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### EDITORIAL

# How to write a medical original article: Advice from an Editor



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#### KEYWORDS

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**Abstract Objectives:** To provide guidelines for potential authors on how to increase the chances of their manuscript being accepted, with a review focusing on writing an original medical article.

**Methods:** This review reflects the personal experience of the present author, who has extensive experience as an author, reviewer and editor.

**Results:** To write an original article successfully, there are three essential requirements, the 'basic triad' of an original article. These are subjects worth reporting, knowledge of the basic structure of an article, and knowledge of the essential mechanics of good writing. This review details each of the three items.

**Conclusions:** Writing, like every other art, cannot be learned wholly from books or lectures, but can be learned largely by experience. The best training is to start the task and persevere. The act of writing, like surgical techniques, must be learned the hard way, by practice and perseverance. Anyone can start writing but only a good writer can finish the task.

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#### Introduction

Much has been done to improve medical writing. Editors reject ill-prepared manuscripts and attempt to

improve those accepted. Referees provide a detailed criticism of the content of papers submitted, so that a journal retains its high standards in the face of the volume of work presented to it.

However, many authors find difficulty in placing a piece of writing which has taken much time and trouble to prepare, and might contain work of importance. Doctors spend a great deal of time with 'pen in hand'. What they need is someone to help them to express themselves clearly. The aim of the present review is to provide guidelines for potential authors on how to increase the

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chances of a manuscript being accepted. In this review I focus only on the writing of original articles for publication in a peer-reviewed journal.

To write an original article successfully, there are three essential requirements, the 'basic triad' of an original article, including a subject worth reporting, knowledge of the basic structure of a peer-reviewed article, and knowledge of the essentials of good writing.

### The subject

There should be a subject worthy of reporting, and that must be an addition to the existing literature. The author should read the previous relevant reports carefully and ensure that he or she is not repeating what has been done successfully before. Do not waste your time in writing a paper which will never be published.

### The basic structure of an article

An original article contains the following items: A title page, an Abstract, Introduction, Patients (or materials) and methods, Results, Discussion, Summary or conclusion, the References, Tables, Figures, legends to Figures and any acknowledgements. A quick checklist of the main items is provided to the author in Box 1 and, to help potential authors to understand the demands of the journal, the criteria used by the reviewer are shown in Box 2.

#### Box 1

The author's check list.

#### **Introduction**

- Short review
- Shortcomings of the existing reports
- Aim of the study
- Scope of the study

#### **Patients (or materials) and methods**

- Full description of patients/materials
- Full description of methods
- Study design
- Statistical analysis
- Ethical considerations

#### **Results**

- Presentation of data
- Correlation of data

#### **Discussion**

- Introduction to discussion
- Discussion of the results
- Advantages of the study
- Limitations of the study
- Recommendations of authors

#### Box 2

The reviewer's checklist.

#### **Introduction**

- Are the objectives clear?
- Is the importance of the study adequately emphasised?
- Is the subject matter of the study new?
- Is previous work on the subject adequately cited?

#### **Patients (materials) and methods**

- Is the study population detailed adequately?
- Are the methods described well enough to reproduce the experiment?
- Is the study design clear?
- Are statistical methods included?
- Are ethical considerations provided?

#### **Results**

- Can the reader assess the results based on the data provided?
- Is the information straightforward and not confusing?
- Are there adequate controls?
- Are statistical methods appropriate?

#### **Discussion**

- Do the authors comment adequately on all their results?
- Have the authors explained why and how their study differs from others already published?
- Do the authors discuss the potential problems and limitations with their study?
- Are the authors' conclusions supported by the results?

#### *The title page*

The title page contains the title, list of authors, institutions, a running title, keywords, a word count, a correspondence address and a second title page.

The title should be informative, specific, comprehensive and accurate, stating exactly what the article is about. It should convey maximum information in a minimum of words. It should express the main issue of the study and preferably the type of study. The title should state the subject, never the conclusion. It should be considered and reassessed frequently, and when the paper is finished the final title is the last sentence to be written.

