Paragraphs in medical writing

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Abstract: Paragraphs are units of writing larger than a sentence and smaller than a section and generally express a single idea or topic. Proper paragraphing and paragraph writing have several key benefits in medical writing which include organizing the meaning of the text, making the text readable and visually pleasing, and enabling efficient skimming and referencing of the text. Well-constructed paragraphs usually consist of a topic sentence, supporting sentences, and sometimes a concluding sentence. Properly writing and arranging these elements with structure, unity, and cohesion in mind will improve readability and fully exploit the advantages of a paragraph. Knowing when to make paragraph divisions can depend on the function of that paragraph. Medical texts can be divided into distinct functions depending on the section they are found in, and these functions can each be a paragraph or a paragraph series. Furthermore, different paragraph types (descriptive, definition, narrative, compare/contrast paragraphs, etc.) each with their characteristic organization, grammar, and vocabulary, can correspond to a given function and thus inform writers about how to most effectively write that function paragraph.

Keywords: Paragraphing; paragraph writing; topic sentence; medical writing

Paragraphing

Paragraphs are essential divisions within a piece of extended writing, and in medical and scientific writing, this is no different. A paragraph can be considered any grouping of sentences which are united by an idea, logical argument, time sequence, or functional purpose. Generally, the sentences in a given paragraph should have a closer relation to the uniting theme in the paragraph they are in, (and thus the other sentences in this paragraph) than in any other paragraph found in the text. In this sense, a paragraph is a unit of meaning which is larger than the sentence, but smaller (or sometimes equal to) a section delineated by a heading or sub-heading. As such, the paragraph is a useful division, and proper paragraphing has a variety of functions and benefits that can significantly aid in the readability of a given text.

The primary function of a paragraph as a unit of meaning is organizational. If all writing is communication, then the text is the total meaning of this communication.

It is impossible to impart this meaning to the reader all at once, in an unstructured whole. Paragraphing, then, is the means to which this total meaning can be divided and structured so that a reader can absorb the text sensibly. To use a metaphor, we cannot eat a whole chicken; a considerate cook will cut the chicken into manageable parts, and they will usually do so at the easiest points and into the most natural sections: the leg, wing, thighs, breast, neck, etc. These parts are the most recognizable to us, and we understand how they articulate with each other to form the whole chicken. In the same way, the paragraph forms not only semi-independent morsels of meaning but also both connects with the paragraphs surrounding it and has commonalities with other, more distant paragraphs in the text. A good writer, like a good chef, should prepare the meaning to be "digestible" and do so elegantly and along the most natural divisions: after all, we want to know what we are eating, and we want to understand what we are reading.

Another related but distinct advantage of proper

paragraphing is the visual and aesthetic aspect, and in a similar sense, how the reader feels when reading your paper. Before they begin reading a text, readers will apprehend the "shape" of your article, and this shape will, for the most part, be determined by the paragraphs and consequent spaces you have chosen to arrange. If your article has a page of writing with no paragraphing—the dreaded "wall of text"—the reader will feel intimidated by such a challenge (1) and might give up before they get started. Conversely, if your text is striped with many short paragraphs and intervening spaces, the reader will be similarly daunted by the prospect of having to continually leap from one idea to the next. This is not to say that paragraphs cannot be very long or very short—they should be written to the length that the idea they express requires; overall, however, your paragraphing should keep in mind the mental capacity of your reader and the pace of reading which is most comfortable. Large paragraphs will require your reader to maintain attention on one idea for too long, and ask them to remember sentences too far back in the text, whereas paragraphs which are too short will require them to repeatedly shift focus, which can be equally exhausting.

A final point about the benefit of good paragraphing is that it should—if the paragraph itself is structured and well-written—enable for skimming and quick reference. If the first sentence of a paragraph is properly written and the subsequent sentences follow accordingly (this will be discussed more in-depth later), it should act as a label to indicate the general meaning of the rest of the paragraph. Given that interested readers might want to find a certain idea or specific piece of information from your text, proper paragraphing and paragraph writing will facilitate a quicker search of your text through a cursory glance by the reader at the first or perhaps the last sentence of the paragraph. If for example, they are looking for information on the incidence of pancreatic cancer in Asian populations, but the first sentence of your paragraph begins with a sentence about treatment outcomes in European patients, one can generally assume this paragraph will not contain the needed information. The reader can avoid wasting their time by reading the whole paragraph, and instead move on to search another paragraph for this information. Note again that if your paragraphs are generally very long or generally very short, the reader will either have to search intensively within one paragraph or search extensively over many different paragraphs; given this, one indication of good paragraphing and good paragraph writing is the ease and efficiency by which the information in it can be searched.

