Results: Unraveling the Findings

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Abstract
Results section is used to inform readers about the actual observations made in the research study. The authors should ensure that the content is appropriate, complete and objective. Using tables and graphs appropriately enhances the readers' interest and understanding.

Introduction
Results section of a manuscript intends to provide a peek into important observations made in a research study. Some journals title this section as “Observations”. Many authors think that writing the results section should be a straightforward task. However, need to be objective and succinct and requirement to choose the right sequence and format for depiction of results are some of the challenges that the authors have to deal with.

Content
The most important step in writing the results is to decide what must be reported and what need not be.¹ This is extremely crucial, as too much data can be distracting.² Also, no journal is going to publish each and every observation made in a research study. At the same time, it is important that readers come to know about all the important and relevant findings in a study. Hence, even before one starts writing the results section, an author should review the collected data, analyze it and determine which results to report in a manuscript. Observations related to the primary outcome measures or endpoints (whether they are supportive of the initial hypothesis or not) should always be reported. All relevant results should also be reported and this is primarily decided by the research questions and objectives presented in the Introduction. Guidelines also provide a clue about what is generally expected by the reviewers and Journal Editors. We will cite the examples of CONSORT³ and STROBE⁴ Guidelines that describe the essential elements that need to be reported while writing a research article based on randomized controlled trials and observational epidemiological studies, respectively (Table 1).

Although, statistical aspects are going to be discussed in a separate series of articles, it is important to remember that the results section should provide statistical results using the correct technical terms. For example, the words “correlations”, “normal”, “random” and “significant” should be used for their correct meaning in statistics. When values are depicted as ±b, one should clearly state if ‘b’ represents standard deviation (SD) or standard error (SE). Most journals also require exact ‘p values’ with 95% confidence intervals rather than just reporting if the p value is less than or more than a particular cut-off value.⁵,⁶ Even Odds ratio and relative risk should be reported with 95% confidence interval.⁶

Sequence and Arrangement
The first few sentences of the Results section can be used to provide an overview, for example by reminding the reader about the study design, the level of healthcare where the study was carried out or by stating the main findings; in order to acquaint the reader with the study settings and inform him about the scope of the study. While doing so, one must desist from repeating the sentences or statements made under the Methods section. For example, rather than re-stating that this was ‘a randomized control trial carried out in a medical college’, it may be a better idea to start the results section with ‘In the randomized control trial carried out in a tertiary care hospital attached to a medical college, use of drug A was associated with a reduction of mortality by 15% as compared to drug B.’ The importance of being concise cannot be overemphasized. While reporting the important results, the authors should avoid getting carried away and should desist from including raw data or other appendix material in the Results section. Some journals provide the facility of reporting detailed observations at the journal website. Authors could utilize this provision to post additional and detailed findings that they are

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The third method is that of presenting results in a logical sequence and grouping them in an appropriate manner. In another method, the most important observations are discussed ahead of the less important ones. Every method has its own advantages and limitations. Also, the method chosen depends upon the type of study, research question and parameters studied. Logical sequencing of results is the most suitable method for the majority of studies. There are papers that use a combination of methods. For example, the most important selected results are presented first and this is followed by depiction of results in a logical or chronological order.

Some journals allow authors to have subheadings in the Results section. This allows authors to arrange results in logical portions. Such an arrangement also allows readers to skip some sections and concentrate on the ones that interest them the most. Whether grouped or not, the opening sentence of each section should orient the reader to the observations that are reported in that particular paragraph.

### Format

The results can be presented in textual, tabular or graphical format. The format used is generally dictated by the type of data. Generally, when very few parameters are to be discussed, textual format might suffice. Tables are suitable for showing comparisons; while graphs can catch readers’ attention. Data depicted in graphs is better remembered, too. In addition, illustrations help condense large amounts of data, direct the readers’ attention to certain important findings and simply complex findings. However, it is worth remembering that content is the key aspect of the results section. Jazzy, beautiful and colorful illustrations cannot conceal mediocre content. Whatever the format used, there should be no repetition of data presented. For example, if a Table is used to depict comparative data, its details need not be elaborated upon in textual format. The various aspects of tables, figures and graphs will be discussed in greater detail in a subsequent article of the series.

### Pitfalls

The various sections of the IMRaD (Introduction-Methods-Results and Discussion) format are quite distinct and there are no overlaps among these sections. While methods section discusses what was done, how data was collected and analyzed; the results section provides the actual data and results of its analysis. However, sometimes authors overlook the subtle differences that exist. For example, the statement that the sample size was calculated as 154 for each group needs to be included in the methods section. However,
Illogical sequence of data presentation
Using terms such as ‘few’, ‘many’, ‘some’, ‘several’, ‘most’, ‘majority’ instead of providing the actual numbers
Errors and inaccuracies in reported observations
Misplacement of information between Methods and Results sections
Reporting observations of parameters that have not been mentioned in the Methods section
Not reporting observations of experiments that have been described in the Methods section
Failure to report data pertaining to the primary objective
Repetition of data in text, tables and graphs
Inappropriate presentation of data: Overuse of tables and graphs
Describing the interpretation, importance or impact of the data and study
Not writing the Results section in the past tense
Citing references in the section, when the Results section should only report observations in the current study

The fact that 154 participants were enrolled in each group needs to be reported under the results section. Similarly, results section is about data presentation; while the discussion section deals with the interpretation, importance, implications and impact of those observations. Other pitfalls that authors should steer clear of are listed in Table 2.

To summarize, results section provides answers to the research questions, without interpreting them. This should be done in an objective manner. The section should be shorn of unnecessary and superfluous details. Whenever required, tables and graphs can be used to enhance understanding and draw readers’ attention to group of findings. But, these should be used judiciously.

References

1. Ng KH, Peh WCG. Writing the results. Singapore Med J 2008; 49:967-8