

Letters to a Young Researcher

tips on writing a good clinical research paper

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One of Rainer Maria Rilke's best-known works is *Letters to a Young Poet*, in which he offers advice to an aspiring author. This article is offered in the same vein (although admittedly without Rilke's wonderful lyricism). I've written or edited many clinically-oriented research papers over the years, and I've read hundreds more along the way. In this article I'll discuss some mistakes I've made myself and that I often see others make, turned into tips on writing a good clinical research paper.

1. Write the paper you'd want to read.

Resist the impulse to copy the dull, inanimate style of the "serious" papers in the "serious" journals—*i.e.*, papers that read like they were written by aliens from outer space, observing the human species from a distance. Instead, be both professional *and* personable in your writing.

Contrary to popular belief, 'professional' does not mean lacking in personality or warmth. You *can* use the first-person, active voice in your narrative; in fact, I encourage it. For example, "we conducted a randomized, placebo-controlled clinical trial" is more inviting to a reader than "a randomized, placebo-controlled clinical trial was conducted." And for god's sake, *please* resist the temptation to refer to yourself as "the author" or "this author" (*e.g.*, "in this author's experience, ..."). Referring to yourself in the third-person is an unnecessary, and frankly ridiculous, pretension to objectivity.

While still following the conventions of the standard scientific paper and the specific guidelines of the target journal, write in a *viva voce* (Latin, "with living voice") style. Use an authoritative yet conversational style—the type of language, terms, and phrases you'd use when discussing your work with a colleague at a scientific meeting.

In other words, dare to leave a little of yourself in your writing; it'll make your paper more readable, more authentic, more compelling, and thus more memorable. (Aim to write "keepers," which is what I call papers I found so informative and articulate on a subject that I just had to keep them.) Furthermore, making your paper more readable also helps get it through the review process. Reviewers are people, too.

2. Tell the reader what you think about your data.

I don't know how many times I've read a paper that left me wondering what the author wanted me to make of the results. Perhaps the paper was written that way because the author was fearful of being criticized for speculating (which, by the way, is not the mortal sin it's so often made out to be in science...) or had been smacked by a reviewer for speculating on what the results might mean. Perhaps the author assumed that the reader already knows what the author knows (which is generally not the case, hence the paper!).

It is not enough to simply present your results or acknowledge your study's limitations. You also have a responsibility to the reader to discuss what you think your study findings or limitations

might mean to the interpretation and application of your results. Be willing to speculate (within reasonable bounds); just be sure to make it clear to the reader that you're 'wondering aloud', rather than stating a fact or drawing a conclusion.

Remember that *you* are the authority on your study, so tell me (the reader) what you make of your findings. I may agree or disagree with your reasoning or your conclusions, but don't leave me guessing what you think it all means.

3. Stay focused.

Another common mistake, particularly when presenting part of a larger research project such as a doctoral thesis, is putting everything you know about the subject, and every reference you've found about it, into the paper. A journal article is not a dissertation.

One habit that's saved me countless hours of tedious work, indecision, and revision is this: before I've written a single word of the paper, I write the central point of the study on a sticky note and put it by my computer screen so that it's always in my line of sight when I'm writing. I limit the core message to one short sentence (or less), because if it won't fit on a sticky note, it's too long!

That core message is like the hub of a wheel: every part of the paper radiates out from it and feeds back to it, and the whole paper revolves around it. Every time I get lost in the minutiae of the data and the supporting literature (which happens a lot!), I return to the core message. It helps get me back on track when I drift off course, and it helps me 'trim the fat' so that I'm able to keep to the journal's word limit and present a paper that is clear, concise, and coherent.

This one thing—articulating the core message in one sentence or less—is perhaps the single most useful piece of advice I can give another author. It has kept me on track more times than I care to admit. (Incidentally, this core message should also be at the center of your hypothesis; in fact, your hypothesis may be your sentence.)

4. Dare to be original.

The thing I find most tedious about doing a literature review is how highly derivative and tepid so many papers are these days. (Perhaps it's always been this way in science and I've only lately reached my limit of tolerance for it.) Not only do these papers make reviewing the literature a highly repetitive task, but each paper has added very little of value to the body of scientific knowledge on the subject. In other words, they are hardly worth the time and effort that went into writing them—or into reading them!

Another thing I find exasperating is the pedantic and frankly timid nature of some papers that really could be groundbreaking if only the author had dared to utter an original thought—a thought not (yet) supported by a vast body of fossilized literature. It may be proven wrong at some point, or incomplete, if not inaccurate; but what if it's right? What if Albert Einstein had remained welded to his seat in the Bern patent office and never dared offer up the results of his now-famous "thought experiments" for scientific scrutiny?

If scientists won't dare to be original, then science won't advance at any useful rate. It is said that "the wheels of justice turn slowly, but grind exceedingly fine." The same might well be said of science. One could also say that the wheels of science grind finely, but turn exceedingly slow.

While essential components of the scientific method include scrutiny and reproducibility, progress in science need not be quite so slow. As long as your data (and whatever literature you can find) reasonably support your speculations and conclusions, then dare to voice an original thought about the implications of your findings. You just may furnish your field of study with the quantum leap it needs; and short of that, you may point to new and potentially fruitful directions for further study.

5. Be concise.

Depending on who you read, there are three or four essential components to good technical writing: the work should be clear, concise, complete, and correct. My three Cs are clear, concise, and coherent (*i.e.*, the logic of the argument holds because it is complete, correct, and well ordered).

