

**Technical writing**  
Mary Birchfield, PharmD  
Teresa O’Sullivan, PharmD, BCPS

**Creative writing**  
**Goal:** to evoke images and emotions

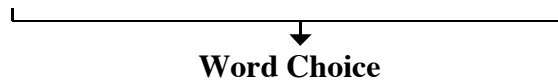
**Technical writing**  
**Goal:** to communicate facts, explain procedures, critically evaluate evidence

**Emphasis:** on characters and character development

**Emphasis:** facts, accuracy, precision

**Words:** many descriptive words used to create setting

**Words:** conciseness encouraged and valued



“We have frequent occasion to observe this tendency to neologism, and the avidity with which [writers] cover a certain crudity of reasoning and obscurity of thought, or endeavour to give weight to a shallow theory, by the selection of the very longest and most technical words which the medical vocabulary will supply. This is an error to be deplored and reprobated.”

Author unknown. Originally published in *The Lancet*, 1885

“The first (and rarest) quality is brevity: short words, short sentences. Why is it that intelligent people (among whom I include doctors) become imbued with verbosity the moment they put pen to paper?”

Paton A. How to do it: I. *BMJ* 1985; 291 :207-11.

“It is remarkably easy not to say what you mean.”

Appleton DR. Cross words. *BMJ* 1994;309:1737-8.

*All quotes are found in the front work of **Medical Writing: a Prescription for Clarity**.*

**Technical writing** is the presentation and communication of accurate and objective scientific and technologic information, ideas, or procedures. You will change your word choice as you change your audience, so before you begin writing, you must **first identify your intended audience and their educational and experiential training**, because these will help you present information that will address **their needs and interests**.

**General rules for word choice or Ten Tips for Technical Writers**

**1. Break long sentences up into shorter sentences.**

- “A complete pharmacokinetic study prevented the investigators from missing any important perturbations, which could have been due to any of the following: poor absorption of oral doses or lack of conversion of prednisone to prednisolone.”

- “A complete pharmacokinetic study allowed the investigators to rule out confounding factors. They tested the rate and extent of prednisone absorption. They also examined prednisone to prednisolone conversion. Differences in absorption or conversion could otherwise have accounted for the differences in clearance between the groups.”

2. **Use short words instead of long words.** Many people think that technical writing needs to use complex terminology. For example, people often write “utilize” when they mean “use,” despite the fact that they would never say “utilize” in everyday conversation.

<b>long word</b>	<b>shorter word</b>
etiology	cause
administer	give
comprise	are
dosages	doses
employ	use (verb)
utilize	use (verb)
usage	use (noun)
efficacious	effective
encountered	seen
methodology	method
pathology	disease
virtually	almost

3. **Avoid colloquialism. Avoid emotion-evoking words.** Colloquialism is when you write the same way you speak, i.e., conversationally. Most of us speak very casually and do not use words that convey a professional tone. We also tend to use emotion-evoking words to convey a feeling or add emphasis to what we are saying. Our word choice when speaking thus tends to be closer to creative writing words than to technical writing words.

Here are some colloquial or emotion-evoking words frequently used by journalists. While these words in the “avoid” column are considered acceptable in articles written for lay individuals, you will want to particularly avoid them when you are writing technical information for health care professionals.

<b>Avoid:</b>	<b>Instead, use:</b>
“on,” as in “study on 100 patients”	“of” <i>or</i> “in”, e.g., study of 100 patients
looked at	examined
turned to	tried
more and more	increasingly
levels	concentrations
researchers	investigators <i>or</i> authors
suffer from	experience <i>or</i> have
sufferers	patients <i>or</i> people <i>or</i> individuals

Contrast the tone of these sentences

**Colloquial/emotion-evoking**

“Even though the authors claim no conflict of interest, this study seems to be reeking of manipulated data.”

**Professional**

“The authors claimed that their prior association with the manufacturer did not lead to conflict of interest. Several inconsistencies in data interpretation challenge this assertion. The first inconsistency was...”

“Severe hypoglycemia is scary and leaves the patient feeling totally wiped, out for awhile.”

