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Methodological letter

The structure of a scientific article

La estructura de un artículo científico

David Parés

Sección de Cirugía Colorrectal, Servicio de Cirugía General y Digestiva, Universitat Autònoma de Barcelona, Hospital Germans Trias i Pujol, Badalona, Barcelona, Spain

Introduction

Clinical research makes a decisive contribution to advancing health care, improving patient care systems, and increasing the health of the population.¹ As we have seen through the COVID pandemic, clinical research is primarily disseminated through scientific articles.

It is important to remember that a major part of the process of publishing a scientific article begins with the habit of reading scientific articles, which should continue throughout one's professional career. There is no doubt that published articles are the main means of scientific knowledge transmission in our profession. At the individual level, therefore, it is highly advisable to include in time in our schedule for scientific reading once a week. There is also no doubt that holding literature sessions, also called "journal clubs" in medical and surgical departments should be part of the teaching trajectory of MIR residents and in general mandatory for all teams.¹ This is how we become familiar with the structure and language used in scientific articles. A good way to get started in writing a scientific article could or even should be to publish papers that have been presented at specialty congresses. Of these, 30% should be published according to experts.²

The first step in writing a scientific article is to choose the type of article you want to write (clinical case, review article, original article, etc.). Good advice would be to start with simple publications (e.g., a clinical case) and increase in difficulty, the "original article" will be the ultimate goal of our curricular trajectory. Next, it is essential to choose the most appropriate journal for submission of the article. This choice will be based

on several aspects. The first, although it may seem obvious, is that the journal should cover the subject information we wish to publish. There are General and Digestive Surgery journals and super-specialty journals (for example, colorectal surgery or hepatobiliopancreatic surgery) that cover our specialty. While the former have more competition but are very appropriate for articles on more general aspects, those specific to subject areas have the advantage of having, in general, less competition. The other aspect to consider is the quality of the journal, which generally now depends on the Journal Impact Factor.³ The impact factor of the journal to which the manuscript is to be submitted should be as high as possible, not only because of the curricular benefit for the authors if the article is published, but also because it is an indicator (even assuming some criticism³) that the article will reach a larger number of readers. This element will also determine the journal quartile (ranking list of journals according to their impact factor) of the specialty in which the article is published and can therefore have many consequences when planning an academic career.

Before outlining some of the keys to writing a scientific article, we should stress that authors should carefully read the *Authors' Guide* of the selected journal. It details the publication rules point by point. It is surprising how many of the instructions authors do not follow, in either length or in form; this is one of the main reasons that articles are rejected or criticised by reviewers.

Once the journal for submission of the article has been selected, it is particularly important to read similar articles in that journal to ensure that the editorial style of the article reflects the line of the journal.

We outline below some more specific formal aspects to consider when writing a scientific article, following the

E-mail address: dapares@gmail.com

Table 1 – Summary of the structure of a scientific article and its considerations.

Title	Choose a title that is original and arouses the reader's curiosity
Abstract	Follow the publication guidelines in form and length. Highlight the most important aspects of your scientific article
Introduction	<i>Why was this study conducted?</i> State the most relevant aspects of the information in the literature that gave rise to the study's research question, or the information presented in the article
Material and Methods	<i>Why was this study conducted?</i> Explain in detail the methodology of the study presented
Results	<i>What was observed?</i> State the results in an orderly, logical manner and in an order that is understandable
Discussion	<i>What is the relevance of the information presented?</i> Explain the relevance according to the literature, strengths and limitations, and future lines of research based on your study
Tables and Figures	Set out the information clearly. Tables and figures should be self-explanatory and avoid repetition
References	Follow the journal's guidelines and ensure the references are up-to-date and relevant to the scientific article
Cover letter	<i>What is the main contribution of the scientific article?</i> Write appropriately to the Editor to describe the interest of the scientific article submitted for publication

acronym IMRaD (Introduction, Methods, Results and Discussion)⁴ which should correlate with the questions that the article should answer: Why was this study conducted (Introduction); How was the study conducted (Methods); What was observed (Results), and What is the importance of the information presented (Discussion).⁵ Table 1 summarises the structural aspects of a scientific article and some considerations to ensure it is drafted correctly.

