



How to write a discussion section?

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ABSTRACT

Writing manuscripts to describe study outcomes, although not easy, is the main task of an academician. The aim of the present review is to outline the main aspects of writing the discussion section of a manuscript. Additionally, we address various issues regarding manuscripts in general. It is advisable to work on a manuscript regularly to avoid losing familiarity with the article. On principle, simple, clear and effective language should be used throughout the text. In addition, a pre-peer review process is recommended to obtain feedback on the manuscript. The discussion section can be written in 3 parts: an introductory paragraph, intermediate paragraphs and a conclusion paragraph. For intermediate paragraphs, a "divide and conquer" approach, meaning a full paragraph describing each of the study endpoints, can be used. In conclusion, academic writing is similar to other skills, and practice makes perfect.

Key words: Academic writing; discussion section; writing a manuscript

Introduction

Sharing knowledge produced during academic life is achieved through writing manuscripts. However writing manuscripts is a challenging endeavour in that we physicians have a heavy workload, and English which is common language used for the dissemination of scientific knowledge is not our mother tongue.

The objective of this review is to summarize the method of writing 'Discussion' section which is the most important, but probably at the same time the most unlikable part of a manuscript, and demonstrate the easy ways we applied in our practice, and finally share the frequently made relevant mistakes. During this procedure, inevitably some issues which concerns general concept of manuscript writing process are dealt with. Therefore in this review we will deal with topics related to the general aspects of manuscript writing process, and specifically issues concerning only the 'Discussion' section.

A) Approaches to general aspects of manuscript writing process:

1. What should be the strategy of sparing time for manuscript writing be? Two different approaches can be formulated on this issue? One of them is to allocate at least 30 minutes a

day for writing a manuscript which amounts to 3.5 hours a week. This period of time is adequate for completion of a manuscript within a few weeks which can be generally considered as a long time interval. Fundamental advantage of this approach is to gain a habit of making academic researches if one complies with the designated time schedule, and to keep the manuscript writing motivation at persistently high levels. Another approach concerning this issue is to accomplish manuscript writing process within a week. With the latter approach, the target is rapidly attained. However longer time periods spent in order to concentrate on the subject matter can be boring, and lead to loss of motivation. Daily working requirements unrelated to the manuscript writing might intervene, and prolong manuscript writing process. Alienation periods can cause loss of time because of need for recurrent literature reviews. The most optimal approach to manuscript writing process is daily writing strategy where higher levels of motivation are persistently maintained.

Especially before writing the manuscript, the most important step at the start is to construct a draft, and completion of the manuscript on a theoretical basis. Therefore, during construction of a draft, attention distracting environment should be avoided, and this step should

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be completed within 1-2 hours. On the other hand, manuscript writing process should begin before the completion of the study (even the during project stage). The justification of this approach is to see the missing aspects of the study and the manuscript writing methodology, and try to solve the relevant problems before completion of the study. Generally, after completion of the study, it is very difficult to solve the problems which might be discerned during the writing process. Herein, at least drafts of the 'Introduction', and 'Material and Methods' can be written, and even tables containing numerical data can be constructed. These tables can be written down in the 'Results' section.^[1]

2. How should the manuscript be written? The most important principle to be remembered on this issue is to obey the criteria of *simplicity, clarity, and effectiveness*.^[2] Herein, do not forget that, the objective should be to share our findings with the readers in an easily comprehensible format. Our approach on this subject is to write all structured parts of the manuscript at the same time, and start writing the manuscript while reading the first literature. Thus newly arisen connotations, and self-brain gyms will be promptly written down. However during this process your outcomes should be revealed fully, and roughly the message of the manuscript which be delivered. Thus with this so-called 'hunter's approach' the target can be achieved directly, and rapidly. Another approach is 'collector's approach'.^[3] In this approach, firstly, potential data, and literature studies are gathered, read, and then selected ones are used. Since this approach suits with surgical point of view, probably 'hunter's approach' serves our purposes more appropriately. However, in parallel with academic development, our novice colleague 'manuscripters' can prefer 'collector's approach.'