“Severe hypoglycemia can be a frightening experience for patients, and often leaves them feeling fatigued afterward.”

Colloquial emotion-evoking words are frequently used by journalists to sensationalize their reports. If you read an article in a women’s magazine or newspaper, you will see words and phrases common to these reports: “promising,” “suffers from,” “researchers,” “threaten,” “huge,” “scientists.” Use of such words will decrease the professional tone of your paper.

**4. Avoid metaphors.** Metaphors are names or descriptive terms applied to an action or object that is imaginative but not literally applicable (for example, “the pot filibustered on the stove”). Metaphors are frequently used in creative writing to convey an image. They should not be used in technical writing.

Try to use the most technically correct form of a word. Some words are used in multiple ways (i.e., they have many meanings), and some of those meanings are really metaphors. A good example is the word “kill.” You can see where phrases such as, “You need to rest before it kills you,” and “My feet are killing me,” are more metaphorical than literal uses of the word “kill.” Strive to use the word that most accurately conveys the concept you are trying to communicate.

**5. Address both sides of an issue.** When you evaluate a study or other evidence, consider and report on both strengths and limitations, rather than just strengths or just limitations. Doing so will make you appear to be an objective evaluator.

**6. Proofread your work.** Use a spell-checker liberally, but use auto-correct with caution. It is useful to either have another good technical writer review your work or finish first draft early, put it down for awhile, then review it critically.

- “Clinicians should prescribe tricyclic antidepressants in small quantities and for short periods of time because of the potential of overdose of these drugs for committee suicide.”
- “...randomized controlled trials to detect statistical decreases in morality would require more than 10,000 patients in each study arm and require a significant amount of money.”

Remember that a correctly-spelled word may not be correct, and it won’t be caught by spell-checker.

- “...clinical trails...”

**7. Ensure the verb reflects what the sentence subject actually did or what really happened to the object.** Think carefully about phrasing. Is what you wrote really what you wanted to say? Ask someone else for an opinion on alternative ways in which your phrases or sentences could be interpreted. The following list of phrases from actual drug information papers illustrates the importance of ensuring that the sentence really says what the author intends:

- "...gestational age was calculated from interviews of the last menstrual period."
- "When choosing case patients, dead people were withdrawn. They might have had different habits in analgesic use."
- "Telephone interviews produced 1,230 infants for study."
- "The study consisted of 384 patients that lasted for 12 weeks."
- "Researchers selected subjects who were mostly female."
- "The patients in this study were required to be men or women."
- "A double-blind, placebo-controlled, randomized trial published in 1995 examined the effect of a moderate dose of fish oil on atherosclerosis in coronary arteries in the Boston, Massachusetts area."

**8. Follow the principles of good technical writing.**

- **Never invent words.** When in doubt about a word's meaning, look it up.
- **Acronyms.** It is necessary to define all acronyms the first time you use them. You will write out the meaning of the acronym first, then follow with the acronym encased in parentheses. For example, "Patients with cystic fibrosis (CF) produce copious amounts of mucous in several areas of their body, particularly the lungs, making patients with CF prone to developing pneumonia." Notice that you do not capitalize common nouns when they are used prior to an acronym.
- **Numbers.** If you begin a sentence with a number, you must write it out, even if it is a long number. Do yourself a favour: don't start a sentence with a number unless it is absolutely necessary.

Spell out all *whole* numbers from zero to ten. Write numbers from 11 up as numbers, *unless* they are at the beginning of a sentence. If you have several numbers in a sentence and some of them are over 11 and some are under 10, express them all as numbers.

- **Making acronyms and numbers plural.** To make acronyms such as ACEI or NSAID, or numbers such as 1950, plural, add a small s. **Do not add an apostrophe-s to denote the plural.** Only use the apostrophe-s to denote the possessive form. If you are talking about a decade and want to shorten it to the last two numbers, you need to place an apostrophe in front of the numbers.

