

Guide to Manuscript Writing

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Version 02/01/2023

Introduction

This guide to manuscript writing was originally developed several years ago to help my doctoral students' with their writing. This guide is a work in progress—I am always trying to improve my own writing and will pass new nuggets along to others. Feel free to reach out to me to request a new version. And feel free to add any of your own personal peeves.

I recognize that some people will not agree with all of the “Billisms” included here. (I can't even convince my best friend to avoid the litany of limitations.) My students have certainly been aware that some faculty will disagree with me. But I think this guide provides sound writing advice. Most students have reported that the guide was valuable to them. I hope it will be useful to you as well.

A few of the points are specific to HIV and sexually transmitted infection work. That's what I do. Ignore these if they are irrelevant to your work.

Over the years, I have read a lot about writing. Several books and articles that helped me become a better writer are listed at the end of this document. I am indebted to those materials and much of what I have learned is incorporated here. I have not given specific citations throughout, but those thoughts, tips, and examples have been critical in my own development and for this document.

I suggest that you read through the entire guide as a starting place. When you read a paper, get into a habit of deciding whether the paper is well-written or not. Think about the story in the papers you read, and think about the story for the paper you are about to write. Learn to see wordiness when it occurs, and strive for concise, clear writing. The more you practice, the easier it becomes. Good luck.

General Thoughts

The most fundamental point of writing is to tell a story. Before you start, identify the key things that you want the reader to remember or learn from the paper – and tell the story to give the reader that information.

As a scientist, you are a professional writer. Whether it is papers, proposals, protocols, or memos, you will be writing. Embrace it. And commit to being a better writer.

Writing is one of the most challenging things we do. Writing well is hard work. Reserve your prime brain function for writing. For me, that's the morning. It may be afternoon or evening for you. Do tasks that are less challenging cognitively (coding, references, creating tables/figures) in your less efficient times.

The purpose of writing is communication. If the writing is not clear, the communication will fail.

When we converse, we can explain a point that isn't clear. When we write, we can only hope that the reader understands what we've written. If we write clearly and simply, we increase the probability that the reader receives the message that we intended to send.

When we read, we predict what is coming next. We use the words, structure, and context to predict the elements of a sentence or paragraph or even section of a manuscript. This prediction is done subconsciously, but it is something we've learned from when we start to read.

Our predictions are shaped by expectations. Our expectations come from the rules of English and the rules of scientific writing. Those expectations occur at the sentence, paragraph, section, and manuscript levels. When we fail to meet those expectations, we create cognitive dissonance and substantially increase the cognitive burden of the reader. Understanding these expectations can help you write better.

To understand what you've written, the reader must: 1) decipher your meaning, 2) minimize ambiguities, 3) pin words into grammatical categories (e.g., noun, verb), 4) file your information away, 5) compare that information to their existing knowledge, and 6) decide what to remember. Those steps are cognitively challenging. Do what you can to make the process easier.

When you write, think of your reader as an intelligent person who may not be an expert in your field. With a little help on specific substantive terms, the reader should be able to understand what you've written without difficulty.

When we write, we don't want our reader to think...at least we don't want them to have to think to decipher what we're saying. If they have to think, then our writing wasn't clear enough. (We do want them to think about the content—walking away thinking about the story you just told.)

Build a library of well-written papers—papers that you'd like to emulate. How do you know that a paper is well written? When you can read a paper once, straight through, without having to reread any sentence or paragraph.

Writing is a skill. Like other skills, it requires practice.

Writing is a multistage process. It involves thinking, writing, and rewriting. Think first to get your ideas sorted. But don't get lost in thought without starting the writing process.

The goal of an initial draft is to get the content down. It doesn't have to be perfect. It doesn't even have to be fully coherent. It just has to have the main content.

The goal of rewriting or editing is to develop a document that communicates your story. Rewriting is the bulk of the rewriting process. One of my own recent manuscripts had 31 drafts (and I have written a lot of papers). Be patient with the process.

Follow these key elements to good writing: 1) Write simply; 2) Write concisely; 3) Avoid clutter; 4) Use structure to help comprehension (sentence, paragraph, section); 5) Ensure continuity; 6) Vary cadence; 7) Follow the rules of grammar; 8) Be patient.

Key elements 1-7 will help you write more clearly. Element 8 will also help in that process by ensuring that you give elements 1-7 the time that they need to create a product that is truly good enough.

Your goal is clear, concise, coherent, and simple text. Simplicity leads to clarity, concision, and coherence.

