

Elements of a Research Article: Paint by Numbers Version

(G. D. Kelen, MD, 12/20/16)

A. Abstract

The Abstract is usually formed last and thus it's discussed in this primer last.

B. Introduction

Generally, two to three paragraphs

Paragraph 1: In a few short sentences introduce the issue/problem you are trying to address. Cite other authorities that think this is a problem (such as CDC, WHO, ACEP, IOM etc.). If appropriate, you might cite statistics as a way of underscoring the weight of the problem.

e.g.: There are 1.5 million new cases of HIV diagnosed in the US.

Paragraph 2: What is known already about this area already. Cite works that have tried to address this problem. What you are doing here is stating current state of knowledge, setting up the gap that this report is addressing. Should be obvious to the reader but the time you get to the gap that a gap exists. Then outright state the gap:

e.g.: "...however, there is a paucity of information on whether....?"

e.g., "...however, it remains unclear...."

Then you follow with the "punch line". How this study is going to fill the gap.

e.g.: Therefore we understood this study to determine"

Paragraph 3: You generally don't need a third paragraph, unless the background (first paragraph); or the set up is complex. However you can use the third paragraph to focus on why what you're going to do here is especially important to the field and specifically to the readership of the journal that you're targeting.

Introduction Pointers:

1. The introduction generally has broad statements. In *paragraph 2*, you will generally avoid detailed accounting of the studies or sources you cite—there will be time for that as appropriate in the Discussion section.

E.g., better to state: “...reverse triage has been shown to create significant surge capacity among hospitalized adults.^{13,15,16}” than: “In a study that enrolled 3,256 patients, reverse triage was shown to improve surge capacity by 10.6% over four days, in an academic hospital and 18% in a community hospital.”

2. All statements of fact require a reference of original work. Avoid citing studies that are opinion, based on original work they have cited. You can cite opinions of (e.g., Pediatric surge capacity poses a problem...), if that’s what is actually intended.

C. Methods

Different publications require different sections. Generally, the following should be included in the methods. As a minimum include:

Setting: (Where was the study done)

Subjects: (Who were the subjects)

Type of Study/study design (randomized controlled trial, retrospective observational, cohort etc.)

Recruitment: (How were the subjects recruited, how they were assigned to groups etc., over what period of time)

Definition of variables (If applicable)

Interventions

Outcomes definitions (could go where variable definitions go).

Data analysis and statistics.

Statement on IRB approval (could go anywhere—usually beginning or the end).

D. Results

1. Start with basics
 - a. How many patients/participants/observations
 - b. How many did not have complete data
 - i. Therefore your final data set has ‘n’ members etc.
2. Main findings next
 - a. Sub-details of the main findings

3. Tables and Figures

- a. First Table is usually demographics of the patient population. Sometimes the main outcomes can be put in this table but usually it isn't
- b. Other tables/figures are the main and sub-outcomes
- c. Use figures to break up tables (e.g., histograms, line graphs).
 - i. Increasingly pie charts are discouraged in publications
- d. Generally some journal have a limit of about 5 tables/figures (combined total) .

Results Pointers:

1. You can only state results for what you have described in the methods.
2. Results are very dry. No comment or interpretation, or editorializing about the data. Stated very cut and dry.
3. Even when referring to figures and tables, main data to which you wish to draw attention should still be stated as text. Avoid simply stating that the data are shown in Table x Use text to draw out key findings that are highest importance /impact to your objectives.
4. Each Figure and Table that you have should be noted somewhere in the results sections in order.

E. Discussion

Paragraph 1: Two choices to start:

- a. Restate the problem and expound on it
- b. Emphatically state what you found, and then expound on the importance

Paragraph 2: However, you started, switch to the other theme above

Paragraph 3-5: Compare and contrast your results to similar work by others. Restate why your data fills the gap these others studies don't. Cite studies that shore up your findings.

Paragraph 6-7: Limitations. Some journals have an actual heading for limitations; others just expect you discuss toward the end of the discussion. There's an art to discussion limitations. You own up to the shortcomings, but you counter with a statement to minimize each limitation if possible.

Paragraph ~8: Usually the last paragraph. What is your main conclusion? What are the implications for policy/education/practice etc. Avoid stating "more research needs to be done...." If this is the case state exactly what the next steps in research would be.

Discussion Pointers:

1. You have the most freedom to paint in the Discussion. It is still somewhat formulaic, but not highly restrictive.
2. Try to keep it short and tight. There's a tendency to discuss the entire world.
3. You can editorialize and opine all you want here. Don't overstate the importance of your findings though.
4. Avoid simply restating your data. Stick to editorializing as to its importance/implications. E.g., if in the Results you noted: *Treatment was 14.87% better than treatment B ($p < .05$)(Table 2)*. In the Discussion you would say: *We saw moderate improvement in the [main outcome] for Treatment A in comparison to Treatment B.* i.e., no need to always repeat the exact data.

F. References

Strongly suggest you learn a referencing program like ref manager (free from Welsh and integrates with Word).

G. Table and Figures

Table and Figures follow the References.

Table and Figure Pointers

1. Each is on a separate page.
2. Some journals ask that Figure legends be on a separate page. If not label on the same page.
3. Each Table and Figure should be able to stand on its own without need to refer to the text. The title should convey what the data are about.
4. If you use acronyms, they need to be spelled out below the table or graph as part of the legend.
5. Tables should be simple, clean and easy to follow (use bold for headers; make spacing consistent).

E. Acknowledgements

Different journals like different things in the acknowledgements section. Need to refer to *Instructions for Authors* section specific to the journal. Typically acknowledgements include: people who assisted, but do not merit authorship, notation of funding, notation of conflicts of interest.

F: Abstract

Each journal has its own format for abstracts. Typically these are highly proscribed with specific sections such as “Background”, Setting, Patients, Methods/Procedures/Interventions, Results (Main Outcomes), Conclusion.

Abstract Pointers:

1. Some aspects do not need to be whole sentences.
2. Focus on simple succinct high level message that captures the reviewer attention; parallels each main section of the article.
3. If you use acronyms, they still need to be spelled out.
4. There is usually a word limit. Some journals are a few as 200 and some as many as 300. Rarely less or more than that.
5. **You cannot put anything in the abstract that is not in the main body of the paper**, i.e., you can't put in a piece of data in the Abstract that doesn't appear in the main text.
6. Your conclusion cannot be different than the main paper—you can nuance the wording, but that's it.
7. Do not conclude anything that is not based on the implications of your study's data (except as shored up, or countered by existing literature).