One of my favorite passages from Ursula Le Guin's interpretation of the *Tao te Ching* is this: "Nature doesn't make long speeches. A whirlwind doesn't last all morning. A cloudburst doesn't last all day. ... If heaven and earth don't go on and on, certainly people don't need to."

Or to quote my mother, "a good preacher is one who stands up, speaks up, then shuts up."

The same goes for a good clinical research paper. Use the word limit specified by the target journal as your own 'hard limit'. In particular, keep your Introduction short and to-the-point; 500 words should be plenty. If there's more you want to say about the background of the study, then refine your message. Be ruthless, even if it means cutting some of your favorite creations. You have room in the Discussion to elaborate if necessary, but that too should be clear, coherent, and concise.

6. Understand your statistical methods.

It's important for you to understand what was done to your data mathematically so that you can accurately summarize the results for the reader. In my experience, very few clinicians have a thorough grasp of statistical intricacies, so you must be able to accurately describe your results and their meaning without overstating them. In other words, you need to have a good grasp on what your results say and what they *don't* say in regard to your hypothesis. You can do that only if you fully understand the stats yourself.

When in doubt, ask a biostatistician. When not in doubt, ask a biostatistician. If you're inclined toward self-help books, I highly recommend [*Intuitive Biostatistics, a nonmathematical guide to statistical thinking*](#) by Harvey Motulsky, MD. (For us mathematically-challenged clinical types, it's positively mind-bending!)

7. Play devil's advocate.

Get into the habit of playing devil's advocate with your work. Sometimes I'll do that in process, while I'm writing a section, although it can stymie the writing process. The paralysis of indecision is no small thing, so usually I'll complete a first draft of the paper (or a key section) and then read back over it as if I'm a reviewer or a skeptic.

Not only does this habit make the paper stronger in terms of its logic and flow, it helps get the paper through the peer-review process because you'll have found and corrected, and thus pre-empted, a good many objections the reviewers would likely have raised. Some of those objections are serious enough to scuttle the paper at initial review, so this step is crucial if your paper is to stand a good chance of getting accepted for publication.

This habit also helps limit post-publication criticism by readers in the form of letters to the editor, invited comments below articles published on the web, and other informal but sometimes painfully public peer reviews. This practice has become increasingly common (and scathing) in recent years—so much so that it ought to be factored in to the lifespan and impact of a clinical research paper. A retraction can be damning for a research project and ruinous to a professional reputation.

This step (self-review) can be difficult, but it's important. Making sure your logic is sound *before* the paper is sent for review can save a lot of time and effort later. Here again, referring back to your core message helps keep you on track.

8. A picture is worth at least 500 words.

Wherever possible, use tables and figures (graphs, photos, drawings, flow charts, *etc.*) to make your point. Not only can illustrations convey your core message better than any number of words can do—particularly these days, when so many readers are skimmers and attention spans in general are short—illustrations can also help you stay within the required word limit for the paper.

That said, make all tables and figures as simple as possible. Keeping the journal's specifications in mind as to the maximum number of tables and figures, it is often better to have several smaller tables than a single large, complicated, and cluttered table. The same goes for graphs and charts. If you try to make your illustrations do too much, the result is confusion rather than clarity.

9. Write a compelling title.

Some journals specify how the title is to be constructed. For example, a journal which requires that “the study design should be clearly stated, in the form of a full explanatory clause separated from the main title by a colon” would expect a title such as this: [*Clinical and cost effectiveness of switching asthma patients from fluticasone-salmeterol to extra-fine particle beclometasone-formoterol: a retrospective matched observational study of real-world patients.*](#)

However, most journals do not place constraints on the title, except perhaps on its word count. Although almost all journals require the author to designate a certain number of key words, the title of the paper is still a very important means by which busy readers find and decide whether or not to read your paper. So, consider the title as the first and best “marketing” tool for your paper.

Take the time to craft an inviting title that piques the reader's interest. Here again, your “hub” sentence can be very helpful. In fact, sometimes your core message can be crafted into the title of your paper; for example, *Switching asthma patients from fluticasone-salmeterol to extra-fine particle beclomethasone-formoterol is clinically- and cost-effective.*

Start by writing what you want to say in the title, then refine it. You may even want to wait until the paper is finished before finalizing the title.

10. Use the abstract as an outline.

It may seem odd that this point is last, when the abstract or summary typically goes at the start of the paper, and apart from the title and author details, it may be the only part of your paper many readers will see. I find the abstract to be the most difficult part of preparing a clinical research paper, primarily because most journals impose a very tight word limit on the abstract, so I have to keep cutting and honing until the abstract is under the limit. However, the abstract is a useful place

for me to write an outline for the paper because its narrow parameters force me to focus on the key findings of the study; it's sort of a long form of my "hub" sentence. I finalize the abstract as the penultimate thing I do (the last is spell-checking the entire paper), but I do a rough draft of the abstract at the start so that it serves as a road map for the paper and I never lose sight of the main points (for very long).

Final thoughts

Writing a good clinical research paper needn't be like pulling teeth with rusty pliers and no anesthetic. Start by deciding exactly what you want to say in the paper, and approach it as if you're writing to a colleague (which is pretty much what you *are* doing), then the whole thing will flow more easily and your paper is more likely to be well regarded. Perhaps it'll even be a keeper.

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