Structuring a paragraph

To fully gain the advantages of dividing your writing into paragraphs requires that each paragraph be structured and written properly. Before even beginning to put words on the page, it is important to have an idea of how your ideas will be sequenced, divided, and organized throughout your whole text. Once it is clear what the general outline of ideas and sub-ideas will be, it should be more apparent what idea each paragraph should communicate, and, once it is clear what the main idea of a paragraph is, the structure of that paragraph should follow. If you do not know what idea you want to express in your paragraph, the sentences in the paragraph will not have **unity**, as they might talk about different things, and they might not have **coherence**, as they might not have any logical connection to each other. In short, before writing your paragraph, know beforehand what it should and should not say, and have a general understanding of the function the paragraph has within the greater context of your whole text.

The structure of a paragraph generally follows the following sequence: **topic sentence**, **supporting sentences**, **concluding sentence**. Note that not all paragraphs have or need concluding sentences if the logic within the paragraph is simple or self-evident, or if the paragraph is merely descriptive. Less often, topic sentences may not be required if it is clear from the overall logic of the text what the paragraph will be about.

Topic sentences are likely the most important part of a paragraph as they determine what the following sentences can include, and act as the "signpost" or label designed to aid the reader in quickly identifying the paragraph's main idea. Therefore, in terms of content, the topic sentence should be broad enough in meaning to cover the ideas discussed by the following supporting sentences. On the other hand, they should be as specific enough to distinguish the paragraph as much as possible from the other paragraphs in the text, and most precisely inform the reader about the paragraph's content. In terms of style, the topic sentence should be clear and to the point to most efficiently act as a paragraph reference. A complex or convoluted opening sentence will make it more difficult to quickly understand the contents of the paragraph. If you feel the need to elaborate upon the topic sentence extensively, consider using this information elsewhere in a later supporting sentence. A

topic sentence can also clarify how the paragraphs relate to the previous paragraph (2) to increase the cohesion in the text, but this is not always necessary.

Supporting sentences should be related to the topic sentence in content, but should not be more general or broader in scope than the topic sentence. The supporting sentences should, in some way, develop or elaborate upon the idea introduced in the topic sentence depending on the type of paragraph you are writing. For example, if you are writing a descriptive paragraph, the supporting sentence will add more specific details; if you are writing a persuasive paragraph, the supporting sentences might provide logical proofs or real-world data; if you are writing a process paragraph, the supporting sentences will each describe a subsequent step in a procedure. There is always a temptation in writing these sentences to become distracted or over-elaborate and include details and information that are too specific or simply not necessary. To avoid doing this, always remember the main idea of your topic sentence paragraph while you write, and judge how closely each sentence you write remains within the topic sentence's scope. Finally, try to connect these sentences using cohesive devices like transition phrases, pronouns, word repetition, and direct reference to the main idea. Doing so avoids having your paragraph read like a list of points, and instead makes one, unified, easy-to-read unit of meaning.

At last, while concluding sentences are not always necessary in a paragraph, they can perform a number of functions which significantly improve the readability of your writing. First, especially for long paragraphs, a concluding sentence can remind readers of earlier information in the paragraph, and indicate to them what the most essential or important points were in the paragraph. In logically complex or argumentative paragraphs, concluding sentences can provide the final implication of a complicated sequence of reasoning, or explain concisely how the supporting sentences prove the claim asserted in the topic sentence. Concluding paragraphs, similar to topic sentences, can also act as a bridge to the next paragraph so long as they also properly discuss the paragraph they are in (2).

Example paragraph writing

Below is a sentence-by-sentence analysis of a paragraph to show how a well-constructed paragraph can maintain **organization**, **unity**, and **cohesion**. For context, this is the full paragraph (3):

Epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors (TKIs) are standard-of-care first-line therapy for patients with advanced non-small cell lung cancer (NSCLC), with tumors harboring activating *EGFR* mutations. The success of TKIs in these patients is supported by findings from several clinical trials that have demonstrated superior efficacy when comparing TKIs with platinum-based doublet-chemotherapy in large phase III studies. Based on their demonstrated efficacy, clinical guidelines currently recommend that all patients with advanced NSCLC are tested for *EGFR* mutations and *EGFR* mutation-positive patients prioritized for TKI therapy. While tissue/cytology samples are the preferred choice for *EGFR* mutation testing, around 85% of patients with NSCLC are diagnosed at the advanced stages of disease. As a result, tissue/cytology samples are normally obtained via minimally invasive techniques, restricting the quality and quantity of sampling material. To overcome this limitation, research has since focused on identifying alternative sample sources for patients with advanced NSCLC, including from plasma, urine, and spinal fluid.

