

# The joys of outlining in medical writing

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## Abstract

Using an outline to organize your writing project can help keep you on a straight path and avoid wandering into wastelands of irrelevance. There are various formats – the classic hierarchal model, the IMRAD system used for research reports, the disease description arrangement often found in clinical reviews, and various types of lists and categories. All help you organise your data and present it in a structured, coherent manner.

**Keywords:** Outline, Organise, Hierarchal, IMRAD, Pre-writing

## About outlining

What is an outline – as used in the context of writing – and what is special about outlines in medical writing? Simply stated, an outline is a short, organised description of what will be contained in an article. When it comes to medical writing, there are a few types of outline that are often used, as described below.

Fig. 1 illustrates a typical outline format.

Whether it comes to writing an essay such as this one, a book chapter, or a research report, I am an unashamed advocate of outlining. To me, beginning a writing project without an outline is like driving in new territory without a road map. Outline-less writing invites one to waste time and risks dithering, with results that can threaten the coherence of your work. Using an outline is especially helpful when a writing project has multiple authors because it can be used to force all contributors to agree on the structure and direction of the project.

**Title of article**  
**XXXXX**  
**Yyyyy**  
**Zzzzz**  
**Zzzzz**  
**XXXXX**  
**Yyyyy**  
**Zzzzz**  
**Zzzzz**

Figure 1: Schematic example of a medical writing outline.

With that said, good writers are flexible and are willing to modify their outlines as bright, new thoughts emerge. When working on an outline, be sure that what is added, or rearranged, is consistent with the overall theme of the project.

The length and complexity of the outline are dictated by the length and complexity of the paper being planned. For a short article, such as this one, an extensive outline with multiple levels of topics is not really needed. A shorter outline, with a limited number of subheadings, will suffice. On the other hand, a more ambitious project such as a long book chapter, thesis, or even a planned book will require a more extensive outline.

## Getting started

Outlining is part of ‘pre-writing’, the phases that should come before embarking on the first draft.<sup>1</sup> When planning an article, you should first think about it – a lot. Let various approaches simmer in your subconscious, until the right one declares itself. At the same time, you should be collecting data, whether you assemble your facts in piles and files or on computer.

I believe there are two special advantages to using an outline. First, as you construct the organisational scheme for your paper, the use of an outline will quickly reveal where more research is needed. Second, the outline also exposes items that are unnecessary and allows you to jettison them early, before they become unneeded distractions diluting the coherence of your presentation.

When you have located key data sources related to your topic – items that will subsequently appear in your paper and your reference list – you are ready to begin sorting the results of your search. Look through the articles and other data you have collected and see how they seem to cluster in groups. At first, you may have too many piles, but usually the small piles can be bunched into three or four general headings. Now you are ready to begin your outline.

There are two main styles of outlines: the topic outline and the sentence outline.<sup>2</sup> In writing a topic

outline, you might use a heading such as, in the example below, ‘Types of medical review articles’. In a sentence outline, that entry would become, ‘There are three important types of medical review articles’. For economy of words, I prefer the former style, which I have used in this article. There are, however, two advantages to the sentence style: your topic sentence in each section of the article is already drafted and the use of full sentences will reveal if you are being inconsistent in verb tenses. Whether you favour the topic or sentence style, you should use indentations to indicate levels of sub-headings.

## Outline formats

There are several types of outline format, and your choice of which you use will be guided by your topic and the style of your target publication.

### *Hierarchical outline*

The classic model is the *hierarchical outline*. This model can be applied to any type of document. For a hierarchical outline, you may choose numbers and letters, decimals, or simply indentations to identify levels of importance. Fig. 2 shows a schematic example of an outline using numbers and letters and an example using decimals.

The American Psychological Association provides some useful examples.<sup>3</sup> A skeletal example of a hierarchical outline for a hypothetical article on ‘Writing a Review Article’ might be:

Why write a review article?  
 Types of medical review articles  
     Clinical update  
     Literature review  
     Systematic/evidence-based review  
 Where and how to have a medical review article published  
     Who publishes review articles?  
     Tips on submitting your work for publication  
 Note that in the example provided, I simply indented the lines and did not include letters, numbers, and

decimals, although you can use bullets. Also, when you make a subheading, another one or more should be added; otherwise the topic merits its own heading or might just be eliminated.<sup>3</sup>

### *IMRAD model*

When presenting research data, such as in a peer-reviewed article, the *IMRAD model* is often the prescribed method. The acronym stands for Introduction, Methods, Results and Discussion. Although not part of the IMRAD acronym, all reports of original research will need an abstract. In describing research results, I urge you to follow this general model because using your own, innovative method may invite summary rejection. Not all journals follow the IMRAD model precisely. Some use their own variations. When you begin to prepare your report of original research, consult the Instructions for Authors of your target journal, and follow the directions carefully. A very useful source of general information describing the structure of a scientific article is found in the Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Manuscript Preparation and Submission.<sup>4</sup>

### *Clinical review model*

A *clinical review*, like the report of clinical research, also follows a predictable series of headings, although these are generally not rigidly prescribed. This type of essay may be published in a journal or as a book chapter. An outline of an article on migraine headache, for example, might be as follows:

Pathophysiology  
 Clinical manifestations  
 Diagnosis  
     History and physical findings  
     Diagnostic imaging  
 Therapy  
     Lifestyle and diet  
     Management of the acute headache  
     Prophylactic therapy

### **Example of use of numbers and letters**

I. XXXXX  
     A. Yyyyy  
         1. Zzzzz  
         2. Zzzzz  
 II. XXXXX

### **Example of use of decimals**

1.0 XXXXX  
     1.1 Yyyyy  
         1.1.1 Zzzzz  
         1.1.2 Zzzzz  
 2.0 XXXXX

Figure 2: Schematic examples of the use of numbers and letters, and also decimals in outlining.

