Detailing the Writing of Scientific Manuscripts: 25-30 Paragraphs

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In their professional practices, physicians often face unexpected situations or chance on innovative proposals and ideas. As a result of their training and competence, they usually come up with hypotheses to be tested and research is conducted. This research is completed and their results submitted for presentations at conferences as free communications. Nevertheless, the realization of this creative process is only complete when a scientific manuscript is published in a journal. At this ultimate stage, most efforts seem not be brought to a standstill[1,2]. There are several reasons why scholars, interns, residents, graduate students and even experienced physicians may find it difficult to move forward from congress' abstracts to full manuscripts published in journals. However, the most significant hindrance rests with the difficulty writing the mere 25-30 paragraphs of an original manuscript. Many freeze and give up in front of a blank paper or a blinking cursor on a blank word processor's page on the monitor screen. In the previous manuscript[3], we analyzed and suggested improvements to the process of peer review. In this point of view, we propose a practical strategy to systematize the writing of scientific paragraphs, aiming to simplify the task of scientific writing. This way, our intent is to increase the rate of publication of full manuscripts based on several outstanding abstracts presented annually at major medical conferences, and facilitate the currently overburdened process of peer review.

The format of scientific communication has been evolving greatly over the centuries[4-7], making reading more objective and standardized. One of the important tools in this process is the IMRaD format[4,5,7], an acronym derived from the initials of the main sections of a manuscript - introduction, methods, results and discussion. Throughout the twentieth century, the IMRaD format has been increasingly applied, accounting for about 10% of the manuscripts in the 1950s, being dominant in the 1960s, and reaching 80% in the 1970s[7]. Presently, IMRad is the format recommended and adopted by the main medical journals all over the world, including the ABC (*Arquivos Brasileiros de Cardiologia*).

Keywords

Journal of Article; Writing; Methodology; Bibliometrics.

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Manuscript received July 24, 2013, revised manuscript August 9, 2013, accepted August 12, 2013.

DOI: 10.5935/abc.20140019

In addition to the IMRaD format, original manuscripts submitted for publication should meet specific standards and rules of each journal. Although a fairly uniform pattern tends to prevail, there are differences that should be observed at the time of writing. For instance, the number of words is limited to 4,500 in ABC and 5,000 in JACC, including text and references. Considering that the references are usually limited to 30-40, and have around 1,000 words, circa 3,500-4,000 are left for the text's body, i.e., to be used in the 25-30 paragraphs of IMRaD, representing about 130 words each.

In the pursuit for evidence and objective data, as a convenience sample, all original manuscripts published in the January 2012 and 2013 editions of ABC and JACC journals have been analyzed (the first two numbers of these months for the latter). There was a fairly clear trend about the total number of paragraphs and distribution of paragraphs in four sections of the IMRaD of a manuscript. For the 20 ABC's manuscripts and 34 JACC's ones, the average number of paragraphs was 28.9 and 28.2 ($p = 0.703$), respectively, with 1/3 of them having 25-30 paragraphs, and 57% of the total manuscripts having overall 22-33 paragraphs. This relative constancy should be observed and highlighted, considering that the topics and areas covered, as well as the background and the nationality of the authors, are quite different. Thus, this confirms the assumption that there is a basic format to be followed for an effective publication.

Figure 1 illustrates the distribution of paragraphs for the various IMRaD sections in the two journals analyzed. Although there is some variability among the manuscripts, the introduction is clearly a section with fewer paragraphs ($p < 0.001$), while the remaining sections are somewhat balanced ($p > 0.05$), especially for original manuscripts of JACC, in which the sections of methods, results and discussion tend to have eight to nine paragraphs. When the distributions of paragraphs between ABC and JACC are compared, introductions and discussions tend to have more paragraphs in ABC than in JACC, respectively, 3.8 versus 2.4 ($p < 0.01$) and 10.4 versus 8.8 ($p = 0.04$).

Based on these results, in our personal experience as authors of original manuscripts and according to other authors' opinions[4,8-10], a simple content model may be proposed within the IMRaD format, taking 25-30 paragraphs as standard for an original manuscript. For practical purposes, one page is considered one page in a word processor, with conventional margins and with a 1.5 line spacing and font size 11.

Unfolding the sections

Introduction: 1 page (ideally), maximum 400 words over 1-4 paragraphs (ideally 3) – some journals restrict this to 350 words (E.g.: ABC); 5-10 references.