#### *The authors*

To be included as an author, the person must have contributed something worthwhile, such as creative thinking, performing diagnostic or therapeutic techniques that are essential to the study, collecting data, or writing the paper. The Vancouver protocol is internationally recognised as the standard for determining the authorship on publications. This protocol was first described

by the International Committee of Medical Journal Editors, and is now applied across all disciplines in the world's top universities. The Vancouver protocol states that, to be credited as an author, each and every author in a publication must have been involved in: The conception and design, or analysis and interpretation of data; drafting the article or revising it critically for important intellectual content; and final approval of the version to be published. It is not enough to have completed just one or two of these tasks, and a legitimate author would need to be involved in all three to be acknowledged as an author.

There are some guidelines which determine who should be the first author. For multiple authors with various contributions, the first author is the one who has done the most work. For multiple authors with equal contributions, give the advantage to the junior author, so the junior is first, the senior the last. For two authors, in the first publication give the advantage to the junior and in the second publication, redress the balance. A thesis is essentially a personal project, and therefore for papers derived from it the name of the candidate should be the first and the most senior person the last.

Be very careful to use only one name with the same spelling for the family, initial and middle names in all publications. For example, 'Shokeir AA' is different from 'Shokeir A'. Using the same name with the same spelling will help in retrieving your publications from the Medline database easily in one pass.

### *Institutions*

The affiliations should be listed in the title page only. In the first draft before the review process, do not provide the affiliations or information within the main text that can then be used to identify the names of the authors. This is important to avoid bias by the referees. After a successful review the name of the institutions and affiliations can be added.

### *Running title, keywords, word count and correspondence address*

The title page should contain a short running title and a few keywords (usually six) to facilitate database searches. Most journals require a limited length (2000–3000 words) for the original article. The title page should contain a full address of a corresponding author who will be responsible for contact with the editors.

### *Second title page*

There should be a second title page that contains the title only, with no author names or institutions, and this is used in the review process to ensure that reviewers are unaware of the origin of authors and institutions.

### *Abstract*

This is the first text to appear and should be last to be written. It contains the most important ideas of the article. It must be structured into four paragraphs, i.e., objectives, patients (or materials) and methods, results, and conclusions. The abstract is limited to 200–300 words by most journals. The abstract should not include undefined abbreviations or references to papers in the main text.

All the conclusions at the end of the abstract should be supported by the results of the study. A common mistake is to write a conclusion based on previous studies and not supported by the present results. The conclusions should satisfy the objectives of the study.

### **Introduction**

#### *Definition*

The introduction outlines the subject but does not develop it. The aim of the introduction is to gain the reader's attention by giving sufficient information to outline the problem or matter of the article. The introduction must be short, easy to read and to the point. Some referees and editors consider the introduction as the most important part of the paper, because it sets the tone and quality of the entire paper. How a writer begins will determine whether the reader bothers to continue, and how it ends will determine whether the reader is satisfied or unconvinced.

#### *Fundamentals*

The Introduction consists of four fundamental parts, i.e., a short review of the main subject of the study, the shortcomings of previous studies, the aim of the study and the scope of the study.

#### *The short review*

The introduction must start with a short review that outlines the core of the subject. The review should be concise, interesting and informative. Long historical reviews are dull. The review varies in length from one sentence to several paragraphs, and it should be supported by the major and more recent references. Nevertheless, do not use too many references, as these are more suitable for the later discussion.

#### *Shortcomings of the existing studies*

The author should convince the reader of the importance of the study by giving reasons for investigating this particular subject. This could be achieved by addressing the problems, limitations and shortcomings of previous studies.

*The aim of the study*

The study should answer a timely and important question, the rationale of the study must be strong and very clear, and the results should be an addition to the existing knowledge.