<b>correct</b>	<b>incorrect</b>
NSAIDs (plural)	NSAID's
1950s (decade from 1950-1959)	1950's
'50s (decade from 1950-1959)	50's

- **Abbreviations.** Do not use abbreviations (e.g., misc., etc., vs.). Spell them out (e.g., miscellaneous, et cetera, versus). The only exception to this rule is that it is not necessary to define measurements (e.g., mg, ml) before using the abbreviation. If you are referring to a dosage form, then this should be indicated by the number-dash-measurement, for example a 20-mg tablet. If you are referring to a dose, then you will leave a space between the number and the measurement, for example, “The usual starting dose of lisinopril is 10 mg.”
- **Writing generic drug names.** Generic drug names are common nouns. The first letter should be lower case. Trade names are proper nouns. The first letter should be capitalized. **Use the generic name of a drug whenever possible.** Herbal drug names are generic names (although genus-species names are proper names where the genus name is capitalized, the species name is not, and the whole name is italicized). If you absolutely must use a brand name (which you will not need to do for any of the exercises in this class) then the brand name will need to have some indication of trademark following it. Use this brand name only once (only if you must use it), and then use the generic name thereafter. Examples of acceptable ways to indicate trademark are: Tagamet<sup>R</sup>, Tagamet®, Tagamet™, or alternatively, clearly linked to the owner of the patent as in the following example: The first FDA-approved histamine-2 receptor blocker was cimetidine (Tagamet–Smith Kline Beecham).
- **Using bullets.** If you bullet your points, you do need to indent the text, but not the bullet. Indenting bullets wastes paper space. *Don’t* use bullets in a formal paper. *Do* use bullets in a newsletter, a web page, and in handouts for presentations.
- **Active versus passive voice.** Use active voice rather than passive voice. Clues to passive voice are the use of a verb plus a verb helper, rather than only a verb (e.g., to do versus does, are seen versus sees) and the placement of the main subject after the verb rather than before it (e.g., Most prescribing errors are detected by pharmacists. versus Pharmacists detect most prescribing errors.)
- **First versus second versus third person.** In a professional paper, write in third person. The only time it is acceptable to write in first or second person is if you are writing a self-study text to be used for distance learning (for example, a newsletter article). Use only third person for the drug information papers you will write for this class (and other classes). When you answer an internet question from an individual, it is appropriate to use second person (“you”). If you write in second person, don’t switch to third person (too awkward).
- **Colons.** Colons are used at the beginning of a list (and occasionally for emphasis) *unless* the word before the colon is a verb.  
“There are several ways to estimate kidney function: 24-hour urine creatinine collection, inulin assay, and the Cockcroft-Gault equation are among the most frequently-used methods.

“There are several ways to estimate kidney function, with the most frequently-used methods being 24-hour urine creatinine collection, inulin assay, and the Cockcroft-Gault equation.

- **Semi-colons.** Semi-colons are used to separate two related but independent\* thoughts. A semi-colon can also be used to separate items in a list if one part of the list contains multiple related topics.  
\*Independent here means that the thought is expressed as a complete sentence.

Specific word problem areas:

- **affect versus effect.** Memorize the following if you have problems with these words  

	synonym (verb)	synonym (noun)
affect	influence	facial expression
effect	cause	result

Remember that *affect* is usually used as a verb and *effect* is usually used as a noun

- **First versus firstly, lastly versus finally.** Try to avoid putting an -ly suffix onto numbers which correspond to your points. Use first, second, and finally, not firstly, secondly, and lastly.
- **Common ESL struggles** include **plural-singular confusion** and **tense shifts**. One type of plural-singular confusion is deciding when to use an article (a, an, the) before the noun; another type is choosing the correct verb form for the noun when it is singular and when it is plural (here you need to know the difference between count and non-count nouns). **Mass nouns.** Some words do not have a plural because they refer to an overall group or body of uncountable things, rather than something that can be broken up into countable units. Examples of such words used frequently in the sciences include research, literature, advice, and knowledge.