On the other hand, we think that research team consisting of different age groups has some advantages. Indeed young colleagues have the enthusiasm, and energy required for the conduction of the study, while middle-aged researchers have the knowledge to manage the research, and manuscript writing. Experienced researchers make guiding contributions to the manuscript. However working together in harmony requires assignment of a chief researcher, and periodically organizing advancement meetings. Besides, talents, skills, and experiences of the researchers in different fields (ie. research methods, contact with patients, preparation of a project, fund-raising, statistical analysis etc.) will determine task sharing, and make a favourable contribution to the perfection of the manuscript. Achievement of the shared duties within a predetermined time frame will sustain the motivation of the researchers, and prevent wearing out of updated data.

According to our point of view, 'Abstract' section of the manuscript should be written after completion of the manuscript. The reason for this is that during writing process of the main text, the significant study outcomes might become insignificant or vice

versa. However, generally, before onset of the writing process of the manuscript, its abstract might be already presented in various congresses. During writing process, this abstract might be a useful guide which prevents deviation from the main objective of the manuscript.

On the other hand references should be promptly put in place while writing the manuscript, Sorting, and placement of the references should not be left to the last moment. Indeed, it might be very difficult to remember relevant references to be placed in the 'Discussion' section. For the placement of references use of software programs detailed in other sections is a rational approach.

3. Which target journal should be selected? In essence, the methodology to be followed in writing the 'Discussion' section is directly related to the selection of the target journal. Indeed, in compliance with the writing rules of the target journal, limitations made on the number of words after onset of the writing process, effects mostly the 'Discussion' section. Proper matching of the manuscript with the appropriate journal requires clear, and complete comprehension of the available data from scientific point of view. Previously, similar articles might have been published, however innovative messages, and new perspectives on the relevant subject will facilitate acceptance of the article for publication. Nowadays, articles questioning available information, rather than confirmatory ones attract attention. However during this process, classical information should not be questioned except for special circumstances. For example manuscripts which lead to the conclusions as "laparoscopic surgery is more painful than open surgery" or "laparoscopic surgery can be performed without prior training" will not be accepted or they will be returned by the editor of the target journal to the authors with the request of critical review. Besides the target journal to be selected should be ready to accept articles with similar concept. In fact editors of the journal will not reserve the limited space in their journal for articles yielding similar conclusions.

The title of the manuscript is as important as the structured sections* of the manuscript. The title can be the most striking or the newest outcome among results obtained.

Before writing down the manuscript, determination of 2-3 titles increases the motivation of the authors towards the manuscript. During writing process of the manuscript one of these can be selected based on the intensity of the discussion. However the suitability of the title to the agenda of the target journal should be investigated beforehand. For example an article bearing the title "Use of barbed sutures in laparoscopic partial nephrectomy shortens warm ischemia time" should not be sent to "Original Investigations and Seminars in Urologic Oncology" Indeed the topic of the manuscript is out of the agenda of this journal.

4. Do we have to get a pre-peer review about the written manuscript? Before submission of the manuscript to the target journal the opinions of internal, and external referees should be taken.^[1] Internal referees can be considered in 2 categories as “General internal referees” and “expert internal referees” General internal referees (ie. our colleagues from other medical disciplines) are not directly concerned with your subject matter but as mentioned above they critically review the manuscript as for simplicity, clarity, and effectiveness of its writing style. Expert internal reviewers have a profound knowledge about the subject, and they can provide guidance about the writing process of the manuscript (ie. our senior colleagues more experienced than us). External referees are our colleagues who did not contribute to data collection of our study in any way, but we can request their opinions about the subject matter of the manuscript. Since they are unrelated both to the author(s), and subject matter of the manuscript, these referees can review our manuscript more objectively. Before sending the manuscript to internal, and external referees, we should contact with them, and ask them if they have time to review our manuscript. We should also give information about our subject matter. Otherwise pre-peer review process can delay publication of the manuscript, and decrease motivation of the authors. In conclusion, whoever the preferred referee will be, these internal, and external referees should respond the following questions objectively. 1) Does the manuscript contribute to the literature?; 2) Does it persuasive? 3) Is it suitable for the publication in the selected journal? 4) Has a simple, clear, and effective language been used throughout the manuscript? In line with the opinions of the referees, the manuscript can be critically reviewed, and perfected.^{[1]**}

Following receipt of the opinions of internal, and external referees, one should concentrate priorly on indicated problems, and their solutions. Comments coming from the reviewers should be criticized, but a defensive attitude should not be assumed during this evaluation process. During this “incubation” period where the comments of the internal, and external referees are awaited, literature should be reviewed once more. Indeed during this time interval a new article which you should consider in the ‘Discussion’ section can be cited in the literature.