*Scope of the study*

At the end of the introduction there must be a short paragraph setting out the scope of the study, providing a quick overview of the organisation of the study that follows.

*Evaluating the introduction*

To evaluate the introduction, the reviewer will ask the following questions:

- Are the objectives clear?
- Is the importance of the study adequately emphasised?
- Is the subject matter of the study new?
- Is previous work on the subject adequately cited?

**Patients (or materials) and methods***Fundamentals*

The section of patients (or materials) and methods consists of five fundamental parts, with a full description of the materials, of the methods, of the design of the study, and the statistical methods used and ethical considerations.

*Patients or materials*

The patients or materials of the study must be fully described, e.g., if patients are involved then the demographic characteristics of the patients and all information relevant to the study must be detailed.

*Methods*

All the methods used must be described, e.g., the surgical technique, radiological technique, or drugs used (preparation, dose, route of administration, timing, etc.) [1]. Only new methods need to be described in detail. For a common previously published method, use only a reference, but for an uncommon previously reported method give a short summary in addition to the reference. Any manufacturer's details must be mentioned. It is important to consider that all the methods mentioned in this section should be entirely relevant to satisfying the objectives of the study; do not detail any irrelevant methods that might have been part of the

study. Remember that the results of all methods mentioned in this section must be provided in the results section.

*Design of the study*

A separate paragraph must provide a full description of the design of the study. If controlled, describe the control, and if randomised, provide the type and method of randomisation [2–4].

*Statistical methods*

A separate paragraph of the section of methods should describe the statistical methods used. For uncommonly used statistical methods it is advisable to provide a reference, but it is not necessary to detail software sources or packages if the methods used are standard.

*Ethical considerations*

This part should include any informed consent required, ethical approval by a committee, the funding source, a conflict of interest statement, and a statement about compliance with the Declaration of Helsinki for animal studies (if applicable).

*Evaluation of the methods section*

To evaluate this section the reviewer will ask the following questions:

- Is the study population described in adequate detail?
- Are the methods described well enough to reproduce the experiment?
- Is the study design clear?
- Are statistical methods included?
- Are ethical considerations provided?

**Results***Fundamentals*

The section of the results contains two fundamental parts, i.e., the presentation of data and analysis of the results.

The results of all methods used must be provided in a respective and systematic manner. Present the results as text, tables or graphs, but do not repeat the same data in more than one. The reader is entitled to have the data presented in a logical order, which might not have been the order in which the work was done. Do not write any result for a method not mentioned in 'Materials and methods'. Results must be written in a clear unequivocal and unambiguous manner [5,6]. Avoid using indistinct terms, e.g., most, some, probably, etc., if there are clear

numerical data to support the proportion. Only relevant results (related to the aim of the study) should be mentioned. Do not distract the attention of the reader by irrelevant results.

### *Analysis of the results*

The statistical analysis should be used to obtain an objective proof or otherwise of the hypothesis set out in the Introduction. In comparative studies, each comparison should be provided with its specific statistical evaluation. In science the object is a precise measurement. Galileo said '*Measure what is measurable and make measurable what is not*'. In biological sciences, all measurements are inexact. The only way to describe this variability is to use statistics intelligently.

### *Evaluation of the results*

To evaluate the Results section the reviewer will ask the following questions:

- Can the reader assess the results based on the data provided?
- Is the information straightforward and not confusing?
- Are there adequate controls?
- Are the statistical methods appropriate?

## **The discussion**

### *Fundamentals*

The section of the Discussion consists of five fundamental parts, i.e., an introduction to the discussion, discussion of the results, new findings provided by the study, the limitations of the study, and any recommendations relevant to practice.

### *Introduction*

It is preferable to start the discussion with a short paragraph summarising the important findings from the results section.