Getting Started

Identify the journal as early in the process as possible.

- choosing the journal is a matter of deciding how “important” the data are, who the target audience is, and your career needs
- talk with your co-authors and mentors about the journal choice
- check out what the journal has been publishing. Is your paper consistent with the types of papers they are publishing?

Balancing the target audience and career issues can be challenging at times. It may be better for your career in one journal, but the real target audience may be best reached in another journal.

If you’ve chosen a journal, use its formatting guidelines from the beginning.

Use an example from that journal to help guide you.

Use an example of a well-written similar study to guide you.

Check out any relevant guidelines for material to be included in manuscripts, such as CONSORT (trials), STROBE (observational studies), PRISMA (systematic reviews/meta-analyses), and their extensions. Use the guidelines when you design the study and to help create an outline for your manuscript.

As noted above, when reading, take note of papers that you find particularly well written. Ask yourself what you like about the paper and emulate that. File those well-written papers away.

Develop a detailed outline for the sections before you begin writing that section (see below). For the introduction and discussion, consider an outline that includes topic sentences or paragraph heads with additional bullets.

Draft the methods early. The methods can be drafted even before the study has been completed.

When you are ready to write in earnest, begin with the tables and figures. Make sure these convey the key results. Then write the results section. Give the tables, figures, and results a second look. Then get comments from the senior author or your mentor at this stage. Agree on the paper’s story. Only then move on to the discussion and introduction.

Personally, I write the abstract last – once everything else is done. Others suggest writing it first so that you know the short version of the story you’re going to tell. Either option works!

The sections are usually: Title page, Abstract, Key words (follows abstract), Introduction (may not have a label), Methods, Results, Discussion, Acknowledgments, References, Tables, Figure Legends, Figures.

In most journals, the conclusion is usually NOT a separate labeled section.

When writing, put names and years for references in comments to make it easy to locate them. Or use the PMID to make it easy to track down. Format references only at the end.

If you don’t know the reference, put in a placeholder (I use REF), and come back to it later. Looking up references while trying to write is a surefire way to be inefficient. Suddenly an hour of your prime writing time is gone...poof!

Look up references at times when you are less efficient. For me, that means afternoon or evening. The morning is devoted to writing.

Use subheadings in the methods and results – when it is allowed.

Generally, don't use subheadings in the discussion.

Writing Style, Word Choice, and Grammar

Write simply.

Short sentences – to the point. Avoid “flowery” sentences. Avoid run on sentences.

Long sentences are cognitively difficult to digest. Long sentences contain proportionately fewer cues for the reader. Long sentences place excessive demands on the reader's working memory. And long sentences are more likely to be misinterpreted and forgotten.

Short paragraphs (in general). Ideas are lost in long paragraphs.

If you start a sentence with an if clause or a similar transition, separate it from the rest of the sentence with a comma. Ditto for therefore, thus, for example, and many other transitions.

Use punctuation correctly. Know when to use commas, semi-colons, colons, dashes, apostrophes, and quotation marks. Remember: “Let's eat Grandma” and Let's eat, Grandma” mean two very different things.

Avoid quotation marks for emphasis. Use quotation marks only when demarcating a quote or when referring to the use of a word (as opposed to the word having its natural meaning).

Write formally with an active voice.

Avoid passive voice, except when it is appropriate. For example, when the subject of the sentence must be referred to in the passive voice.

Common examples of sentences in passive voice are sentences beginning with an isolated pronoun (e.g. it, there, this, these) and sentences with by after the verb.

Use I and we, when appropriate, to remove the passive voice. You did the work, claim it. Don't hide behind “The authors...”.

Avoid sentences that begin: This is... or These were... Almost always, the reader may not grasp immediately what “this” or “these” refers to from the preceding sentence. Use the actual subject.

Avoid sentences that begin: There are, There is, It was... These isolated pronouns are nearly always signs of wordiness (clutter) and a passive voice. Find the subject of the sentence and rework it. Often you'll find the subject immediately after the verb (e.g. is, was). “It is important that participants are compensated for their time” becomes “Participants should be compensated for their time.”

To help you with avoiding it and there as isolated pronouns, get in the habit of doing a search (<ctrl f>) for “there” and “it”, looking for them specifically at the start of sentences.

Split infinitives are ok. Make that decision based on how it sounds to you.

Avoid contractions. Contractions are too informal.