5. What are the common mistakes made related to the writing process of a manuscript? Probably the most important mistakes made related to the writing process of a manuscript include *lack of a clear message of the manuscript*, inclusion of more than one main idea in the same text or provision of numerous unrelated results at the same time so as to reinforce the assertions of the manuscript. This approach can be termed roughly as “loss of the focus of the study” In conclusion, the author(s) should ask themselves the following question at every stage of the writing process: “What is the objective of the study? If you always get clear-cut answers whenever you ask

this question, then the study is proceeding towards the right direction. Besides application of a template which contains the intended clear-cut messages to be followed will contribute to the communication of net messages.

One of the important mistakes is refraining from critical review of the manuscript as a whole after completion of the writing process. Therefore, the authors should go over the manuscript for at least three times after finalization of the manuscript based on joint decision. The first control should concentrate on the evaluation of the appropriateness of the logic of the manuscript, and its organization, and whether desired messages have been delivered or not. Secondly, syntax, and grammar of the manuscript should be controlled. It is appropriate to review the manuscript for the third time 1 or 2 weeks after completion of its writing process. Thus, evaluation of the “cooled” manuscript will be made from a more objective perspective, and assessment process of its integrity will be facilitated.

Other erroneous issues consist of superfluousness of the manuscript with unnecessary repetitions, undue, and recurrent references to the problems addressed in the manuscript or their solution methods, overcriticizing or overpraising other studies, and use of a pompous literary language overlooking the main objective of sharing information.^[4]

B) Approaches to the writing process of the ‘Discussion’ section:

1. How should the main points of ‘Discussion’ section be constructed? Generally the length of the ‘Discussion’ section should not exceed the sum of other sections (introduction, material and methods, and results), and it should be completed within 6-7 paragraphs. Each paragraph should not contain more than 200 words, and hence words should be counted repeatedly. The ‘Discussion’ section can be generally divided into 3 separate paragraphs as. 1) Introductory paragraph, 2) Intermediate paragraphs, 3) Concluding paragraph.

The introductory paragraph contains the main idea of performing the study in question. Without repeating ‘Introduction’ section of the manuscript, the problem to be addressed, and its updateness are analysed. The introductory paragraph starts with an undebatable sentence, and proceeds with a part addressing the following questions as 1) On what issue we have to concentrate, discuss or elaborate? 2) What solutions can be recommended to solve this problem? 3) What will be the new, different, and innovative issue? 4) How will our study contribute to the solution of this problem An introductory paragraph in this format is helpful to accommodate reader to the rest of the Discussion section. However summarizing the basic findings of the experimental studies in the first paragraph is generally recommended by the editors of the journal.^[5]

In the last paragraph of the Discussion section “strong points” of the study should be mentioned using “constrained” , and “not too strongly assertive” statements. Indicating limitations of the study will reflect objectivity of the authors, and provide answers to the questions which will be directed by the reviewers of the journal. On the other hand in the last paragraph, future directions or potential clinical applications may be emphasized.

2. How should the intermediate paragraphs of the Discussion section be formulated? The reader passes through a test of boredom while reading paragraphs of the Discussion section apart from the introductory, and the last paragraphs. Herein your findings rather than those of the other researchers are discussed. The previous studies can be an explanation or reinforcement of your findings. Each paragraph should contain opinions in favour or against the topic discussed, critical evaluations, and learning points.

Our management approach for intermediate paragraphs is “divide and conquer” tactics. Accordingly, the findings of the study are determined in order of their importance, and a paragraph is constructed for each finding (Figure 1). Each paragraph begins with an “indisputable” introductory sentence about the topic to be discussed. This sentence basically can be the answer to the question “What have we found?” Then a sentence associated with the subject matter to be discussed is written. Subsequently, in the light of the current literature this finding is discussed, new ideas on this subject are revealed, and the paragraph ends with a concluding remark.

In this paragraph, main topic should be emphasized without going into much detail. Its place, and importance among other studies should be indicated. However during this procedure studies should be presented in a logical sequence (ie. from past to present, from a few to many cases), and aspects of the study contradictory to other studies should be underlined. Results without any supportive evidence or equivocal results should not be written. Besides numerical values presented in the Results section should not be repeated unless required.

Besides, asking the following questions, and searching their answers in the same paragraph will facilitate writing process of the paragraph.^[1] 1) Can the discussed result be false or inadequate? 2) Why is it false? (inadequate blinding, protocol contamination, lost to follow-up, lower statistical power of the study etc.), 3) What meaning does this outcome convey?