## 9. Give your document a professional appearance.

- **Don't overmix fonts.** Do not mix more than two fonts in a single document. If you use more than one font, make the heading font a sans-serif font (e.g., arial, helvetica) and the body text font a serif font (e.g., times, times new roman). Do not mix font sizes; use the same size font throughout the document.
- **Separate paragraphs.** There are two ways to separate paragraphs. The old way is to indent the first line of the paragraph. The newer way is to place one line of white space between the paragraphs, with no indentation at the beginning of the paragraph. Do not mix the two. Either indent or use a white space, not both.
- **Use one space between sentences, not two.** Two is from the old days of typewriters.
- **Use underlines, italics, and bold correctly.** Do not underline to emphasize. Underlining is for typewriters; *italics* are used in professional text for emphasizing things and **bold** is used for headings. Do not overuse italics. Do not use CAPITALS, except for acronyms. Both underlines and capitalizations of common words are used

extensively in publications that are trying to appeal to the emotions, rather than to reason, and will make your answer to a drug information question appear to be emotion-based, rather than evidence-based. When people see an underlined word, they now think “hyperlink.”

There are a few non-emphasis instances where you will use italics. When you write the genus and species name of a plant, it is proper to italicize these names. You will also italicize some foreign words, such as *in vitro* and *in vivo*. In newsletter articles you should italicize any journal names, but you don't need to italicize titles in your assignment reference lists.

Use **bold** to emphasize the first use of key words when you are writing a distance-learning text. Be sure not to bold or italicize the word subsequent to the first use.

10. **Get a good reference text.** It will help with common problems.

- For technical writing
  - Brusaw CT, Alred GJ, Oliu WE. Handbook of technical writing. There is a new edition of this published every 3-4 years.
  - Hacker D. A writer's reference. There is a new edition published every 3-4 years.
- For medical writing: Goodman NW, Edwards MB. Medical writing: a prescription for clarity.

Finally...

When you're done with your first draft, have two people read your writing. At least one should:

- not be a non-health care professional.
- not speak/read English as a second language.
- not be a good friend or loved one.

### **Paraphrasing versus plagiarism**

Paraphrasing is taking ideas (but not words!) from one or more sources and fitting them together in a new and original statement of your own.

Do not copy exactly what the author has written and then cite it. This makes it appear that you have paraphrased rather than borrowed the author's exact words, and borrowing the author's exact words is plagiarizing. You also should not use the same sentence structure as that used by the author(s), because you would not be fitting ideas into new and original statements of your own.

(From the UW web site on academic dishonesty):

The following example is from *A Writer's Reference* by Diana Hacker (New York, 1989, p. 171).

**Original:** *If the existence of a signing ape was unsettling for linguists, it was also startling news for animal behaviorists.*

**Unacceptable borrowing of words:** *An ape who knew sign language unsettled linguists and startled animal behaviorists.*

**Unacceptable borrowing of sentence structure:** *If the presence of a sign-language-using chimp was disturbing for scientists studying language, it was also surprising to scientists studying animal behavior.*

**Acceptable paraphrase:** *When they learned of an ape's ability to use sign language, both linguists and animal behaviorists were taken by surprise.*

Let's try one of our own. Here is some material quoted directly from the abstract of a recently-published study of cranberry juice. Paraphrasing this information will be a useful exercise, because you will have to do this when you write your paragraphs for the body of your drug information paper.

**BACKGROUND:** The cranberry produces antimicrobial compounds such as proanthocyanidines in response to microbial invasion. In vitro it is able to prevent growth, adhesion or biofilm formation of a large number of bacteria, while clinically, cranberry juice has been shown to prevent urinary tract infections (UTI) in women. However, the effect of cranberry on bacterial colonization more widely has not been evaluated. We were interested in studying cranberry juice in children since many children with recurrent UTI need long-term antimicrobial prophylaxis and would benefit from an alternative.

**OBJECTIVE:** To evaluate the effect of cranberry juice on nasopharyngeal and colonic bacterial flora, to evaluate how well cranberry juice is accepted by children and to evaluate its effect on infectious diseases and related symptoms.