Sentence 1: topic sentence

Epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors (TKIs) are standard-of-care first-line therapy for patients with advanced non-small cell lung cancer (NSCLC), with tumors harboring activating *EGFR* mutations.

The paragraph begins with the topic sentence. It is clear, to the point, and broad, identifying the major aspects of the paragraph topic—*EGFR TKI's*, *non-small cell lung cancer*, and *patients with EFGR mutations*—without going into detail about any one of them. We expect the subsequent supporting sentences to elaborate on, in some way, one or more of these topics.

Sentence 2: supporting sentence

The success of **TKIs** in **these patients** is supported by findings from several clinical trials that have demonstrated superior efficacy when comparing TKIs with platinum-based doublet-chemotherapy in large phase III studies.

Indeed, the first supporting sentence goes into further detail about the evidence supporting TKI treatment. This maintains unity. Through repeating "*TKI's*", and using a pronoun with a noun, "*these patients*", which refers to the NSCLC patients with EFGR mutations in the topic sentence, we know the

Sentence 1—TKI therapy in EGFR-mutation-positive NSCLC patients

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Sentence 2—Evidence for efficacy of TKI therapy

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Sentence 3—Guidelines based on TKI therapy evidence suggest testing

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Sentence 4—Main sampling method for testing

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Sentence 5—Limitations of the sampling method
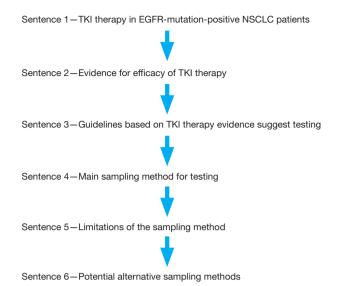
↓

Sentence 6—Potential alternative sampling methods

Figure 1 Sample of paragraph development

concepts in the first sentence are being used again in the second sentence. This maintains cohesion.

Sentence 3: supporting sentence

Based on **their demonstrated efficacy**, clinical guidelines currently recommend that all patients with advanced **NSCLC** are tested for *EGFR* mutations, and that EGFR-mutation-positive patients are prioritized for **TKI** therapy.

The second supporting sentence maintains unity by referencing ideas from the topic sentence: "*NSCLC*", "*EFGR mutations*", and "*TKI*". It develops the paragraph by expanding upon the guidelines and testing related to this therapy. Cohesion is maintained again by using a demonstrative pronoun plus repeating a noun, "*their demonstrated efficacy*", referring to the TKI therapy trials of the previous sentence.

Sentence 4: supporting sentence

While tissue/cytology samples are the preferred choice for **EGFR-mutation testing**, around 85% of patients with **NSCLC** are diagnosed at the advanced stages of disease.

The third supporting sentence further develops the paragraph by discussing the sampling methods to test for EGFR mutation. Unity is maintained with the repetition of the words "*NSCLC*" and "*EGFR-mutation*". Cohesion with the previous sentence is achieved through using the word

"*testing*" which is the main focus of the previous sentence.

Sentence 5: supporting sentence

As a result, tissue/cytology samples are normally obtained via minimally invasive techniques, restricting the quality and quantity of sampling material.

This sentence is closely related to the previous one (they can even be considered one sentence) and moves the discussion to the limitations of the sampling for EFGR mutation. The transition phrase, "*As a result*", and repetition of "*tissue/cytology samples*" shows the logical connection with the previous sentence and thus maintains cohesion. Note that due to the easily understood connection between these two sentences, paragraph unity is maintained without the need to refer directly to the main topic again.

Sentence 6: concluding sentence

To overcome **this limitation**, research has since focused on identifying alternative **sample** sources for patients with advanced **NSCLC**, including from plasma, urine, and spinal fluid.