Feel free to begin sentences with “But” or “And”. These words can be very powerful to make a point. I strongly encourage you to adopt but as your go-to contrast. But is a much stronger word than however and it is easier to read and digest.

You may also begin sentences with “Because”. Also “since” may be used to mean “because”.

Beware common spelling and grammatical mistakes: less vs. fewer; they’re, their, there; principle vs. principal; its vs. it’s; etc.

Remember that spellcheckers are not infallible. *Their* is not a problem (may look fine to a spellchecker!)

Avoid jargon. Use precise language, rather than language that you use casually in speech about a project. For example, a “screener” should not refer to a screening instrument—it is a person who screens.

Avoid using individual to mean person. Use people, persons, adults, children, men, women—whatever fits best. Individual is a cognitively demanding word; the alternatives are simple and easy to digest. (Please, please, please follow this advice!!! The word individual should be reserved to contrast with a group.)

Avoid using impact to mean affect. “The policy affected the HIV prevalence” rather than “The policy impacted the HIV prevalence.” (While not technically wrong, this use is often criticized, so don’t bother!)

Remember: the whole comprises the parts. (The “of” in “comprised of” is not necessary or preferred, but it is not wrong.)

Unearth buried verbs. For example, agreement with → agrees, antibody detection → detect.

Buried verbs are everywhere. Many of them end with -ion (description) or -ment (measurement). But others have the same form as noun and verb (review). When you unearth the buried verb, the identification of a strong verb is easier. Whoops. When you unearth a buried verb, you can easily identify a strong verb.

Avoid unnecessary qualifiers: quite, very, rather, a bit

Avoid in order to; using “to” alone will suffice in nearly every instance: “In order to write this guide, I...” becomes “To write this guide, I...”. It works; I promise.

Turn negatives into positives when possible. “Does not have” becomes “lacks”; “not certain” becomes “uncertain”; “not many” becomes “a few”. Lots of other examples...

Make the science the subject. (Please, please, please follow this advice.) Avoid statements such as: “Prior research has shown that chlamydial infection is associated with...” or “Researchers have studied...” or even “In a previous study, ...” These sentences waste words, and use the literature or the research as the subject of the sentence. Focus on the science (what is known, what may be known) instead. Use the real subject of the sentence as the subject. Work hard at this approach and you’ll be surprised how much easier your writing becomes to read. Get into the habit of finding these sentences in your writing and eliminate them when you see them. (Again, <ctrl f> is your friend)

Instead of using “Previous research” and similar phrases, just give the information. Examples: Previous research has shown that cats have whiskers → Cats have whiskers.

Miller, et al. showed that the prevalence of chlamydial infection in the United States was 4.2% →
The prevalence of chlamydial infection in the United States was 4.2%.[Miller, et al.]

If your point is that the science is uncertain or that previous studies have had varying results, use our English language to express that uncertainty. “Cats may have whiskers.[REFS]” Our language has many words that reflect uncertainty (uncertain, unknown, unclear, may, possible, probable, debatable, doubtful, dubious, controversial, disputed, questionable, ambiguous, etc.)

Limit the use of author names of other papers in the text. Citing their work is enough. Names are just extra words. Make the science the subject. “Gaynes, et al. have shown that the Friendship Bench is an effective intervention.” → “The Friendship Bench is an effective intervention.[Gaynes, et al.]”

Organisms are italicized *Genus species*

Avoid repeating part of abbreviations: STI ~~infection~~ (STI – sexually transmitted infection), HIV ~~virus~~

Empiric is a noun. Therapy is given empirically, i.e. "empirical therapy." (An empiric is an ancient physician that gave therapy on experience alone.)

Get in the habit of ruthlessly editing your own writing. Strive for concise, clear sentences.

Make sure that each paragraph conveys the key message that you want it to convey.

Topic sentences...topic sentences...topic sentences. If a topic sentence isn't working, use a paragraph head, which is 2-3 sentences instead of just one.

Recognize that many people will not read more than the topic sentence of a paragraph – especially in the introduction and discussion.

Even results sections should have meaningful topic sentences whenever possible.

Develop careful sentence and paragraph structure. Make sure that ideas flow logically from one to the next.

In a paragraph, old information precedes new information (familiar-unfamiliar). A sentence should not begin with new information, which is jarring to the reader. New information, when out of place, creates cognitive dissonance... “Wait, did I miss something? Should I go back to the last sentence?” Instead, old information from a previous sentence should serve as the subject and lead logically to the new information in the stress position at the end of the sentence. Old before new is probably the single most important element to improving the flow of your writing.