3. What are the common mistakes made in writing the Discussion section?: Probably the most important mistake made while writing the Discussion section is the need for mentioning all literature references. One point to remember is that we are not writing a review article, and only the results related to this

paragraph should be discussed. Meanwhile, each word of the paragraphs should be counted, and placed carefully. Each word whose removal will not change the meaning should be taken out from the text.” Writing a saga with “word salads”^{****} is one of the reasons for prompt rejection. Indeed, if the reviewer thinks that it is difficult to correct the Discussion section, he/she use her/his vote in the direction of rejection to save time (Uniform requirements for manuscripts: International Committee of Medical Journal Editors [http://www.icmje.org/urm_full.pdf])

The other important mistake is to give too much references , and irrelevancy between the references, and the section with these cited references.^[3] While referring these studies, (excl. introductory sentences linking indisputable sentences or paragraphs) original articles should be cited. Abstracts should not be referred, and review articles should not be cited unless required very much.

4. What points should be paid attention about writing rules, and grammar? As is the case with the whole article, text of the Discussion section should be written with a simple language, as if we are talking with our colleague.^[2] Each sentence should indicate a single point, and it should not exceed 25-30 words. The priorly mentioned information which linked the previous sentence should be placed at the beginning of the sentence, while the new information should be located at the end of the sentence. During construction of the sentences, avoid unnecessary words, and active voice rather than passive voice should be used.^{*****} Since conventionally passive voice is used in the scientific manuscripts written in the Turkish language, the above statement contradicts our writing habits. However, one should not refrain from beginning the sentences with the word “we”. Indeed, editors of the journal recommend use of active voice so as to increase the intelligibility of the manuscript.

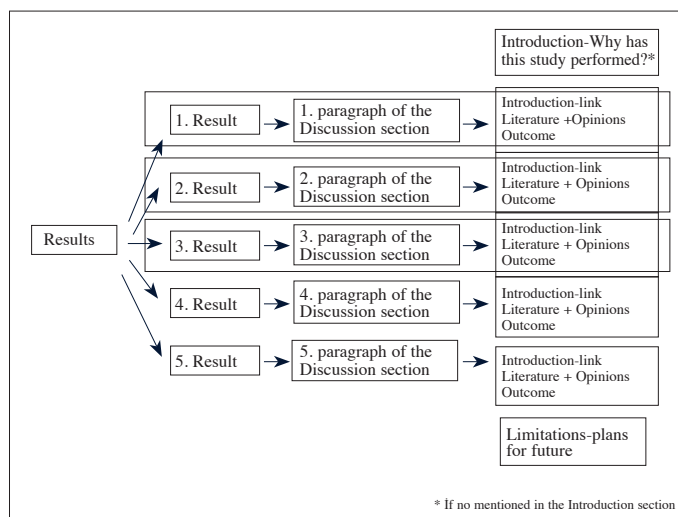


Figure 1. Divide and Conquer tactics

In conclusion, the major point to remember is that the manuscript should be written complying with principles of simplicity, clarity, and effectiveness. In the light of these principles, as is the case in our daily practice, all components of the manuscript (IMRAD) can be written concurrently. In the 'Discussion' section 'divide and conquer' tactics remarkably facilitates writing process of the discussion. On the other hand, relevant or irrelevant feedbacks received from our colleagues can contribute to the perfection of the manuscript. Do not forget that none of the manuscripts is perfect, and one should not refrain from writing because of language problems, and related lack of experience.

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Instead of structured sections of a manuscript (IMRAD): Introduction, Material and Methods, Results, and Discussion

Instead of in the Istanbul University Faculty of Medicine posters to be submitted in congresses are time to time discussed in Wednesday meetings, and opinions of the internal referees are obtained about the weak, and strong points of the study

Instead of a writing style which uses words or sentences with a weak logical meaning that do not lead the reader to any conclusion

Instead of "white color"; "proven"; instead of "history"; "to". should be used instead of "white in color", "definitely proven" , "past history", and "in order to" , respectively (ref. 2)

Instead of "No instances of either postoperative death or major complications occurred during the early post-operative period" use "There were no deaths or major complications occurred during the early post-operative period.

Instead of "Measurements were performed to evaluate the levels of CEA in the serum" use "We measured serum CEA levels"