This concluding sentence further advances the discussion by outlining the research in different sampling methods for EGFR mutation. In this way, it acts as a transition or bridge to the next paragraph; we expect the next paragraph to discuss one more of these new sampling methods, and indeed it does. The concluding sentence also, however, maintains cohesion and unity. Through using "*this limitation*" and "sample", it points to the previous sentence and the "*restricting*" of the sample quantity and quality, thus accomplishing cohesion. Through mention of "*NSCLC*" the reader is brought back to one of the main topics introduced in the topic sentence, and unity is preserved.

Overall, we can see how the topic is introduced in the first sentence and is gradually progressed in each sentence. The reader can follow this progression because the unity of theme and cohesion are respectively maintained through repetition or reference to the main topics, and transition words and pronouns in each sentence. We can see in *Figure 1* how the paragraph develops in theme on a step-by-step basis.

Paragraphing for medical research articles

While the discussion in previous sections can be applied to

Table 1 Possible functions of a medical article and related paragraph types

Section	Function	Possible paragraph type(s)
Introduction	Background	Description/definition, compare/contrast
	Literature review	Classification/analysis, narrative, compare/contrast
	Social impact	Argumentative, description
	Research problem statement	Process, description
Methodology	Participants	Process, description
	Inclusion/exclusion criteria	Process, description
	Procedure	Process/narrative
	Statistical analysis	Process
Results	Findings of procedures	Description
	Findings of statistical analyses	Description
Discussion	Principal findings	Description
	Comparison with literature	Compare/contrast
	Interpretations & implications	Argumentative
	Limitations	Qualification
	Conclusion	Argumentative, description

academic writing in general, this section will consider how paragraphing can be applied to the typical characteristics of an original medical research article. Two aspects will be approached here: (I) how to determine where paragraph divisions should be made in-text, and (II) how to structure each paragraph according to what function they perform in the text. Note that these are mainly guidelines or recommendations and are by no means hard rules or formatting guides that must be strictly followed.

Paragraph divisions and functions

Both of these aspects depend on using the idea of different "**functions**" or the necessary parts in a medical article. Functions typically perform a specific role that depends on the kind of text, or genre, you are writing for. Generally, medical texts follow the introduction, methodology, results, and discussion (IMRAD) structure, and their communicative purpose is to describe a scientific study and discuss its potential implications. These functions can be grouped according to what section of the IMRAD structure they fall under. The description and separation may overlap, or vary depending on the author, publisher, or institution. Indeed, the functions themselves can be determined on an individual-to-individual

basis; what is important is that the functions, and therefore, the main idea of each paragraph, be considered to structure the paper and inform the content of each paragraph.

For illustration, one description of the functions and the IMRAD section of a research article they belong to are summarized in *Table 1*. Again, these are merely one version of how an article might be structured.

For the purposes of paragraphing, that is, dividing your writing into smaller units, each of the above functions can correspond to a paragraph or multiple paragraphs depending on the length or extensiveness of a given function. For studies with multiple research questions or multi-part methodologies, each of these questions or parts will naturally form paragraphs in the methodology and corresponding results section.

Paragraph types and functions

After determining how your article might be divided into paragraphs, a proper consideration of how a given paragraph might be structured can begin. Depending on the type of function the paragraph is performing, the structure of a paragraph can vary according to a different **paragraph type**. Different paragraph types might have particular ways

of organizing sentences, typical grammatical features, and common words or vocabulary. Suggested paragraph types according to function are summarized in *Table 1*.

Definition or description paragraph

This type of paragraph is useful for outlining the **background** in the introduction, **participants** in the methodology, and specific **findings** from the results sections. Definition paragraphs can help describe more abstract concepts, procedures, ideas, or perspectives within the medical field, and might structure the paragraph according to the different elements that compose the full definition of a given term or idea. Meanwhile, description paragraphs might outline the different features of more tangible medical phenomena such as conditions, treatments, diseases, outcomes, etc. and be structured according to the particular details which characterize this phenomenon.

Classification or analysis paragraph

Similar to a definition or description paragraph, this type of paragraph attempts to outline the features of a particular topic; however, it might discuss these parts in more analytical depth (4), and in a more critical fashion. This type of paragraph might actually be useful in the **literature review**; the point of the review is to attempt to fully account for a particular topic with reference to known sources, and to critically analyze these sources in order to identify a literature gap. In conjunction with a **compare/contrast paragraph**, the structure here can introduce separate pieces of the topic, compare and evaluate the relevant literature, and, in the concluding sentence, state what aspect of the topic is not sufficiently understood (the gap).