The concept of old before new is also called continuity. Lack of continuity happens in two main ways: inversion and logical gaps. These two problems look schematically like this:

Inversion: Old→New New→Old (new information precedes the old information in the 2nd sentence)
Logical gap: Old→New New→New (Only new information is in the 2nd sentence)

Here's an example of inversion:

The most common bacterial STI is chlamydial infection. *Young women* have the highest prevalence of chlamydial infection.

In this example, “Young women” is new information followed by the old information “chlamydial infection”. You don’t expect it. You expect the second sentence to begin with chlamydial infection (or perhaps about another STI).

Here is a fix for this inversion:

The most common bacterial STI is chlamydial infection. Chlamydial infection is particularly common among *young women*. [or you could work prevalence into the sentence if necessary]

Here is an example of a logical gap:

Health care providers who receive incentives may improve adherence to guidelines. Chronic undertesting of STIs is often attributed to lack of awareness.

In this example, the second sentence does not directly follow the first. We can fix it by *bridging the gap*: Health care providers who receive incentives may improve adherence to guidelines. Adherence to guidelines for STI testing is often low. Chronic undertesting of STIs is usually attributed to lack of awareness. ...Incentives may...

Putting new before old is common. We do it because, as writers, we get an idea for the next sentence that we want to get down. We naturally put that new exciting information first—great for the writer, bad for the reader. Learn to look for this problem and fix it. If someone says your work doesn’t flow, look for this issue.

Remember that you as a writer know what you’re trying to say, but the reader does not. You may be able to make sense of a flow that doesn’t go logically old-new, old-new, but a reader cannot without re-reading repeatedly.

Another way to help with continuity is to use transitions. Transitions are words like therefore, thus, alternatively, but, because, and and. These words, and many more, link back to the previous sentence with a variety of purposes: continuity (and, also, furthermore); contrast/mood change (but, although, in contrast); order (first, second; primarily); cause/result (thus, therefore, because, consequently); conclusion (in summary, finally).

Give your work to others to read early on. Give yourself a break from editing a manuscript and come back to it. Both of these strategies will highlight gaps or flow problems.

For major terms, be consistent. Use the same term repeatedly. Don’t change the term just to change. The consistency helps the reader. If you must change a term, use a more general one. For example, after repeatedly using STI, you might use infection alone.

Don’t expect that everyone will know what an “effect modifier” is, or even what confounding is.

Instead of saying...”The number of sex partners was found to be an effect modifier of the relationship between age and chlamydial infection...” say “The relationship between age and chlamydial infection varied depending on the number of sexual partners”

Remember, always, figure out the "story" and tell it. You have to do the focusing and synthesizing, not the reader.

Writing Process

Writing is a skill. Practice writing and keep writing. Identify opportunities to write and take them.

Writing is challenging – find a way that works for you

- Write early in the day or write late in the day – whenever you write best
- Make an outline and use it as a guide
- “Vomit” on the paper; or think first, then write – different styles work for different people
- Scribble thoughts, ideas, keep track of them, organize them

Use outlines of topic sentences/paragraph heads to organize your thoughts and help with the flow of each section.

Consider “post-hoc” outlines. Copy the topic sentences from a section into a new document. Read through those topic sentences. Do they flow logically? Do they tell the story you are trying to tell adequately? These topic sentences should convey all of the key information that you need to pass along to the reader.

Share drafts early. Accept criticism. Expect many drafts – be patient with the process.

Avoid binge writing. Don't wait for a big block of time to write. The most successful writers write often, e.g. 4-5 times per week for 20 minutes to an hour. Binge writing is much less efficient, leading to inertia and long periods of ramp up to get going.

Stop when you are in a good place and you know what comes next. Jot that down. Then the next day, it is easy to start again.

Write for the reader. Think about how you read papers, especially when rushed. And make the paper read well for the busy reader.

Do not expect the reader to think. The communication should be clear without the reader having to interpret what you mean.

Writing with Co-authors

When you ask a co-author to read the paper, or ask someone else to read the paper, be as specific as possible in terms of what you want them to do. It doesn't help you if you're looking for content guidance and they give you grammar lessons.

Make notes to yourself and your co-authors in the text. Let them know when you're unsure or need help.

You don't have to know everything. Use your co-authors' expertise.

Don't be afraid to give very rough drafts to people to read. But tell them it is a very rough draft. Rough drafts are most helpful for being sure that the content is there.

Sharing rough drafts early is important because it is much harder to figure out what is missing from a paper than it is to identify things that should come out. If you wait until the end, you may miss a key element.

Read the paper yourself before sharing, especially in hardcopy. Fix what you find first. (Why hardcopy? You'll be surprised how different a manuscript is on paper, as compared to on screen.)

A paper to be shared with a co-author should not be perfect, but it does need to be legible. Take the time to fix the big issues before sharing, but don't worry about completeness or style in early drafts. Just be explicit what you want to get from your co-author.

When writing with busy co-authors:

- give timelines

- set meetings to discuss
- identify specific portions of the text for them to focus on. Get their input where you need it most.
- Ask them how they want to work, full drafts vs. pieces. I prefer getting pieces of a paper rather than the whole paper all at once (at the start) because I can do it in less time.
- Give the co-authors sufficient time to give comments. It is not reasonable to expect turnaround in a few days.

Consider sitting with a co-author or two and outlining the discussion section. Put down the topic sentences and/or the ideas for each paragraph.

Work with your co-authors to identify the story before you get deep into the paper.

Paper Structure

Introduction

Typically 2-3 paragraphs. Think of it as a funnel (Figure 1), from general to specific.

Paragraph 1 – A “global” introduction.

- Put the disease you’re studying into the medical or public health context. Why is it important?
- The first sentence of the paper – the topic sentence of paragraph 1 – should be very strong.

Paragraph 2- A specific introduction.

- What’s known about the specific question that you are about to address.
- Here’s where you’ll **briefly** cite the major literature that relates to your specific subject
- Often the longest paragraph of intro
- This paragraph may be split into two if a significant amount of info must be conveyed
- Generally avoid many specifics here – those will be reserved for the discussion

Paragraph 3 – An overview of your aims or hypothesis

- how did you address the shortcomings of the existing literature?

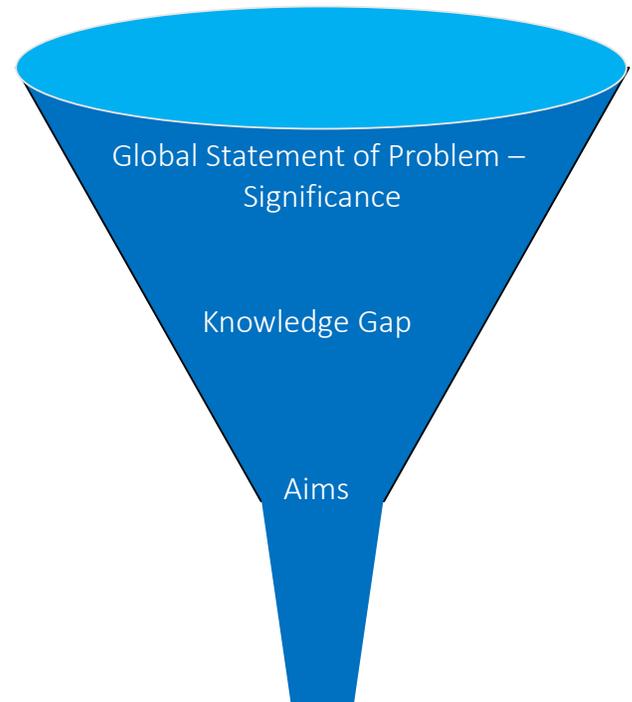
Use the intro to begin telling the story. Set the reader up for the main messages that you want them to remember. And remember, only one or two messages.

If writing for a general journal, you will need to build a case for why people outside your field would be interested. For a specialty journal, you can be more specific, especially in paragraph 1.

Methods

Ideally, the methods are written with sufficient detail that someone could recreate the study. In actuality, the methods rarely have that much detail.

The methods section is one of the first things to write. The methods can be written before the analyses are completed. Revise as needed after.



Structure is similar to that in a proposal or protocol, but with less detail.

A great way to get started with a manuscript is to copy and paste the methods from a protocol or grant proposal into the paper. “Look, Mom, I wrote the whole methods section today.” Then edit it to fit the actual paper.

Sometimes, you can have a longer methods section in the original submission, then eliminate some of it after reviewers’ comments. (Editors often ask you to shorten the text or the responses to the reviewers’ comments may put you over the word limit.)

Basic methods section components:

Study setting

- where was the study performed?

Study design

- what design was employed?
- This section may be combined with data collection or study population, depending on the circumstances

Study population

- May be combined with study setting
- how were people recruited?
- What were the eligibility criteria
- Were people excluded from the data set?

Data collection (how study was actually done)

- What were the procedures in the study setting?
- Who administered the questionnaire?
- Who administered the examination (if there was one)?
- How were these people trained?
- Questionnaire
 - o What was included in the questionnaire?
 - o Was it validated?
- Laboratory
 - o What tests were performed?
 - o By who?
 - o Manufacturer?
 - o How?

Data sources (when primary data was not done)

- Describe each of the data sources
- Follow a similar outline to data collection above
- Think about where the data came from—how the information was captured in the dataset—and report it

Data Analyses

- Data entry and data management (double entry, validation, conversion if any to statistical package)
- Statistical package
- Outcome(s)
- Variables/structure

- Frequencies/univariate
- Bivariable analyses
 - o Effect measures used
 - o Estimation of CI
- Stratified analyses
 - o Purpose
 - o May or may not actually be included and reported
- Multivariable analyses
- Be sure to include the process for assessing confounding, effect modification
- Include your modeling strategy
- Include the purpose of your modeling
- Sensitivity analyses are usually the final aspect of the methods when they have been performed.

Results

Number of paragraphs depends on the type of results and the amount of data you have to present

Try to figure out the most important information that you want to convey – Tell the story. You virtually **never** can include all the data you have. Your job is to figure out what is important and what you want the reader to take away. A reader will almost always leave with one or two pieces of information—that's it. The rest is fluff and support that helps a reader know whether it is worth remembering those one or two points. (This point is especially important for survey data—where you often have about 15 outcomes that you want to talk about.)

Use topic sentences to introduce qualitatively the points that you are about to give in each paragraph. Those are the sentences that people will remember – not the OR of 1.6 (95%CI 1.2-2.0)

Avoid sentences that serve only to refer the reader to a table. “Table 1 shows the characteristics of the study population.” It's a waste of words – and an especially bad topic sentence for a paragraph.

Instead: The study population comprised 44% women and 56% men (Table 1). The reader is then referred to table 1, is given some useful information, and you don't waste any words.

Think about how difficult it is to remember a sentence like “Among men who were unaware of their HIV infection, 20% had AUDIT scores consistent with hazardous drinking, 30% had scores suggesting harmful drinking, and 25% had likely alcohol dependency” versus “Men who were unaware of their HIV infection had higher AUDIT scores (hazardous (20%), harmful (30%), likely alcohol dependence (25%)).” The point is not to remember the %, but rather to help them remember which group of men had a bigger problem.

The bulk of the information will be presented in tables and figures

Often, figure legends are all together on a separate page, but this varies by the journal.

Figure legends should include enough information that a casual reader can understand the figure without reading the entire paper. Do not limit your figure legend to just the title of the figure. Usually 2-4 sentences are needed to provide sufficient information to interpret the figure without looking at the text.

Do not place a title on the figure (as is common with Excel). Include the title with the figure legend.

Make your figures pretty. Do not use Excel defaults.

Use a CONSORT type flow diagram as your Figure 1 (or at least usually figure 1). Describe how you got the final sample. This diagram works for observational studies with just a little tweaking from the trial version.

Tables usually do not have gridlines – except for a line at the top, one separating the headings from the body, and one at the bottom of the table (although in JAMA they do)

The text is used to highlight the information in the tables/figures and to supplement that information. Do not be afraid to cite *some* of the information in the tables in the text. Remember you are in control—what do you want the reader to focus on in the table? That's what goes into the text.

Begin with descriptive information, then move through simple bivariable relationships, to more complex adjusted relationships.

First paragraph and Table 1 are virtually always a description of the study population.

- How many people were recruited? How many met eligibility? How many were in the sample? (Occasionally, you'll see this in the methods but generally, if it is a number, it is a result.)
- Use the text to highlight the important features of the table
- Can also supplement – for example, give the ages in groups in the table, but provide the mean age and SD in the text (I prefer this approach. Use categories in the table, and continuous info in the text. For one thing, it makes tables neater)

Second paragraph will often focus on the outcome. Do not bury the descriptive outcome data at the end of a paragraph. People care about the outcome. Bring it to the forefront.

Third paragraph will often be the unadjusted analyses.

- may include some of the unadjusted relationships for other variables

Fourth paragraph will often be the adjusted analyses.

Obviously, supplemental information may be a significant part of the results.