Structure of a scientific article

Title page

For the title page, as for the rest of the manuscript, it is very important to follow the publication guidelines, as each journal has a specific format.

Choosing a good title is difficult and will be the first big challenge. It should be very attractive, containing as few words as possible, and it is best not to give away the mystery or research question of the article. This could result in less interest in reading the article. It is worth remembering that this is an opportunity to arouse the reader's curiosity or interest, to encourage them to read the article. We should not forget that the main objective of writing a scientific article should be to contribute knowledge by ensuring that it is read. The title is the part of every article that is always read.

It is essential to make special mention of the authorship of the manuscript. The order of authorship, often a source of dispute, must follow the rules of the editors and ethical standards and reflect the work done as defined by the International Committee of Medical Journal Editors.⁶ Although this mention is necessary, this methodological letter does not allow for an in-depth study of the ethical and controversial aspects of authorship. However, it is advisable that the author(s) decide how they will sign their first articles, especially whether to use a single surname or both surnames (whether joined with a hyphen), as it is recommended that they should maintain this form throughout their scientific careers as researchers.

Follow the instructions of each journal to state who is the corresponding author and provide details of funding of the

study, conflicts of interest, and presentation of the content at a congress in the field.

Abstract and keywords

The summary or abstract is a very important part of the article as in many cases it is the only part that will be read. In addition to following the publication rules of the chosen journal, as in many cases there are variations in the form and length of the abstract, you must take care that the relevant information is clear and concise. It will depend on the title and this section whether the reader is attracted enough to read the whole article. Recently, visual abstracts have improved the dissemination of the information presented in scientific articles and therefore will gain importance in the near future through social networks.⁷ A good recommendation is to leave the structure of the abstract until the entire scientific article has been written, as it will help highlight the elements that are clearly of interest.

Finally, remember to select keywords appropriately, especially with the use of MESH terms through PubMed, to ensure that your article will be found over the years and therefore have a high number of citations.

Introduction

The introduction should define the topic and above all arouse the reader's scientific curiosity to continue reading the article. It is a very important part of the text, because with a length that should be short, the authors have to address the research question and explain the consequent objectives of the study and, therefore, of the scientific article. In addition to the title and abstract, this part is known for the effect it may have on the reader as to whether to continue reading the rest of the manuscript. It is worth remembering that special emphasis should be placed on verb tenses. In general, the past tense is used, except where it is relevant to the discussion of the article.⁸

Material and methods

This part should describe the entire methodology used in preparing the work and/or study to be published. As a general

rule, in addition to using appropriate terminology to make the study design clear, the reader should be able to replicate the study in their own setting after reading the article. Our group conducted a study of publication quality in randomised clinical trials and found that many aspects fell short in form and presentation.⁹ There is often little information on the study design, the chosen population, the definition of inclusion and exclusion criteria, the study variables, the ethical aspects, the statistical analysis, or on the calculation of the study sample.

For some years now, therefore, the editorial boards of high impact factor journals have been advised (or even required) to follow consensus standards according to the type of study. For example, the CONSORT guidelines for clinical trials or the STROBE guidelines for observational studies.¹⁰ Checklists are published for this purpose and are useful to ensure a complete description of the methods.

Results

There is no doubt that the main objective of an article will be to show the results of medical or surgical research. Most studies have a large number of results and therefore authors should consider which are main results to show appropriately to avoid either giving too much data or having all the data seen to be of equal relevance. Therefore, it is highly recommended to divide the results according to the objective(s) set out chronologically. Some experienced authors recommend that this part should be the first to be written in a manuscript in the form of tables and figures, together with Material and Methods, followed by the Introduction and Discussion.

