
Educational Technology

Aid to Good Medical Writing

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Most of us, particularly in the early years of our career, aspire to have a curriculum vitae that runs into several pages, most of which list papers one has published. This compulsive desire to see ones name in print is compounded by an, albeit misplaced, universal emphasis on publications' as a criteria of determining competence and suitability for academic positions.

The last decade has seen an explosion of new medical journals. It is my impression that because of this, it has probably become easier now to get ones paper accepted for publication. In spite of this, the average Indian researcher still faces major problems in having his research published in a leading journal. There are two important reasons for this: (z) poorly conceived and conducted research; and (ii) poorly presented research,

It is clear that poorly designed and conducted research will never yield a worthwhile paper and, therefore, due attention must be given to this aspect at the conception stage. It is not my intention to write about how to conduct good research. Having presumed that a scientifically valid research has been conducted, my aim here is to polish up areas of presentation of data

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that can make all the difference between a good paper and a mediocre one; a difference that can decide whether the paper is accepted for publication or rejected. The interested reader may consult excellent detailed monographs on **this subject(1-3)**.

Aim of Writing

The aim of writing up research is to contribute to the advancement of science and, indeed, patient care. However, for an individual researcher the aims are; (z) that a *good paper* appears in a first-rate journal; and (ii) that the *research is read* by the largest possible number of people. Unfortunately, even amongst the published papers, only a minuscule number actually contribute to an advancement of scientific knowledge. The rest are, as one author put it, "anecdotal garbage".

Warming up

There are certain fundamental principles of any kind of writing and particularly relevant to writing medical research, that one must never lose sight of.

1. Writing is always hard work, and there can be no short cuts if one hopes to produce something that other people would want to spend time reading.
2. Don't start writing only because you must. You must have something to say, only then are you likely to succeed.
3. Never manipulate data or mislead, because truth will ultimately be out.
4. It is never possible to cover up lack of scientific substance by literary flourishes. Therefore, it is not necessary to know Shakespeare to be able to write a good scientific paper.

5. One must avoid duplicating publications or breaking up one research subject into three or four papers ('salami research').

The ingredients of a good paper with a high probability of acceptance are:

- (i) originality of research,
- (ii) relevance and applicability,
- (iii) good scientific data,
- (iv) simple writing style,
- (v) lots of luck.

Getting Started

Half the battle is won if before you start to think about "How to write?" you pause and ponder over "What to write?" and "Where to submit?". Having conducted and concluded the research project one sits down to analyze the data. It is usually possible to conclude whether the data is meaningful or not, and whether it is of any use to others or not. The first question to ask yourself is "Is there a message?". A good measure of your likely success is if you can clearly write the conclusions of your study in one sentence. Problems arise when your boss tells you to dig into departmental records and write up the experience of, say, a particular treatment modality. This is a retrospective collection of data and is likely to have a lot of flaws. Such papers are difficult to write and equally difficult to accept for publication. Sometimes, however, they may have a clear and important message by virtue of a large body of experience. But as far as possible, plan research prospectively. Then you can set yourself a question and come up with an answer that will be the message of the paper.

The next thing to worry about is "*What is the best format of presentation?*" of your research. Is the content really worth writing about, or is it only relevant to your

colleagues in the speciality locally, in which case you should plan only for an oral presentation. In case you think it should be written up, decide at the outset whether it should be presented as a review article, original article, case report or a letter. Also, decide early "*What is the target audience?*" for your paper. As pediatricians you may have undertaken a study that may best be appreciated by physiologists, or your findings may excite obstetricians. The paper must be written with the target audience in mind and to an appropriate journal that is read by that audience. It is, therefore, important to decide at the outset "*Which journal?*" do you intend to send your paper to. This decision will be influenced by several factors including target audience and higher probability of getting ones paper accepted. But the reason why this decision must be taken early is that starting from the first draft, the paper must be written in the style and format of the journal.