### *Category and list model*

Many review articles are based on *categories and lists*. Some examples of possible approaches are listed below. For each of these, I believe that the outline is suggested by the title. For an article on statins, for example, the main headings might be: (1) Current issues regarding statin use in primary prevention; (2) The case for using statins...; (3) The case against ...; and (4) Conclusion.

The use of statins for primary prevention of cardiovascular disease: the cases for and against

A short history of cancer chemotherapy: from nitrogen mustard to *Gleevek*  
 Some myths about the use of herbal medicine in elderly patients  
 Three new drugs to treat depression  
 Four common mistakes in the evaluation of abdominal pain  
 Five reasons why physicians should write for the medical literature

## Putting theory into practice

At this point, let me share the outline I used for this article. It was composed on paper, probably a reflection of my personal experience and habits. Today, most writers would prepare their outlines on computer.

After doing some thinking and just enough research, I began. The outline that follows eventually developed after moving some items and crossing out others, resulting in several drafts before I was satisfied. In the end, the outline helped me organize my thoughts. I used the outline items as headings in the text, although in a shorter article, I might not have included headings. Generally, I like headings because they help the reader understand what I am trying to say, and they break up the flow of words on pages.

Here is the outline of the article you are reading:

Abstract (required by the *journal*)  
 Introduction: About outlining  
 Getting started  
   Prewriting: thinking, data, files, and piles  
   Merits of outlines  
   Outline styles  
 Outline formats  
   Hierarchal model  
   IMRAD model  
   Clinical review  
   Categories and lists  
 Putting theory into practice  
   The outline for this article  
   Some helpful comments  
     Computer use  
     Including citation prompts  
     A writer's block remedy  
 Conclusion  
 References

## Practical tips on outlining

Following are some additional tips that may be helpful when you begin to develop your next article outline:

- Learn the skill of using your computer for outline construction; it is much more efficient than pen and paper. On your screen, you may find it useful to use bold font for major headings.
- Consider indicating in your outline where key citations will occur. Including prompts to important referenced facts helps assure that each will be included, and that a cited statement will not show up twice in your article.
- Outlining can be a useful remedy for writer's block. If you are 'stuck,' and have tried the ploys of seeking coffee, reading your work out loud, or walking around the block, try creating an expanded outline for the section of the article that has you blocked.

## Conclusion

If you have never tried outlining for your writing, I urge that you do so. It imposes a discipline that many of us lack, helps you maintain your focus, and is an excellent deterrent to over-writing.<sup>5</sup> With a well-thought-out, comprehensive outline, your article practically writes itself. In the end, you may find that medical writing is more fun than ever.

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## Clinical pharmacology series

### Symbolism in PK reporting

The author Dan Brown is recognised for using symbols and their mystery in many of his novels. In a similar way pharmacokinetic (PK) literature is laden with its own symbols and mystique. Unlike a Dan Brown plot, PK symbols should immediately and precisely convey their meaning to the reader.

The word symbol is derived from the Greek verb “symballein” which means “to put together and the related noun “symbolon”, which means “mark”, “taken” or “sign”. Many PK parameters and terms raid the Greek alphabet to aid their abbreviation. For example the dosing interval is represented by tau ( $\tau$ ) the 19<sup>th</sup> letter of the Greek alphabet. It is commonly used thus,  $AUC_{\tau}$ , to denote the area under the plasma concentration-time curve over a dosing interval.

PK processes such as elimination of drug from the body and drug uptake into body tissues can be mathematically represented using a rate constant. In chemical engineering, from which much of the mathematical basis of PK is derived, rate constants are represented by the letter, ‘k’. In PK a subscript is often added to ‘k’ to define the associated rate. The respective rate of drug elimination from the body and rate of drug absorption are commonly given as  $k_{el}$  and  $k_a$ . Though the former may be reported as  $\lambda_z$  ( $\lambda_z$ ) in order to identify that the parameter has been derived from the terminal portion of the drug concentration-time curve i.e.  $k_{el}$  is equivalent to  $\lambda_z$ .

Any individual who has worked for several pharma companies or who has reviewed published PK papers across several academic journals will have discovered inconsistencies in how the same PK parameter can be represented. A frequent offender of this changeability is the measure of exposure term area under the drug concentration time curve (AUC). For example, the area under the curve from time zero to infinity can be denoted in

several ways:  $AUC$ ,  $AUC_{\infty}$ ,  $AUC_{0-\infty}$  and  $AUC_{0 \rightarrow \infty}$ . All are correct in their presentation.

Unsurprisingly, several published papers have attempted to present a gold standard for the representation of PK symbols<sup>1-4</sup>. Unfortunately, these attempts have failed to launch a universally accepted set of symbols for PK parameters. Generally, the core symbol for a particular PK parameter tends to be similar regardless of its origin. The discrepancies occur in the denotation of the subscript as outlined above. Although many regulatory guidances concerning PK have been published by the EMA and FDA, none define appropriate symbols for PK parameters. So where does this leave the medical writer?

Essentially symbols are an integral part of PK and as explained above there is often more than one way to denote a specific PK parameter. The medical writer’s task is therefore to ensure consistency of PK symbols within a project so that data can be compared across clinical studies and easily extrapolated back to pre-clinical work.

To conclude  $T_{max}$  or  $t_{max}$ ? I prefer the latter, but don’t let the idiosyncrasies of an individual pharmacokineticist distract you from the bigger picture.

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