It is also worth remembering to avoid repeating data included under Material and Methods (e.g., the description of the population studied) as well as data already presented in the form of tables and figures. In the latter case, the authors encourage the reader to read them. This part of the article is not a section where value judgements can be made regarding the results. The authors' considerations on the results obtained in other published series should be made in the Discussion section.

Discussion

Although this part is much dreaded by the authors, it should actually be relatively straightforward. It is worth remembering that it is the only part of the text that can be written in the present tense and there are a number of paragraphs that should never be missing. The text usually begins with a presentation of the most relevant results of the authors' study, followed by a comparison of these results with other published series, whether similar or divergent.

Do not forget to add a section where the strengths and limitations of the study are discussed in a frank and clear manner. Finally, before concluding, the author(s) should provide a vision of future lines to be explored based on the information provided in the scientific article.

The Discussion is an opportunity to present the ideas of the research group, and therefore allows some flexibility to contribute the most creative aspects of surgical practice or biomedical research in general.⁵

References

The references included in the manuscript should only be those necessary and up to date (ideally from the last 5 years). The editorial standards for transcription must be followed, generally in Vancouver style, as well as the number of references. In general, around 30 references are used for original articles, more or fewer will be used depending on the editorial standards and article format. To make citation indexing during the writing of the article more efficient, authors are increasingly using bibliographic referencing systems (e.g., Mendeley©) for this task which also act as reference databases and adapt to the different formats of each journal.

Tables and figures

Choosing the information to publish in tables and figures is key to ensuring that the manuscript has an appropriate structure and is easy to read. In general, tables and figures serve to present the most relevant data and organise them in a visual format that allows the authors' message to be understood. Therefore, all editorial committees insist that tables and figures should be "self-explanatory", i.e., if possible, they should be understandable to the reader without the need to read the paragraphs of the article. It is recommended that the data contained in the figures is not repeated in the text. Once again, it is useful to check the editorial style of the journal chosen for submission of the article to see the type of tables and figures that they usually publish.

Submission to the scientific journal

The process of submitting a scientific article to a journal, once it is finished, requires special attention. All journals ask for a cover letter to the editor(s) of the selected journal together

Table 2 – The 5 keys for a scientific article to be accepted in a specialty journal.

- Key 1. Select the journal for submission of your article based on the subject matter and the quality of the journal (e.g., by its impact factor)
- Key 2. Read articles from the chosen journal before and during the process of writing the scientific article. The author will become familiar with the editorial style of the journal
- Key 3. Read carefully and follow the Author's Guide (Submission Guidelines) of the chosen journal. Follow the sections of the article according to the submission guidelines (Title, Abstract, Introduction, Material and Methods, Results, Discussion, Tables and Figures, References)
- Key 4. Publishing a scientific article is the responsibility of the author and co-authors. Share the manuscript with all co-authors to ensure their adequate participation and to improve the information in the manuscript
- Key 5. Pay attention to the submission process. Write a proper cover letter and if reviewers ask for corrections, make as many as possible to improve the manuscript so that it can be published

with the scientific article. This letter is of utmost importance as the authors must explain the main contribution of the scientific article and it will be key to arousing the interest of the Editor or the editorial team.

Currently, the process of sending the scientific article is telematic through the website of each journal. It is important to pay close attention to the submission instructions to avoid the process taking too long due to steps that have missed or incorrect formatting. It is also necessary to follow the legal aspects (ethical aspects, conflicts of interest, and copyright) of the publication process. This is a part that requires special time and attention, to avoid our article not being published due to formal aspects such as registration in randomised clinical trial registries.

Keys to ensuring a scientific article is published

There is no doubt that the ultimate goal of writing a scientific article is to get it published, and if possible, in a journal with a high impact factor in the specialty. Although we will deal with the rejection of a scientific article in another methodological letter, [Table 2](#) summarises the aspects to be considered (at the author's discretion) to increase the chances of a scientific article being accepted in a specialty journal.

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