Narrative or process paragraph

Narrative and process paragraphs are similar in that they both describe a sequence of events in time. The process paragraph is more concerned with outlining how to complete a process and is thus suited for the **procedure** part of the methodology. The structure follows what occurred from earliest to latest, and mostly uses the simple past tense and adverbs of sequence (e.g., "first", "next", "after", "finally"). Narrative paragraphs can have a similar structure but emphasize telling a story over points in time. These can be used in some methodology procedures, but are perhaps best suited for **literature reviews** which are chronologically organized according to when important discoveries were made, or when landmark articles were published. These paragraphs are also ordered sequentially

and use the simple past tense, but use more adverbial phrases of time (e.g., "in 1985", "after this study", "during the same period").

Argumentative paragraph

An argumentative paragraph will use logical reasoning and consequence as the main means to arrive at or prove a conclusion and is more useful for discussing the **interpretation** and **implications** of the findings, as well as the **conclusion**. This format is particularly suitable if the article attempts to prove a hypothesis statement. What is critical here is that the main organizing principle is logical reasoning. Each sentence connects with the previous one not according to time or topic, but due to logical consequence. Discussion of a hypothesis statement can state the hypothesis statement in the topic sentence, and use evidence from the findings to logically prove its truth. Discussion of the interpretation or implications of the findings can describe the findings in the topic sentences, deduce their logical meaning with reference to other literature in the supporting sentences, and state a final implication in the concluding sentence. These paragraphs will need transition phrases of consequence or logic (e.g., "therefore", "hence", "as result", "consequently") to logically link each sentence in the paragraph.

Compare/contrast paragraphs

This type of paragraph is best suited for discussion of literature either in the **literature review** (to show lack of consensus), and/or in **comparison with literature** of the findings in the discussion section. In can also be useful in the **background** if two or more treatment methods, conditions, populations, etc. are being compared. The main organizing principle of this type of paragraph is to show how things are the same, different, or both. The paragraph might begin with a general statement about the topic, or a statement of the principal findings, with the subsequent sentences comparing or contrasting these facts with those findings found in the literature. A concluding sentence might assert a lack of agreement, synthesize a new idea, or strengthen the validity of a previous idea. Typically these paragraphs will use a multitude of comparing/contrasting phrases (e.g., "similarly", "in contrast", "less than", "more than", "consistent with", "inconsistent with").

Qualification paragraph

This type of paragraph will define the conditions under which a statement can be true, and delimit the applicability

of certain assertions (4). Naturally, this is most useful for **limitation** paragraphs. Mostly these paragraphs begin with a statement that certain limitations should be acknowledged. The supporting sentences will usually detail the different limitations and then explain what conclusions do remain, or what of the study is definitively useful. The concluding sentence will likely suggest future research based on these limitations. These paragraphs will usually use transitions of contrast (e.g., "however", "but") to note the limitation, and transitions of exception (e.g., "nonetheless", "regardless", "despite this") to note the remaining usefulness.

Summary

Paragraphing is necessary for dividing your article into manageable units of meaning, providing a visually attractive and mentally comfortable structure for reading, and enabling an effective and easy referencing system.

Paragraphs should express a single idea and can be as long as that idea requires them to be. Despite this, the overall paragraphing should keep in mind the pacing and logic of the article.

Each paragraph should have structure, unity, and coherence. To accomplish this, paragraphs should start with a topic sentence which contains the main idea of the paragraph, supporting sentences which elaborate upon the topic sentence, and a concluding sentence which summarizes the essential meaning of the paragraph.

Paragraphs can be made according to the functions of a typical medical research article. Furthermore, they can be internally structured and conform to the typical linguistic features of the paragraph types for which they are most suited. These types include description, process, classification, argumentative, compare/contrast, and qualification paragraphs.

Acknowledgments

Footnote

References

1. Strunk W Jr, White EB. The Elements Of Style Illustrated. New York: Penguin, 2005.
2. Messuri K. Writing Effective Paragraphs. The Southwest Respiratory and Critical Care Chronicles 2016;4:86-8. Available online: https://pulmonarychronicles.com/index.php/pulmonarychronicles/article/view/290/719
3. Denis MG, Lafourcade MP, Le Garff G, et al. Circulating free tumor-derived DNA to detect EGFR mutations in patients with advanced NSCLC: French subset analysis of the ASSESS study. J Thorac Dis 2019;11:1370-8.
4. Procter M, Visvis V. Writing Advice Home. University of Toronto. Available online: https://advice.writing.utoronto.ca/planning/paragraphs/