Good scientific writing: science or art?

General Recommendations for Good Scientific Writing Practices.

Importance of writing a research paper

“ *VERBA VOLANT, SCRIPTA MANENT* ” is a latin saying, generally valid also for scientific writing. The earliest academic journal published in Europe is considered the “ Journal des sçavans” (later spelled in modern French as *Journal des savants*), which appeared in January 1665 in Paris, France (1). Shortly after it, in March 1665 made its first appearance in London, England, the “ *Philosophical Transactions of the Royal Society* ”, the official journal of the *Royal Society,* probably the oldest scientific society still in existence. “ *Philosophical Transactions of the Royal Society* ” is considered as the more longest-running scientific journal, and in so doing it originated the“ peer review” method, now the main characteristics of a scientific journal (2). Around 50 million scientific journal articles have been published worldwide since the first appearance of these first academic journals (3). Today, it is widely accepted that scientific writing is the end-point and the final result of all research process. The scientific publishing is actually the only known way through which the results of a research work (scientific or professional) can be accepted as such, communicated to a scientific or professional community and also to the open public. The results of a scientific publication serve as the only basis upon which new actions in clinical practice can be developed in accordance with the actual concept of “ *evidence based medicine* ”. It goes without saying that health research is not a luxury to be conducted only by rich countries. JawaharlalNehru, one of the founders of the modern India, has made the following statement: “ Because we are a poor country, we cannot afford not to do research” (4). Unfortunately, an

important stimulus to write scientific articles is often “ the obligation to publish”, otherwise called as “ publish or perish!”, as almost the principal criterion which enables the acquisition of scientific degrees and titles and defines the professional competence in a particular field. Articles that are written only for this purpose contribute significantly to the poor quality of scientific publications. It is estimated than less than 15% of the scientific papers published worldwide every year are of benefit to the specific domain they are covering (5). So, every researcher must consider the personal responsibility to produce a scientifically valid publication, readable and acceptable from the scientific opinion.

Before writing a scientific paper: Importance of the methodology and study design

The difference between a “ simple open public writing” and “ scientific writing” is mainly based in the “ peer reviewing” concept. The scientific prestige of a scientific journal is mainly based on the quality and strength of the “ peer reviewing” process of this journal and also to its strict adherence to the rules complying with internationally accepted requirements for a scientific article (6).

A scientific paper must succeed to clearly demonstrate how the research work is carried out and what results have been achieved through this research. These facts are necessary not only for the scientific community but also for professionals who perform in the clinical practice. In order to achieve the above result a number of preconditions are required. An important weakness of any publication comes from the lack of a careful and meticulous

planning of the scientific work to do, such as: 1. Lack of clear, original and feasible objectives established since the beginning of the study outline. 2. Deficient methodological planning of the research work. 3. Implementation of not acceptable scientific criteria. Non fulfillment of these preconditions can make impossible to write a publishable scientific article after the research work has been completed. Therefore, before starting the planned research work the author must clarify the following points: 1. The objectives of the research work and the scientific methodology. 2. The formulation of a clear message or hypothesis which has prompted the author to plan the study. 3. The type of the study design must be clearly determined (7) (Table 1). 4. The collaborators in the research work must be defined before the beginning of the study. 5. Last but not least, before starting a research study, the study project has to pass for approval through the institutional ethics committee, a condition requested from most scientific journals.

Table 1.
Study designs in medicine

Basic studies	Observational studies	Experimental (Interventional) studies	Economic evaluations	Meta-Analysis /Systematic Review
-Animal experimenta	Descriptive:	Phase I-IV	-Cost Analysis	

tion

-Method development	-Case report	-Randomised Controlled	-Cost-Minimization Analysis
-Genetic study	-Case series	-Non-Randomised Controlled	-Cost-Utility Analysis
-Molecular/ Cellular level study	-Cross-sectional (descriptive or prevalence)	-Self-Controlled -Crossover	-Cost-Effectiveness Analysis
	Analytical (Inferential):		-Cost-Benefit Analysis
	-Cross-sectional survey		
	-Case-Control		
	-Cohort		

(Prospective

or Historical)

After the research work has been completed, the following points are to be clarified before writing a scientific paper: 1. What is the target audience to be reached and in what scientific journal? 2. What is the best format for the presentation of the research work: as an original article, topic treatment (review), case presentation or correspondence? The format of the paper varies in function of the type of the article. The guidelines for authors of the journal where the paper will be sent for publication must be read carefully before writing in order to fully comply with them. 3. A comprehensive search of the literature and a detailed coverage of the themes under consideration are obligatory and must have the following purposes: a. Identification of knowledge gaps in the existing up-to-date information and that the proposed article aims to fill. b. Elimination of replays if the same message or research project is already published in the literature. 4. Problems associated with the authorship of the article, ethical issues and statistical processing should also be clarified since the beginning of a scientific writing process. Editors and reviewers of scientific articles see for the concision, precision and clarity of the manuscript and they examine the validity of the methodologies used as well as how the scientific hypotheses are presented in the paper. When evaluating journal submissions, reviewers and editors take their decisions on the basis of the novelty and originality of the topics, the validity and power of the statistical methodology, quality of writing, structuring and formatting of each section of the manuscript, originality and usefulness of tables and

graphical materials, and the professionalism in analyzing scientific facts and conclusions. The evaluators (referees and reviewers) also consider ethical issues and the adherence of authors to the guidance of scientific journal editorial board associations (8, 9).

Writing a scientific article

Several recommendations are to be taken into account when writing a scientific article, in order to made it readily acceptable.