Always include frequencies/proportions/cumulative incidences/incidence rates and not just the ratio (risk ratio/odds ratio) or difference (risk difference/rate difference). The frequencies are critical for interpretation.

$$RR = 0.4/0.2 = 2 \text{ over } 10 \text{ years} \quad \neq \quad RR = 0.0004/0.0002 = 2 \text{ over } 10 \text{ years}$$

In a case control study, include the frequencies/proportions of the exposure by disease status

If reporting cumulative incidence or risk ratio, be sure to include the time frame

Avoid pseudo-precision. Do not report too many digits past the decimal. See guidance below:

Percentages: round to nn%, n.n%, 0.nn%, and 0.0n%

OR/RR: round to nn, n.n, 0.nn, 0.0n (occasionally, you may choose to show two digits for values near 1, e.g. 1.0n)

If your study is descriptive, carefully consider whether a model is necessary. Typically, a descriptive study is just that and is a model may not be interpretable.

Beware of the Table 2 fallacy. A model with many factors included may not be interpretable in the way that you wish it to be. See Westreich D & Greenland S. The table 2 fallacy: presenting and interpreting

confounder and modifier coefficients. *Am J Epidemiol* 2013; 177:292-8

Be sure that the numbers in your tables add to the total – or have a footnote to explain why they don't. (People that know little about the actual analyses, know enough to add up columns – and they view columns that don't add up as indicating sloppy analysis. It's something I dislike when people bring it up, but you sort of have to just get over it.)

Be sure that numbers in abstract, text and results are the same.

Be sure that numbers cited in the abstract are cited somewhere in the text. (If they're important enough to be in the abstract, they're important enough to be in the text.)

Use figures to help convey your results. Visual representations can be very powerful.

Work sensitivity analyses into the results where appropriate. The analyses may be a separate section, or a paragraph following the main results.

When possible and appropriate, provide absolute differences in addition to relative measures.

Avoid “A majority of”... Use “Most” instead.

Whenever possible, use an approximate number “About half”, “About two thirds”, “Nearly all”, etc. These descriptive terms are easier to remember than the actual numbers. You are helping the reader interpret the numbers.

Discussion

The primary purpose of the discussion is to:

- convey the importance of your work
- relate your findings to previous work
- identify the limitations of your work
- identify the effect of the limitations on your work
- put your work into the larger context of the research

Paragraph 1 is usually a summary of the major findings. NO NUMBERS. Just qualitative summary that tells the story very briefly and puts it into the larger context.

The next 2-3 paragraphs will be discussing what was known previously – typically in more detail than in the introduction – and relating your findings to the previous knowledge

If there are major differences, seek to identify the potential sources for the differences.

If it is very similar, justify what you're adding to the literature.

You MUST know the literature in an area very well to write a good discussion section.

Avoid making policy recommendations that go beyond the results of your work. For example, an exploratory analysis rarely has policy implications.

Do not have a strengths section—ever. (Discuss the strengths in relation to the previous work in the area.)

Either within or after the discussion relating your findings back to the existing literature, highlight the important contributions of your findings to that literature.

Preferably, the discussion of limitations can be woven into the discussion of the contribution of the paper to the existing knowledge. This approach is really useful and important because it allows the reader to think about your paper, with its weaknesses, in the context of the other work in the field.

For any given limitation, you need to address three things: the limitation, its effect on your study (e.g. likely direction of the effect on your point estimate), and why or why not the reader should be worrying about it.

Use sensitivity analyses to address major limitations and then report those findings as results, and discuss the sensitivity analyses with their implications.

Do NOT write a “limitations paragraph.” Do NOT have a paragraph beginning with the sentence, “This study had several limitations.” The litany of limitations that is seen so commonly in papers is not a useful way to discuss limitations.

Instead: Begin the limitations section (if there is a section) by highlighting one of the most important limitations or a limitation that follows naturally from the preceding paragraph.

If the study has a major limitation or a unique design feature that may be thought by some to be a limitation, discuss it early in the discussion, in the second paragraph, for example. Addressing the major issue early is a good way to convince the reader that the limitation wasn't so bad after all.

Do not simply list the limitations. A limitation requires at least two—usually three—sentences: state the limitation, discuss its potential effect (i.e. the direction of the bias), and discuss why it is or is not a significant problem in your paper. Three sentences makes a paragraph—for one limitation.

