019; 17: e92113.
36. Bahadoran Z, Jeddi S, Mirmiran P, Ghasemi A. The principles of biomedical scientific writing: Introduction. *Int J Endocrinol Metab* 2018; 16. DOI: 10.5812/ijem.84795
37. Sanganyado E. How to write an honest but effective abstract for scientific papers. *Sci Afr* 2019; 6: e00170.
38. Bahadoran Z, Mirmiran P, Kashfi K, Ghasemi A. The principles of biomedical scientific writing: Abstract and keywords. *Int J Endocrinol Metab* 2020; 18: 4–10.
39. Bahadoran Z, Mirmiran P, Kashfi K, Ghasemi A. The principles of biomedical scientific writing: Title. *Int J Endocrinol Metab* 2019; 17. DOI: 10.5812/ijem.98326
40. Cardoso CK de S, Santos AS e A de C, Rosa LP de S, et al. Effect of Extra Virgin Olive Oil and Traditional Brazilian Diet on the Bone Health Parameters of Severely Obese Adults: A Randomized Controlled Trial. *Nutrients* 2020; 12: 403.
41. Silveira EA, Kliemann N, Noll M, Sarrafzadegan N, Oliveira C. Visceral obesity and incident cancer and cardiovascular disease: An integrative review of the epidemiological evidence. *Obesity Reviews* 2020; obr.13088.
42. Fernandes MA, Vieira FER, Silva JS e, Avelino FVSD, Santos JDM. Prevalence of anxious and depressive symptoms in college students of a public institution. *Revi Bras Enferm* 2018; 71: 2298–304.
43. Silva RM da, Mangas RM do N, Figueiredo AEB, et al. The influence of family problems and conflicts on suicidal ideation and suicide attempts in elderly people. *Cien Saude Colet* 2015; 20: 1703–10.
44. Adraskela K, Veisaki E, Koutsilieris M, Philippou A. Physical Exercise Positively Influences the Breast Cancer Evolution. *Clin Breast Cancer* 2017; 17: 408–17.
45. Edalati S, Bagherzadeh F, Jafarabadi MA, Ebrahimi-mamaghani M. Higher ultra-processed food intake is associated with higher DNA damage in healthy adolescents. *British Journal of Nutrition* 2021; 125: 568–76.

46. Habibzadeh F, Yadollahie M. Are shorter article titles more attractive for citations? Cross-sectional study of 22 scientific journals. *Croat Med J* 2010; 51: 165–70.
47. Silveira EA, Souza JD de, Santos AS e A de C, Canheta AB de S, Pagotto V, Noll M. What are the factors associated with sarcopenia-related variables in adult women with severe obesity? *Archives of Public Health* 2020; 78: 71.
48. Rodrigues LP, Rezende ATDO, Moura L de AN e, et al. What is the impact of multimorbidity on the risk of hospitalisation in older adults? A systematic review study protocol. *BMJ Open* 2021; 11: 1–6.

## Resumo

**Introdução:** a escrita científica é um processo que exige dedicação, conhecimento e habilidades de diferentes áreas científicas. No entanto, os autores, principalmente os jovens que iniciam a pós-graduação e a carreira científica, estão propensos a cometerem alguns erros ao escrever e que muitas vezes pode passar despercebido.

**Objetivo:** Neste sentido, este estudo objetiva descrever erros comuns na redação científica e técnicas de como evitá-los. Erros podem ocorrer no processo de escrita antes e durante o ato de escrever, pois muitos autores não estão familiarizados com a escrita científica ou pulam etapas importantes a que deveriam ser consideradas anteriormente.

**Método:** Para preparar o manuscrito é essencial que os autores dominem a temática do estudo e que os resultados da pesquisa sejam suportados pela literatura científica.

**Resultados:** Durante a redação, muitas vezes o autor faz uso equivocado dos itens necessários em cada seção do artigo, perdendo o sentido lógico dos resultados da pesquisa e dificultando a leitura do texto. Antes de iniciar o processo de redação, é necessário, portanto, planejar cada parágrafo e utilizar técnicas textuais que garantam coesão e coerência entre os parágrafos.

**Conclusão:** este estudo descreve os principais erros no processo de redação de artigos científicos, visando aprimorar técnicas, otimizando o tempo dos pesquisadores para desenvolver um texto adequado, claro e elegante.

**Palavras-chave:** publicação, comunicação científica, alfabetização científica, habilidades científicas, escrita científica.

©The authors (2022), this article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated.