A checklist to improve your writing

For the last several years, I have lead several courses on scientific writing in the US and Europe. In my courses, I provide participants with several simple things they can do to improve their writing. Recently, several participants have requested a checklist summarising these ideas. My eight-item checklist is shown in Figure 1, and in this article I explain and give examples for each item.

Item 1: Avoid nominalisations
Nominalisations are probably the most pervasive problem in scientific and medical writing. They are verbs turned into nouns, such as “it is” or “there are”. Nominalisations are probably the most pervasive problem in scientific and medical writing. They are verbs turned into nouns, such as “it is” or “there are”. For example, treatment is a nominalisation of the verb treat, but of course it’s ok to use it.

Item 2: Avoid phrases and sentences starting with “it is” or “there are”
Like nominalisations, it is and there are create awkward sentences and so should be avoided. This is discussed in more detail by Tom Lang (page 21) in this issue of Medical Writing. Below are some examples and how they might be replaced:

In patients treated with ibuprofen, there was a much earlier onset of pain relief.
Replace with: In patients treated with ibuprofen, onset of pain relief was much earlier.

It is known that oestrogen is a steroid hormone...
Replace with: Oestrogen is a steroid hormone...

It is possible that neutrophils contribute to other aspects of passive protection.
Replace with: Neutrophils might contribute to other aspects of passive protection.

Note: With nominalisations, it is and there are are sometimes the best solution, but consider whether an alternative solution is possible. By the way, I could also have said “consider whether there is an alternative solution”, which would have been ok. However, keep it and there are phrases to a minimum to avoid tiring your reader.

Item 3: Eliminate useless words
Wordiness is a frequent problem for many writers. Do what you can to eliminate unnecessary words, because they are another way of tiring your reader. For further detail, refer to articles in this issue of Medical Writing by Christine Müller (page 14), Barb Every (page 17), and Tom Lang (page 21). The following are some examples of useless words and how they can be eliminated:

In order to
Replace with: to

A past history of
Replace with: a history of

A bigger/higher/larger amount
Replace with: more

The objective/aim/goal of the study was to investigate...
Replace with: This study investigated

It is well known that/previous studies showed that/it is thought that...
Replace with: Nothing – delete!

A history of
Replace with: A past history of

Jack and Jill are a boy and a girl, respectively.
Replace with: Jack is a boy, and Jill is a girl.

The incidence of herpes zoster decreased by 17.2%, 27.3%, and 55.2% in subjects immunised with 5 μg, 12.5 μg, and 25 μg antigen, respectively.
Replace with: The incidence of herpes zoster decreased by 17.2% in subjects immunised with 5 μg antigen, 27.3% in subjects immunised with 12.5 μg antigen, and 55.2% in subjects immunised with 25 μg antigen.

Item 4: Eliminate “respectively”
Respectively causes the reader to look backwards to decipher what happened. This tires and confuses the reader so is best avoided. Unlike nominalisations and it is and there are, I recommend that you always delete the word respectively. Here are some examples:

Jack and Jill are a boy and a girl, respectively.
Replace with: Jack is a boy, and Jill is a girl.

The incidence of herpes zoster decreased by 17.2%, 27.3%, and 55.2% in subjects immunised with 5 μg, 12.5 μg, and 25 μg antigen, respectively.
Replace with: The incidence of herpes zoster decreased by 17.2% in subjects immunised with 5 μg antigen, 27.3% in subjects immunised with 12.5 μg antigen, and 55.2% in subjects immunised with 25 μg antigen.

Figure 1. Writing checklist
A checklist to improve your writing – Leventhal

antigen. Alternative: The incidence of herpes zoster decreased by 17.2% at 5 µg antigen, 27.3% at 12.5 µg antigen, and 55.2% at 25 µg antigen.

**Item 5: Use parallel structure**
Parallel structure means using similar grammatical constructions for different items in a list. It makes complex sentences easier to understand. Parallel structure is discussed in some detail in a previous article in Medical Writing by Michelle Arduengo. Here are some examples:

*The time to treatment failure was 12.2 months in the group treated with drug X, compared to 3.1 months in the placebo group.*

**Replace with:** The time to treatment failure was 12.2 months in the drug X group and 3.1 months in the placebo group. Alternative: The time to treatment failure was longer with drug X than with the placebo (12.2 vs. 3.1 months).

**Explanation:** The construct in the original text is common in writing by non-native English speakers. It causes the reader to stop to realign the information. In the revisions, the information is realigned so that the reader does not have to do it. In the first suggested replacement, the construct in both halves of the sentence is xx months in the xx group; in the second suggested replacement, it is simply with x.

**Item 6: Avoid multiple hedges**
A hedge is simply a way of avoiding doing something definite. For example, you can hedge your bets when you play cards by not betting all of your money. Scientists are frequently told to not say anything definite because new information can come along invalidating their conclusions. Similarly, in medical writing, company compliance officers often ask to avoid saying anything definite for legal reasons. Hedges are ok, but you only need one. For example:

*These preliminary results suggest the possibility that the drug might be effective at reducing the incidence of the disease in some populations.*

**Replace with:** These results suggest that the drug will reduce the incidence of the disease.

**Explanation:** The original sentence contains the following hedges: preliminary, possibility, might, and in some populations. By hedging four times, this sentence ends up concluding nothing.

**Item 7: Keep the subject and verb close together and where the reader expects to find them**
This is another common problem for non-native speakers of English, although it can also be a problem for native speakers too. In English, the subject and verb need to be obvious. Searching for them tires and confuses the reader. Also, within a paragraph, the topic of the previous sentence needs to be linked to the subject of the following one to create a logical flow of ideas. This issue was also discussed in detail in the previous article in Medical Writing by Michelle Arduengo. Linking ideas within paragraphs is discussed in this issue of Medical Writing in an article by Amy Whereat and me (page 38).

Here is an example:

*A critical gene that serves as a beacon and gives cells a much needed sense of direction in the chaotic days of early development has been identified by HHMI researchers.*

**Replace with:** HHMI researchers have identified a critical gene that serves as a beacon and gives cells a much needed sense of direction in the chaotic days of early development.

**Explanation:** In the original sentence, the subject is not clear and needs to be identified to understand what the writer meant. In addition, the verb is not clear. Is it gives or has been identified? In the revision, the subject is clearly a critical gene and the verb have identified. In addition, the verb comes just after the subject, making the sentence easy to understand.

**Item 8: Use abbreviations sparingly**
Although counter-intuitive to many writers, having more abbreviations makes a text more difficult, not easier, to understand. The reason is that abbreviations often make the reader go back and search for definitions. Reserve abbreviations for complex, multi-word expressions that are used at least three times.

**Exercises**
Rewrite the following sentences for maximal simplicity.

1. Previous studies have shown that AIDS is caused by the HIV virus.
2. The rate of response showed an increase with the dose.
3. The trial subjects exhibited an apparent dose response to the treatment with responder rates of 17%, 40%, and 61% after treatment with placebo, 100 mcg, and 600 mcg, respectively.
4. It is well known that there are no differences between the effects of the treatments in terms of fertilisation rate or number of embryos transferred.
5. A positive correlation has been shown between monoclonal antibody-dependent complement deposition on pneumococci and passive protection in mice.
6. In a majority of cases it is a combination of social, psychological, and biological factors that cause major depressive disorder.
7. A larger proportion of cells treated with polymixotine underwent apoptosis compared to cells treated with placebo.
8. We observed the death of all mice in these treatment groups within two days.
9. Macrophage depletion using cladronate liposomes resulted in the elimination of the protection of all mice from death.
10. At this point, it is important to consider whether counselling may be productive.
11. Local reactions were observed with a higher intensity and with a longer duration in subjects treated with bigizimab compared with morizimab.
12. The occurrence of influenza epidemics has a well-established link with various climate and meteorological parameters.

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The trial subjects exhibited an increase with the dose.

**Explanation:** As in the previous sentence, exhibited an apparent dose response to the treatment with response rates of 17%, 40%, and 61% after treatment with placebo, 100 mcg, and 600 mcg, respectively. The rate of response showed an increase with the dose.