Groundwork

Let us now attempt to jump the first hurdle. At this stage itself, if you have not already done so far, *decide on the authorship*. Whose names will appear on the paper and in which order. Any delay in taking this ticklish decision is bound to cause heartburn. In this context, I refer you to the guidelines on authorship that have been recommended by an International Committee of Medical Journal Editors(4).

Next, a *complete literature* search must be done before you embark on writing a paper. If the same data or message has been written before you a hundred times over, pack up! On the other hand, a good literature search may help you identify gaps in existing information that your paper may help fill up. Highlight these aspects in your paper; you are more likely to succeed. Also, get the appropriate ethical, statistical and copyright clearance for the paper in the

beginning itself. It is a good idea to have all the illustrations prepared and collected before you set out.

The First Draft

Most journals would like the text of the paper to be presented in the format:

Introduction: What question was asked?

Methods: How was the answer to this question sought?

Results: What was found?

And

Discussion: What is the answer to the question after assessment of all available evidence?

Besides this body of text of the paper, there are two important show windows, the *Title* and the *Abstract*.

Title

This is the reader's first encounter with the paper in the 'Contents' page of a journal. Naturally, the title will decide whether the reader will turn to that page of the journal and want to read on. The title must, therefore, be descriptive. It must also be short and simply worded to catch the reader's attention. Although attractive titles are more eye-catching, they should avoid sensationalism. A good, reliable and simple technique is to briefly write the question that was asked, or the answer that was arrived at.

Abstract

This is like the trailer to a film, and is about as far as most readers will go while scanning a journal. A good abstract provides, in 150-250 words all the information about the paper; the aim of the study, the methodology, the results obtained and the conclusions drawn. A good abstract stands alone. Most journals demand a *structured*

abstract where the abstract is split into sub-headings: objectives, design, setting, methods, results, and conclusions. Considerable time must be spent in writing the abstract since the editorial reviewer is likely to make his initial impression about the paper by reading the abstract.

Introduction

Try and avoid the "Once upon a time..." beginning to your paper. Remember that you are not narrating a story and neither is the 'Introduction' a review of the subject. Briefly but clearly state "What you wanted to do" and "Why you did it". In other words, spell out the question or hypothesis that your research aimed to settle. Also explain why the research was undertaken - were there gaps in existing knowledge or was the existing data conflicting in its conclusions.

Methods

This section is really the Waterloo of a majority of papers. A keen eye will very quickly detect the chinks in the armor of the paper by looking at the "Methods". This section should be fairly descriptive for two reasons:

1. It must convince the reader that the results obtained and the conclusions drawn have been by fair means and using appropriate methodology. This will judge the authenticity and validity of the paper;
2. It should give sufficient information so that others can repeat the experiment. This section must give three details: (i) How was the study designed? - was it prospective, randomized, community-based, *etc.*, (ii) How was the study carried out? - how were the patients selected, what were the exclusion criteria, details of intervention, etc; and (iii) How were the results analyzed? - details of statistical methods.

Results

This part is probably the easiest to write as it is a compilation of facts and observations. This section provides the evidence that leads to the answers to the question you posed in the Introduction. The reader should be guided to these findings by using the text of the Results along with a judicious use of Tables and Illustrations. Narrative is a good style but avoid terms like 'majority', 'most of the patients', 'in some cases', 'significantly greater than'. Follow a sequence. Do not jump from one group of patients to another and then back to the first. All the patients must be accounted for in Results. Do not hesitate to give negative results. Also, describe the unexpected findings, if any. Do not use percentages or statistical figures when the numbers are small and these figures are irrelevant.

Discussion

It is usually a good idea to begin this section by giving the answer to the question you set out with. Next, support this conclusion by stating the main findings of your research. Compare this data with other published information and bring out the similarities and conflicts, if any. Discuss in detail the implications of your findings. Most reviewers and, indeed readers, will appreciate if you also highlight the shortcomings of your study. Don't behave like an ostrich. The shortcomings of your paper will be evident even if you wish to hide them; so be bold and own up. Wind up the Discussion by giving your conclusions from your assessment of available information highlighting the message to the reader and the practical implications of the observations. You may also wish to suggest the need for additional research and the direction or format this research should take.