### *Discussion of the results*

Each result obtained must be adequately discussed and compared with similar previous studies in a respective, logical and clear manner. If the results of the study differ from previous ones, an explanation must be given. Each issue must be discussed in only one place, avoiding any repetition of ideas. Do not return to discuss a previously discussed issue. Avoid opinion bias. All important previous studies must be highlighted regardless of their results (whether with or against the present results).

### *Advantages and disadvantages of the study*

A separate paragraph should describe the advantages and any new findings provided by your study, followed by another detailing the disadvantages, limitations and shortcomings, and how these could be avoided in future studies.

### *Recommendations by the authors*

Authors should provide recommendations based on the results of their study.

### *Evaluation of the discussion*

To evaluate the discussion the reviewer will ask the following questions:

- Do the authors comment adequately on all their results?
- Have the authors explained why and how their study differs from others already published?
- Do the authors discuss the potential problems and limitations of their study?
- Are the authors' conclusions supported by the results?

## **The summary**

The summary could be written as a separate section or as the last paragraph of the Discussion. It should stress the most relevant findings of the study. It is the 'take-home message' and a digest of the whole study. It is not a repetition of the abstract, but an extended conclusion. It justifies and explains the conclusion of the study.

## **The references**

### *Styles*

The most common styles of references are the alphabetical (Harvard) and the Vancouver system. The Harvard system is commonly used in a thesis, while most medical journals use the Vancouver system. In the Harvard system the reference in the text is written as the name of the author(s) followed by the year of publication, e.g., (Shokeir, 2005), while in the reference section the references are arranged alphabetically rather than a numerical list. In the Vancouver system the references are arranged numerically in the reference section according to their order of appearance in the text, and expressed in the text as numbers.

### *General advice*

Each journal has its own style of references (house-style) explained in 'Instructions to authors'. Read the instructions and examine a recent copy of the journal. All references should be written in the same style with the same arrangement. Recent references are better than older ones, and book references are of the least significance.

The integrity of the references is the responsibility of the author only (neither the referee nor the journal). Some journals have a maximum number of references for an original article that should not be exceeded. If you have a choice between citing a recent reference published in the chosen journal or another journal, cite from the chosen journal, as it helps the impact factor of the chosen journal and pleases the editor.

#### *Evaluation of the references*

Most referees check some references at random. References are a very sensitive indicator of the whole article. If the author is lax with references, he or she might have been careless with the entire paper.

### **Tables**

#### *Objectives and characters*

The objectives of the table are to detail the content without reading the text, and to provide comprehensible results at a glance. A good table is a single unit of communication, i.e., completely informative and completely intelligible to others. It should supply the maximum of information with the minimum of words. Tables should provide additional information not present in the text, to avoid redundancy.

#### *How to design a good table*

To design a clear table the data should be arranged in the correct order, omitting unimportant values and eliminating unnecessary words. Tables should be carefully designed to avoid any repetition of headings and to be simple, clear, not confusing, and easy to follow. Tables must be condensed, avoiding the splitting of similar data, so that all possible relevant information is presented together in one table.

#### *General advice*

Tables comparing groups should contain their specific statistical analysis. If abbreviations are used, they should be explained in a footnote, unless they are already defined in the text and list of abbreviations. Tables are usually provided after the references, each on a separate page, with a number and title. Be sure that the correct number of the table appears in the correct place in the text. If you have to choose between presenting the same data as a table or a graph, ask 'what is more important to the reader?' If a general trend is more important, present the data as a figure, but if exact values are more important, use a table.

### **Illustrations and figures**

#### *Objectives*

The objective of the illustration or figure is not only to grasp the message easily, but also to hold it longer. A

common phrase is 'one picture is worth a thousand words'. The purpose of the illustration or figure is not to beautify the paper, but to convey clear information (introduce, explain or summarise).

#### *Designing a good illustration or figure*

Because simplicity is the keynote of all arts, a good illustration must be simple. Avoid sophistication and secondary details. Although there are several well-known graphics packages, they are seldom designed for scientific graphs, and tend to produce figures more suitable for business presentations. Avoid using the unnecessary features common in these packages, like three-dimensional bars or pie charts. There is advice how to present the results in a peer-reviewed journal [7].