**DESIGN:** Children (mean age 4.3 years) in day care centers were randomized to receive either cranberry juice (n=171) or a placebo (n=170) for 3 months. Bacterial samples were collected before and after the intervention and analyzed for both respiratory bacterial pathogens and enteric fatty acid composition, reflecting changes in the colonic bacterial flora. Infectious diseases and their symptoms were monitored using symptom diaries. Compliance was evaluated as the number of drop-outs during the trial and by counting the numbers of doses taken.

**RESULTS:** The carriage of respiratory bacteria did not change significantly during the intervention, while fecal fatty acid composition changed significantly with time ( $P < 0.001$ ) but did not differ between the groups ( $P > 0.05$ ). Cranberry juice had no effect on common infectious diseases or their symptoms. The cranberry juice was well accepted: the number of drop-outs in 3 months was 18 (11%) in the cranberry group and 11 (7%) in the placebo group, and most of the doses were taken as instructed, 145 (88%) and 129 (77%) children, respectively, taking at least 90% of the doses.

**CONCLUSIONS:** Cranberry juice was well accepted by the children, but led to no change in either the bacterial flora in the nasopharynx or the bacterial fatty acid composition of stools. Thus cranberries seem to have beneficial effect on urinary health only and this is not compromised by other unexpected antimicrobial effects.

**paraphrased:** (this is using some of the information provided to you about writing the body of the drug information paper, from the PHARM 309 DI paper web site):

A randomized, double-blind, placebo-controlled trial published in 2005 examined the effects of daily cranberry juice administration on respiratory and fecal bacterial



colonization and infection development in 341 Finnish children (age range 1 to 7 years).<sup>1</sup> Attendees of day care centers in a single city were randomized to drink 5 ml/kg of cranberry juice or matching placebo daily (in three divided doses) for three months. Bacterial and fecal cultures were examined at baseline and 3 months; parents were instructed to take their child to the study center any time the child showed symptoms of an infection. There were no between-group statistically significant changes in the rate of either respiratory or fecal bacterial colonization in the 304 children who completed the protocol. There were likewise no differences in the overall infection rate (mean number of episodes 12.0/person-year of risk in the treatment group versus 12.6 in the placebo group;  $p = 0.41$ ). The investigators concluded that regular administration of cranberry juice does not prevent development of non-urinary tract infections in children.

1. Kontiokari T, Salo J, Eerola E, Uhari M. Cranberry juice and bacterial colonization in children—a placebo-controlled randomized trial. *Clin Nutr* 2005;39:877.

### **Citing references**

Please carefully read the information on the course website. For this course we will use the National Library of Medicine (NLM) writing style guidelines.

### **Word processor things to know**

#### **Turning off hyperlinks**

If you don't want Word to automatically make any internet address you type in (e.g., in your citations) into a hyperlink, go to Tools→AutoCorrect. You will want to uncheck the “internet paths with hyperlinks” function in both the “AutoFormat” and “AutoFormat as you Type” tabbed screens. In Excel I have found it less easy to turn the hyperlink function off, and usually go to Edit→undo hyperlink to take hyperlinks off email addresses or web sites I have in a spreadsheet.

### **Determining grade level of your writing**

In Microsoft Word, you will need to

- For IBMs: Go to the Tools menu and select Options. Click the Spelling and Grammar tab. For Macs, go to preferences and select Spelling and Grammar.
- Check the box by the “show readability statistics” line.
- Now highlight the body of your writing assignment and do a spelling and grammar check (in the Tools menu). It will show the readability statistics after it has finished the spelling/grammar check.
- Look for the “Flesch-Kincaid” grade level score to tell you the grade level of the writing.

You will need to write at the eighth-grade level for newsletter articles, brochures, and other material you prepare for the general public.

How do you decrease the Flesch-Kincaid (F-K) score?

- Use words that don't have very many syllables. Three- and four-syllable words produce a higher F-K score than one- and two-syllable words.
- Shorten your sentences. Longer sentences increase the F-K score.

A note: the F-K score isn't perfect, but it's the only objective way available for the majority of us to check readability.

**Too much space between words in heading.** If the words in headings or other parts of your document seem too widely spaced, you may want to turn on fractional widths. (found in MS Word preferences - see the subheading of "print")