Tables and Illustrations

This is the jewellery of a scientific

paper. If used tastefully it can enhance the worth of any paper, on its own it is simply cold metal. Computer graphics have made this section very versatile. I concede that exciting graphics can easily impress an observer and enhance the paper's acceptability. But don't get carried away. The basic purpose of Tables and Illustrations is that it should help the reader understand the text better. In this day of rising printing costs, most editors prefer to keep the number of illustrations to a minimum. Most of the numerical data of Results section could go into well constructed Tables for easy comprehension. The role of illustrations is to provide evidence of authenticity (as by histology slides, etc.) and to emphasize an aspect of the paper.

References

This section ties the author in knots if not properly handled. Stick to the journal format of writing the references. Most journals would like the references to be cited in the Vancouver style. Write all cited references on a separate sheet and leave the numbering of the citations in the text for the last. Since if the text is rearranged, then the numbering goes haywire and can cause untold misery. Always read the whole article that is being cited in original. This will prevent errors in interpretation and avoid misquoting.

Peer Review

Heave a sigh of relief! You are this far and still alive. The next thing to do is to sit on the first draft for a couple of weeks. Or may be give it to your colleague for a critical review. It should be a colleague who is capable of and should be willing to provide constructive criticism of your first draft without being scared of you. In fact, appreciate his efforts, for you can use his comments to improve your paper while there is still time.

Revising Drafts

While looking at the remains of your first draft and the caustic comments of your colleague, pick up heart and press on. Ask yourself:

1. Is the Title accurate? Does it attract?
2. Does the Abstract reflect all that the paper wants to say?
3. Does the Introduction put the question asked briefly and clearly? Does it make the reader want to read on?
4. Are all the statements and facts of the Main Text accurately, clearly and simply said? Are there any irrelevant statements, paragraphs or illustrations? Are there any contradictions in the paper? Are there any repetitions? Are all the references necessary?

Style

You now have a paper that is worth a try at publication. If you wish to enhance its chances of acceptance, apply cosmetics. Unfortunately, English is not our mother-tongue and our command over it can never be natural. Style, therefore, comes to us by repeatedly writing, falling, getting up and writing again. Components of style that could make your paper crisp and easy reading are:- fluency of thought, clarity of expression, accuracy, economy of words and phrases and grace.

The Watch Dog

Your precious, gently nurtured paper now reaches the rough hands of the editor of a journal and his expert reviewer. It is a good idea to know how a reviewer's mind works because if your paper satisfies all his queries and expectations, you have won the battle. The reviewer must decide for the overburdened editor, usually in a short period of time, whether the paper is fit

for publication or otherwise. Some of the points the reviewer looks for in a paper are:

1. Is there a clear hypothesis or question?
2. Has appropriate methodology been used and are the techniques up to date?
3. Are the results understandable and believable?
4. Are the conclusions supported by data?
5. Does it add to the existing knowledge?
6. Is the study interesting, important and worthwhile to the reader of the journal?

Post Script

It would be apt to conclude by a quotation from O' Connor and Woodford(1): *"Getting down to writing a paper for a scientific journal is like trying to start an old car on a frosty morning; the would-be driver is anxious, the car is cold and reluctant, and both man and machine suffer for a while"*. In this chapter I have tried to help budding authors through this painful period by suggesting how they can get the machine running smoothly. *"Editors and referees will sometimes rescue an author whose prose has broken down - but they are busy people whose humanitarian instincts should not be abused, and it is better for all concerned if authors try to submit papers that are in good working order"*.

REFERENCES

1. O'Connor M, Woodford FP. Writing Scientific Papers in English. London, Pitman Medical, 1978.
2. Hall GM. How to Write a Paper. Delhi, Byword Publishers, 1996.
3. Huth EJ. How to Write and Publish Papers in the Medical Sciences, 2nd edn, Baltimore, William and Wilkins, 1990.
4. Huth EJ. Guidelines on authorship of medical papers. *Ann Intern Med* 1986; 104: 269-274.