Good Scientific Writing: Advice from the Editors of *Chiropractic & Osteopathy*

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"A sentence should contain no unnecessary words,
a paragraph no unnecessary sentences,
for the same reason that a drawing should have no unnecessary lines
and a machine no unnecessary parts." [1]

Simply phrased, the goal of scientific writing is the succinct, effective, written communication of facts and ideas. Although numerous characteristics of style can contribute to good writing, we will focus on what we think of as *the big three*: submitted manuscripts must be complete, clear, and concise..

Complete:

Provide all information readers may need to comprehend, interpret, and replicate your findings. Avoid general terminology, in favor of words carrying all useful detail. For example, in a case report:

The patient expressed discomfort

would carry less meaning than:

The patient complained of nausea and dizziness

Clear:

Clear writing yields a manuscript that is unambiguous. We favor any element of style that supports this objective. For example:

1) Use correct grammar and punctuation to enhance clarity. Such rules of style help writers assemble and arrange parts of speech to facilitate readers' quick and accurate interpretation.

2) Use common or simple words wherever possible. Familiar English usually leads to quicker and more certain interpretation of ideas, than uncommon, more complex language. This does not mean that fancy wording or jargon cannot be useful in scientific writing, but try to use words that will be understood by all.

3) Sequence concepts logically, in an active voice. Even if you have used correct words, clumsy ordering may jeopardize clarity, conceptual flow, or even understanding. A "rule of thumb": the fewer punctuational pauses required, the better. Writing with fewer commas, semi-colons, and parentheses is usually more direct and naturally flowing, helping readers interpret meaning more quickly and reliably. For example:

She rinsed all bottles with a bleach solution, to sanitize them.

is more directly (and succinctly) phrased as:

She sanitized all bottles with a bleach solution.

4) Write concisely. You can enhance clarity by removing all words that do not help carry your message.

Concise:
Readers of scientific writing are often trying to maintain an up-to-date knowledge base, for their own scholarly use, or to assist their clinical practice. When they read your work, the more quickly they can digest your question(s), protocol(s), results, and conclusions, the sooner they can move to their next task. Except for words necessary to make your submission complete and clear--the fewer, the better.

For example, please read the following sentence for understanding:

These two protocols produce different side effects that are important, and that need to be taken fully into account when studies of the outcomes following these two particular interventions are conducted.

Now, see if you agree that rendering this sentence in 11 words (rather than 31) permitted you to make sense of it more quickly:

When comparing efficacies of these interventions, side effects must be considered

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Another "rule of thumb" for good scientific writing: use as many words as you must to communicate your idea clearly, and not one word more (or fewer). If we judge that a word, phrase, or sentence does not help deliver your message, we may require that you change or delete it.

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Submission:

Even if your science seems good, if we judge your submission incomplete, unclear, or wordy, we will return it for cleansing—usually before peer review. To maximize the likelihood that external reviewers and editors will receive your submission with favor, we recommend the following protocol:

1) adhere strictly to our Instructions for Authors [2];

2) as your manuscript nears completion, scour it for grammatical and punctuational flaws;

3) remove every word that does not help carry a message;

4) use common language, rather than terms possibly known only to English linguists or

content specialists (if you must use special terms, define them);

5) avoid general terms, in favor of words that carry more meaning; and

6) move or change words, passages, and paragraphs, to maximize clarity and conceptual flow.

7) After a long enough break to permit a fresh perspective, read your manuscript again. (Writing can be enjoyable, if you give yourself time to do it right; repeat this step as often as necessary.)

Once satisfied that your manuscript is as clean as you can make it,

8) share it with one or more colleagues likely to notice remaining ambiguities or grammatical flaws.

Finally, if English is your second language (or you still are not confident that your manuscript is as clear and concise as it can be), we **strongly** recommend that you

9) engage a professional copyediting service.[3]

No BioMed Central journal editors (including those of *Chiropractic & Osteopathy*) provide detailed copyediting prior to publication. This important step is left to authors.

Share with copy editors the preceding items two through six, so they understand that you want them to render your manuscript as clear and concise as possible. Also, request that they make these alterations without concern for your personal writing style or feelings.

If your work is properly reported when submitted, the process leading to publication will be more enjoyable for all (and months faster).

Sources:

1. Strunk W and White EB: *The Elements of Style (4th Ed.)*. New York: Longman; 2000:23. [We recommend this classic because it offers a concise, user-friendly perspective on what constitutes good writing.]

2. For concise presentation of conventions of style and formatting not specified in our Instructions for Authors (http://www.chiroandosteo.com/info/instructions/), see: The Cochrane Collaboration: *Cochrane Style Guide, 3.0*; 2005 (http://www.cochrane.org/style/csg.htm).

3. For copyediting, use any service that you know to be reliable. After testing several, we were most pleased with David Sutton (http://www.adeptedit.com) BioScience (http://www.biosciencewriters.com) and Lindsay Schuenke (http://www.schuenkecommunications.com).