Be upfront and honest about the limitations – even things that aren't really limitations, but a reader might think is a limitation. The more clearly you acknowledge the limitation, the better chance you have that the reviewer will accept your forthrightness.

Do not include frivolous limitations. For example, certain things can only be assessed by self-report. That is not a limitation.

If you feel a limitation is so significant that you don't really believe your results, don't publish the paper.

Note: You may have pushback about not having a limitations section. Respond that you have discussed the limitations fully in the earlier part of the discussion and/or included paragraphs addressing specific limitations. If needed, cite the Schimel book from the references below.

Anticipate possible criticism and address it.

After discussing the limitations, bring the paper home with a final concluding paragraph that highlights the public health or clinical importance and identifies the areas for further work.

Avoid simple statements like “Further research is needed.” Instead, lay out more clearly what needs to be followed-up. If a particular study is needed, describe it briefly.

Tables

Make tables pretty. Make them easy for the reviewer to read – even in draft form.

No gridlines. Carefully aligned columns.

Use as much paper as you need to provide a neat table – don't crowd unnecessarily.

Include the referent always – unless the journal makes you take it out for space purposes – even for dichotomous variables. (So two rows for any yes/no variable; two rows for men/women.)

Don't make people do math (Oh, if you include one group, the other is obvious, you just have to subtract. NO! Only if the editor tells you to do that. Otherwise, include the info in the table)

If a table breaks over two pages, make sure no groups are split (i.e. men and women should be on the same page)

Characteristics are in the same column as the heading:

Characteristic	Prevalence (95 % CI)	Prevalence Ratio (95 % CI)
Sex		
Men	x.x (x.x, x.x)	---
Women	x.x (x.x, x.x)	y.y (x.x, x.x)
Race		
White	x.x (x.x, xx.x)	---
Black	x.x (x.x, x.x)	y.y (x.x, x.x)
Asian	x.x (x.x, x.x)	y.y (x.x, x.x)
Native American	x.x (x.x, xx.x)	y.y (x.x, x.x)

Note the use of mini-columns and mini-rows for spacing purposes.

Always give N (%) or % (N). Right justify the first column, left justify the second.

Do not mix mean/median and N (%) in the same part of the table. It makes it much harder to read. Either put the continuous variables in the main text and the categorical variables in the table or move the continuous variables to a different part of the table so the headings align properly.

Print the tables out and look at them. Often what looks ok on the screen looks crowded or sloppy on paper.

Figures

Make figures pretty.

Don't use the default in Excel. No grey backgrounds.

Sloppy tables and figures can irritate a reviewer – and that irritation can make a difference – even if the paper is stellar work.

Abstract

Identify the structure of the abstract for your target journal

Can generally plan on 4 main sections (background, methods, results, conclusion)

Highlight the main findings

Set up the story in the abstract.

Give only those methods and results that really matter.

Provide a meaningful conclusion—not “More research is needed.”

Check to be sure all results in the abstract are reported in the results section of the paper!

Know the word limit!

Citations & Recommended Reading

Gopen & Swan. The science of scientific writing. *American Scientist*. 1990; 78:550-8.

Grant. Right your writing. *The Scientist*. 23:65. (interview with Swan.)

Schimmel, Joshua. *Writing Science: How to write papers that get cited and proposals that get funded*. Oxford University Press, New York, NY. 2012.

Douglas, Yellowlees. *The Reader's Brain: How Neuroscience Can Make You a Better Writer*. Cambridge University Press, Cambridge, UK. 2015.

Dent, Christopher. *Writing in Science & Medicine: The Investigator's Guide to Writing for Clarity and Style*. Principal Investigator's Association. Bonita Springs, FL. 2014.

Matthews, Bowen & Matthews. *Successful Scientific Writing. A step-by-step guide for the biological and medical sciences*. Cambridge University Press, 1996.

Zinsser, William. *On Writing Well*. HarperCollins, New York, NY. 2006.

Strunk and White. *The Elements of Style*, 4th edition. Pearson, Boston, MA. 2000.

Pinker, Steven. *The Sense of Style: The Thinking Person's Guide to Writing in the 21st Century*. Penguin Books, New York, NY. 2014

Garner, Bryan. *Garner's Modern American Usage*. Oxford University Press, New York, NY. 2009.

Thurman, Susan. *The Only Grammar Book You'll Ever Need*. Adams Media, Avon, MA. 2003.

Straus, Jane. *The Blue Book of Grammar and Punctuation*. Jossey-Bass, San Francisco, CA. 2008.