1. The titlemust present the content and the completeness of the study and should not be misleading or too long. A running short title is also often required.
2. The authorshipshould include all those who have an active participation in the work and they must comply with the last guidelines of ACMJ (10). On the basis of these recommendations all the authors must fulfill the following four criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition,

analysis, or interpretation of data for the work; AND

2. Drafting the work or revising it critically for important intellectual content; AND

3. Final approval of the version to be published; AND

4. Agreement to be accountable for all aspects of the work in ensuring that questions

related to the accuracy or integrity of any part of the work are appropriately investigated

and resolved.

Only those people who have met all four criteria for authorship, should be designated as authors. Those who do not meet all the criteria should be included in the acknowledgements. Honorific (friend) co-authorship should be avoided. It is recommended that the co-authors of the article can be clearly defined and informed before writing the manuscript in order to prevent any subsequent misunderstanding.

3. The abstractshould provide accurate information and have no cuts. It must include every component of the study and should define the scope of the study, the procedures used (selection of study subjects, methodology, key findings, statistical methods), main conclusions and implications of the study. The implications and benefits of the study should be consistent with the results and should be highlighted.
4. Thekey-words(or short sentences) should include all aspects of the study. Preferably, words listed in the Medical subject headings (MESH) in Index Medicus (Medline) must be used.
5. The introductionmust contain detailed information about the topic and the assumptions or the main issues to be studied must be presented. Four to five major publications on the studied problem from the literature must be critically presented and must be eventually discussed. Gaps encountered in the literature and conflicting data must be noted. The purpose or reason for implementing the study should be

clearly defined in the introduction and the specificity and originality of the study in question must be presented in relation to existing theories and methods on the subject. No need to mention the results or conclusions in this section. A general short overview of the study in question must also be presented in the introduction. This presentation serves as a guideline for the reader to the following sections of the manuscript.

6. Material and Methods section. The selection of subjects under study should be described in detail. The research plan should be presented clearly and it must answer to the questions to be solved. The methods, equipments, procedures should be described thoroughly so as to allow their reproduction. The procedures used for acquiring the data should be presented clearly as well as all methods should be referred in detail including statistical methods.
7. The resultsmust be presented in a logical flow in the text and also in tables and figures. The most important observations should be highlighted or summarized. Results section should made statements and not include opinions. Unexpected or negative results should also be presented.
8. The discussionsection should cover all aspects and the eventual controversies of the study. It can pass also beyond the results achieved and can cover or criticize methodological problems. The discussion should not be used as a platform to express opinions. The reader should not be diverted into another subject. The original results are to be compared with other similar studies. The similarities and differences should be highlighted.

9. At the conclusionsthe new and most original aspects of the study should be highlighted. The possible applications of the obtained results but also their limitations should be discussed as well as the exit point of the demand for further studies in the areas of interest involved in the study.
10. The number of referencesshould be reasonable (neither too many nor too few). Avoid using “ abstracts” of conferences and congresses as reference. The references must be verified by the author against the original articles. It is recommended that the source references must be cited and not publications where these references are cited. The references are to be presented according to the standard guidelines of the journal where the manuscript will be sent for publication.

Avoiding “ scientific misconduct”

The “ scientific misconduct” is a sensitive matter, largely discussed in the scientific community. It comprises data fabrication or deformation, plagiarism of ideas or of entire text parts, sentences, affirmations or conclusions and also duplicate or multiple submissions or publications. Data fabrication or deformation is considered as the worst form of a scientific misconduct. It is also the most difficult to be detected since it requires a very thorough review from the referees (reviewers) of the manuscript and often a specialized biostatistician. If suspected, the editorial board of the journal has the right to request the entire data base of the source from where the results have been drawn. The author must be ready to provide to the editorial board all the records of the data that have been elaborated in the results section. If

any data manipulation or fabrication is detected the paper must be retracted from the publication. Plagiarism is another form of scientific misconduct and it is actually a real concern if considering the myriad of scientific publications worldwide. There are many forms of plagiarisms. The plagiarism of ideas is often difficult to define since the same idea can be presented in different forms and conditions or applied in different groups of individuals or population (10). The “ verbatim” plagiarism of entire parts of a text is more easy to be detected since there are actually many computer programs capable of detecting such plagiarism at different degrees (11). There are many forms of textual plagiarism. If less than 100 words are plagiarized it is called as minor plagiarism and the authors are asked to correct it. If more than 100 plagiarized words are found then it becomes a major concern for the editors and reviewers. This sort of plagiarism is a common transgression among non native-speaking English authors, who are prone to copy ready-made phrases or part of text instead of constructing them from the beginning. In order to avoid this source of plagiarism, it is recommended that non native English speaking authors must write down at first the manuscript in their own native language and then translate it in medical scientific English. The review of the text by a native English speaker before its submission is highly recommended (12, 13). It is also recommended that before sending the manuscript for publishing the author must pass himself the text through a plagiarism detection software in order to prevent any further scientific misconduct suspicion. Another form of scientific misconduct is the case when a manuscript is submitted in two or more scientific journals at the same time (duplicate or multiple submissions). Most of the scientific journals request a statement that the submitted manuscript has not been

sent concomitantly elsewhere for publication. If a duplicate or multiple publication has resulted from this kind of submission, the journal detecting it has the right to proceed for the article retraction. Finally, following the steps recommended above for the design of the research work and its implementation is a necessary condition for achieving a positive result in the publication of a scientific article.

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10. Authorship recommendations

COPE – Committee on Publication Ethics. http://publicationethics.

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for scientific publication including the International Council of Medical Journal Editors (ICMJE), the World Association of Medical Editors (WAME), the Council of Science Editors (CSE), the European Association of Science Editors (EASE) and now COPE,

Best Practice Guidelines on Publishing Ethics: A Publisher’s Perspective. Second Edition, 2014 John Wiley and Sons

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