There should be no repetition and no contradiction to the information mentioned in the text or tables. Consider that potentially good reproduction on photocopying by not using light colours like yellow, light green or light orange.

#### *General advice*

Be sure that the correct number of the figure appears in the correct place in the text. For conventional airmail submission, the back of each figure should be identified by its number and its top, to avoid publishing the figure in an incorrect configuration.

#### *Legends to figures*

The legends for all the figures are provided on a separate page, usually after the tables. Do not write the legend above or below the figure (as a graphic). Legends should be complementary to the text, not repetitive. Do not distract the reader too long from the text by writing an overlong legend.

### **Acknowledgements**

Persons who are not included among authors and who helped at any stage of the study, starting from searching a subject and ending by submission of the manuscript, must be acknowledged in a separate section at the end of the manuscript. The most senior author defines who should be an author and who should be acknowledged.

### **The mechanics of writing**

#### *The structure of the sentence*

Each sentence should convey just one idea. To be a good writer you have to read well-written papers. The keys to successful writing are simplicity and clarity. Avoid the cardinal sins of writing which are:

- Lack of clarity.
- Repetition.

- Wordiness (using more words than needed).
- Pretentious writing (claiming great merit or importance).
- Use of jargon (words or expressions developed for use within a particular group of people).

### The structure of the paragraph

The paragraph usually starts by a topic sentence that opens the paragraph, followed by the information, data, ideas and finally a concluding sentence that closes the paragraph (if appropriate).

### The sequence of writing

#### *Who will write?*

When there are several authors, one only must write the paper. Too many writers produce a patchwork of different styles. Authorship, like so many acquired skills, must start early in life. The junior should write and the senior should revise.

#### *Preparing to write*

- Choose something worthwhile to report.
- Search the literature and read journals.
- Collect data.
- Write a provisional title.
- Look at the proposed journal.

#### *First version*

In the first version write the maximum information you have in the following sequence:

- Patients (or materials) and methods.
- Results (text, provisional tables and figures).
- Discussion.
- Introduction.

#### *Second version*

Arrange the ideas in their correct sequence. Carefully revise the tables and figures. Examine the whole paper and ask three questions:

- Is the item necessary?
- Is it in the correct section?
- Are all necessary items included?

#### *Third version*

Discriminate between what is of primary and what is of secondary importance, and ask the following questions:

- What can be shortened?
- What can be simplified?
- What can be summarised all together?

- What can be omitted?

#### *Fourth version*

- Finalise the references.
- Write the abstract and summary.
- Choose a final title.

#### *Final version*

Revise and test the style, as every statement must be tested to be expressive, simple and concise. Be sure of the meaning of every word in the paper [5,6].

Revise the spelling, grammar and syntax. Check the verb tense. The introduction, discussion and conclusions are written in the present tense, while methods and results are written in the past tense.

Ask the co-authors to check the manuscript. Ask a consultant with reviewer experience to read it independently, because when you finally revise the paper it is very easy to read what you think you said, not what you did say.

### Common reasons for rejection

Despite all this hard work, the paper might still be rejected. The common reasons for rejection are:

- The article is not relevant to the journal.
- The paper is not styled for the journal.
- It was a poorly designed trial.
- The article was badly written.
- The conclusions are unjustified.
- There was reviewer/editor bias.

### The next step

Do not be discouraged. Use the reviewers' comments to write a better paper. Finally, it is important to state that writing, like every other art, cannot be learned wholly from books or lectures, but can be learned only by experience. The best training is to start the task and persevere. The act of writing, like surgical techniques, must be learned the hard way, by practice and perseverance. Anyone can start writing but only a good writer can finish the task.

### Conflict of interest

None.

### Source of funding

None.

### References

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