

How to Write an Effective Discussion

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Introduction

Elements to Include in the Discussion

State the Major Findings of the Study

Explain the Meaning of the Findings and Why the Findings Are Important

Relate the Findings to Those of Similar Studies

Consider Alternative Explanations of the Findings

State the Clinical Relevance of the Findings

Acknowledge the Study's Limitations

Make Suggestions for Further Research

Give the "Take-Home Message" in the Form of a Conclusion

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Overinterpretation of the Results

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Summary

Explaining the meaning of the results to the reader is the purpose of the discussion section of a research paper. There are elements of the discussion that should be included and other things that should be

Explain the Meaning of the Findings and Why the Findings Are Important

the study's outset. Why is the study important? How does this study relate to previous studies? What are the limitations of the study design? There are elements of the discussion that should be included and other things that should be avoided (Tables 1 and 2). Most important, always write the discussion for the reader; the discussion is not a forum for you to impress others with your knowledge of the subject. You should be trying to convince the reader of the merits of the study results.

Elements to Include in the Discussion

State the Major Findings of the Study

The discussion should begin with a statement of the major findings of the study. This should be the very first paragraph in the discussion. It should be a direct, declarative, and succinct proclamation of the study results. However, it should not include data or reference to the study design. Several examples illustrate the point. In a paper by Anton et al¹ the discussion begins with the sentence, "Our results confirm that these nasal and full-face masks are similarly efficient over 15 min of NPPV with COPD patients recovering from acute hypercapnic respiratory failure." This clearly states the most important finding of that study. Fluck et al² began the discussion section of their paper with the sentence, "Our findings suggest that ambient light has no statistically significant effect on S_{pO_2} readings and that ambient light's effect on S_{pO_2} is clinically unimportant." That is a good example of a direct, declarative, and succinct proclamation of the study results.

sible explanations for the study results, rather than just those that fit your biases.

State the Clinical Relevance of the Findings

The reason we conduct studies is usually to improve the care of our patients. Thus it is important to cast the findings of your study in the context of clinical practice. For which patients do the results apply and for which do they not apply? Experimental studies conducted in the laboratory usually do not involve human subjects, but the results may have clinical implications, which should be stated. A paper by Swart et al⁴ gives an example of a laboratory study, the clinical relevance of which is overtly stated: “The clinically important measurements, for both screening and monitoring, are predominantly FEV₁ and FVC, and the Spirospec and Masterlab 4.0 showed excellent correlation ($r = 0.99$) and very good limits of agreement for FEV₁ and FVC. For FEV₁ and FVC the Spirospec and the Masterlab 4.0 could be used interchangeably.”⁴

Acknowledge the Study’s Limitations

All studies have limitations. Unfortunately, the limitations of some studies are fatal flaws that preclude publication. However, even the best studies in the most prestigious journals have limitations. It is far better for you to identify and acknowledge your study’s limitations than to have them pointed out by a peer-reviewer or a reader (in a letter to the editor after publication). Fluck et al² acknowledged a limitation of their study and used it to make a suggestion for further research: “We used only healthy white subjects, to minimize confounding variables. Future research should include testing subjects with darker skin and subjects whose oxygen saturation is below normal ($< 95\%$).”

Make Suggestions for Further Research

Although a study may answer important questions, other questions related to the subject may remain unanswered. Moreover, some unanswered questions may become more focused because of your study. You should make suggestions for further study in the discussion section. Laboratory experimental studies typically lead to suggestions for follow-up clinical studies with human subjects. An example comes from a laboratory study of oscillating positive expiratory pressure (OPEP) devices by Volsko et al,⁵ who wrote, “One subject that remains to be explored is how to determine at the bedside whether a patient can perform OPEP and, if so, which device to select.”

Give the “Take-Home Message” in the Form of a Conclusion

What is the “take-home message”? What do you want the reader to remember from your study? The take-home

message should be the first sentence of your conclusions section. In some journals the conclusions section is a paragraph or subsection at the end of the discussion, whereas other journals (*RESPIRATORY CARE*, for instance) require a separate conclusions section. The conclusions section may also provide suggestions for practice change, if appropriate. An example of a well-written conclusion comes from a study by Apostolopoulou et al,⁶ who wrote: “VAP is a common infection and certain interventions might affect the incidence of VAP. ICU clinicians should be aware of the risk factors for VAP, which could prove useful in identifying patients at high risk for VAP and modifying patient care to minimize the risk of VAP, such as avoiding unnecessary bronchoscopy or modulating enteral feeding.”

Things to Avoid When Writing the Discussion

Overinterpretation of the Results

It is easy to inflate the interpretation of the results. Be careful that your interpretation of the results does not go beyond what is supported by the data. The data are the data: nothing more, nothing less.

Unwarranted Speculation

There is little room for speculation in the discussion. The discussion should remain focused on the your data and the patients and/or devices in your study. If the subjects in your study had asthma, it is usually not appropriate to speculate about how your findings might apply to other patient populations. If your study used volume-controlled ventilation, it may not be appropriate to speculate about how the findings might apply to pressure-controlled ventilation. If you feel compelled to speculate, be certain that you clearly identify your comments as speculation: “We speculate that. . . .”

Inflating the Importance of the Findings

After all of the hard work that goes into a study, it is easy to attribute unwarranted importance to study findings. We all want our study to make an important contribution that will be cited for generations to come. However, unwarranted inflation of the importance of the study results will disgust reviewers and readers. A measure of humility goes a long way.

Tangential Issues

It is important to remain focused on the hypothesis and study results. Injecting tangential issues into the discussion section distracts and confuses the reader. Tangential issues

run the risk of diluting and confounding the real message of the study.

The “Bully Pulpit”

Do not use the discussion section to criticize other studies. Although you should contrast your findings to other published studies, this should be done professionally. Do not use the discussion to attack other investigators. Moreover, never preach to the reader.

Conclusions That Are Not Supported by the Data

The hypothesis → study → data → conclusions should be a tight package. Avoid the temptation to allow your biases to enter into the conclusions.

Summary

The discussion section gives you an opportunity to explain the meaning of your results. When writing the discussion, remember that the focus should be to help the

reader understand the study and that the highlight should be on the study data.

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