3. **Original:** The trial subjects exhibited an apparent dose response to the treatment with response rates of 17%, 40%, and 61% after treatment with placebo, 100 mcg, and 600 mcg, respectively.

**Suggested rewrite:** The response rate increased with the dose.

**Explanation:** Rate of response can be simplified to response rate, and an increase is a nominalisation and can be replaced with the verb increased.

4. **Original:** It is well known that there are no differences between the effects of the treatments in terms of fertilisation rate or number of embryos transferred.

**Suggested rewrite:** The effects of the treatments on fertilisation rate and number of embryos transferred do not differ.

**Explanation:** Eliminate the preamble it is well known that and there are. Also, delete in terms of because it is a wordy way of saying nothing. Finally, differences is a nominalisation of differ.

5. **Original:** A positive correlation has been shown between monoclonal antibody-dependent complement deposition on pneumococci and passive protection in mice.

**Suggested rewrite:** Monoclonal antibody-dependent complement deposition on pneumococci correlates with passive protection in mice.

**Explanation:** Correlation is a nominalisation and can be replaced by correlates. Doing this makes has been shown unnecessary and forces a choice of subject (complement deposition on pneumococci or passive protection in mice).

6. **Original:** In a majority of cases it is a combination of social, psychological, and biological factors that cause major depressive disorder.

**Suggested rewrite:** In most cases, major depressive disorder is caused by a combination of social, psychological, and biological factors.

**Explanation:** A majority of can be simplified to most. After that, the subject needs to be clarified. Is it major depressive disorder or a combination of social, psychological, and biological factors? In this case, I think that the main topic is the former, so it makes sense to move it to the beginning of the sentence. Finally, eliminating it is simplifies the sentence and forces it to be reorganised.

7. **Original:** A larger proportion of cells treated with polymixotine underwent apoptosis compared to cells treated with placebo.

**Suggested rewrite:** More cells treated with polymixotine than with placebo underwent apoptosis.

**Explanation:** A larger proportion can be simplified to more. In addition, this sentence needs parallel structure. The sentence can be further simplified to the alternative version by thinking about its meaning – the placebo should not induce apoptosis, so the only thing inducing apoptosis is polymixotine.

8. **Original:** We observed the death of all mice in these treatment groups within 2 days.

**Suggested rewrite:** All mice died within 2 days.

**Explanation:** The death of is a nominalisation and can be replaced by the verb died. Also, We observed that is unnecessary wordiness; just say what is. Finally, in these treatment groups is probably not necessary.

9. **Original:** Macrophage depletion using clodronate liposomes resulted in the elimination of the protection of all mice from death.

**Suggested rewrite:** All mice died when the macrophages were depleted using clodronate liposomes.

**Explanation:** This sentence includes four nominalisations: depletion, elimination, protection, and death. If you change the first two of these into verbs, you arrive at: Depleting macrophages using clodronate liposomes eliminated protection of all mice from death. Eliminating protection from death, however, simply means that the mice died when the macrophages were depleted.

10. **Original:** At this point, it is important to consider whether counselling may be productive.

**Suggested rewrite:** At this point, counselling should be considered.

**Explanation:** Eliminating It is forces the introductory phrase to become should, must, or something similar. This also make productive redundant.

11. **Original:** Local reactions were observed with a higher intensity and with a longer duration in subjects treated with bigizimab compared with morizimab.

**Suggested rewrite:** Local reactions were more intense and lasted longer in subjects treated with bigizimab compared with morizimab. Alternative: Bigizimab caused more intense and longer-lasting local reactions than morizimab.

**Explanation:** A higher intensity can be simplified to more intense. After that, parallel structure is provided by rewriting as were more intense and lasted longer. You can further simplify the sentence by changing the subject to Bigizimab and then keeping the verb caused close.

12. **Original:** The occurrence of influenza epidemics has a well-established link with various climate and meteorological parameters.

**Suggested rewrite:** Influenza epidemics are linked to climate and weather.

**Explanation:** The sentence includes two nominalisations. The first, occurrence, can be deleted, and the second, link, can be changed to the verb linked. Also, well-established is a kind of preamble and can be deleted. Finally, climate and meteorological parameters can be simplified to climate and weather.