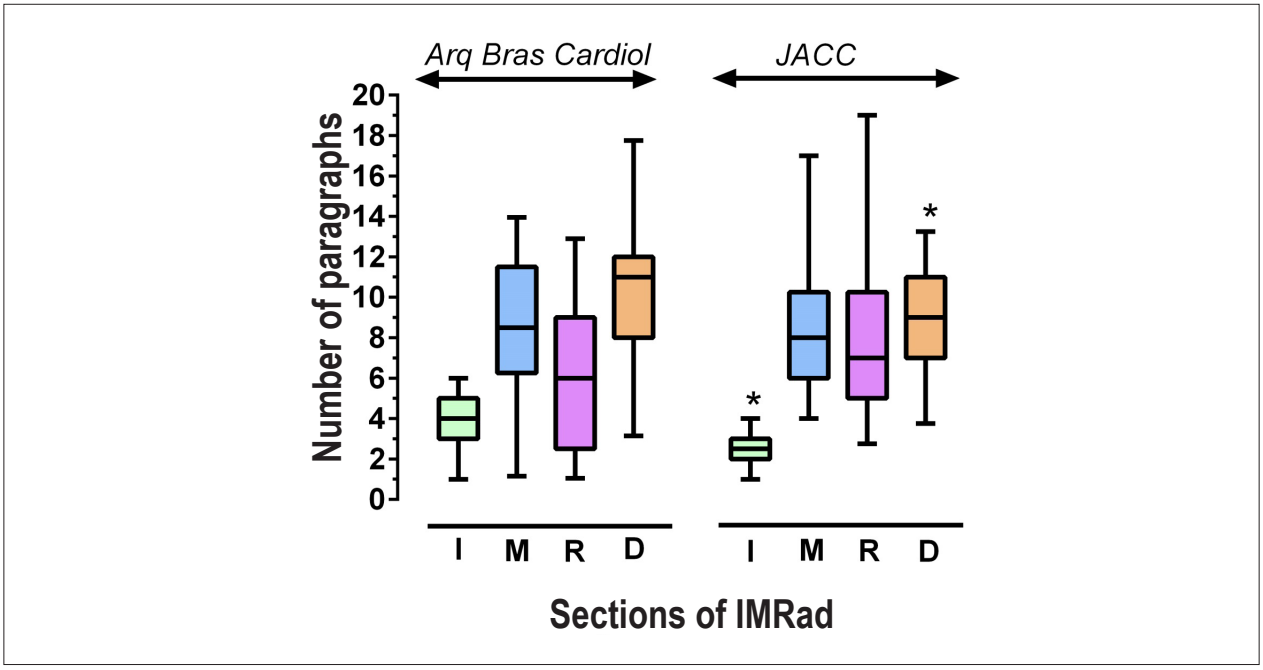

Figure 1 - *Comparative analysis on the number of paragraphs per section of IMRaD for original manuscripts between Arquivos Brasileiros de Cardiologia (Arq Bras Cardiol) and Journal of The American College of Cardiology (JACC). I: introduction; M: methods; R: results; D: discussion. The box-plot represents median values, the first and third quartiles and 5th and 95th percentiles.*Significant difference between the number of paragraphs of the two journals for this section.*

Methods: 2-3 pages (possibly higher in experiments resorting to innovative methods or plenty of techniques or sophisticated statistics) – not exceeding 750 words over 6-9 paragraphs; 5-15 references

Results: 2-3 pages of text, figures and tables, as strictly necessary; not exceeding 1,000 words over 4-9 paragraphs; usually without references.

Discussion: 3-4 pages of text; this is usually the most extensive part of the manuscript relating to word count[4,8-10], with 1,000-1,500 words distributed over up to 10 paragraphs; including a conclusion paragraph, although some journals consider the latter another text section. The discussion usually has 10-20 references, with some of them possibly appearing in previous text sections.

Unfolding the paragraphs

Introduction

1. Problem – what is known?

2. Contextualization*

3. Knowledge gap – what is not known?

4. Definition and purpose of the study – what will be studied and the hypothesis or objective; preferably not including results or conclusions*

Methods

5. Population and sample – inclusion and/or exclusion criteria; reference to the informed consent form and approval by the ethics committee

6. Population and sample II – description of specific sampling subgroups or, when necessary, in-depth detailing of procedures connected to follow-up and losses*

7. Main methods – most important variable or procedure

8. Main methods II – unfolding the paragraph above *

9. Secondary methods – less important variables

10. Study protocol – detailing of what has been done and how it has been done

11. Study protocol II – additional data when necessary and justified*

12. Statistical analysis – descriptive and inferential methods

13. Statistical analysis II – software and significance level*

Results

14. General data – description of sample and information about the patient selection flow and actual performance of the study

15. Main results – the most important variables

16. Main results II – additional results and other analyzes of the most important variables*

**These paragraphs are optional, and often the contents can se incorporated into the previous paragraph(s).*

17. Secondary results – the other study variables

18. Secondary results II – additional results of variables or the interrelation or interaction between them*

19. Secondary results III – additional results of variables or the interrelation or interaction between them*

20. Other results and analysis carried out in the study*

Discussion

21. The problem and the study's "original" proposal – discussing again the study's problem

22. Interpretation of the main result – meaning of what has been found

23. Comparison with the literature – how this result confirms previous data

24. Further comparison with the literature* – exploring methodological or mechanistic differences

25. The main result's contribution to knowledge – the "novelty" or main message or contribution of the research to the current state-of-the-art

26. Interpretation of secondary results – what these results inform or mean

27. Interpretation of secondary results II*

28. Comparison of this study with previous ones – the contribution and developments in this study for the area's knowledge

29. Limits of the study – strengths and weaknesses; the weaknesses and methodological problems of the study and, especially, how these limitations may hinder the practical application of the results and their interpretations. The strengths of the study may also be stressed, possibilities may be pointed out, as well as issues to be further researched — other knowledge gaps

30. Conclusions and implications – this represents a synthesis of the study, usually answering the hypothesis reported in the final paragraph of the introductory section, solving the study objective.

* These paragraphs are optional, and often the contents can be incorporated into the previous paragraph(s).

A rather practical observation is that the writing of paragraphs does not need to follow the order of sections or, even, the several paragraphs making up the given section. In practice, most of the experienced authors start with the methods and results, hence following to the discussion, and only then proceeding to the introduction. The title is typically their last concern.

Grounded on the practical strategy presented in this point of view, in keeping with the IMRaD format, we may assert that potential authors will deal better with blinking cursors on the word processor and will deal easily and objectively with the final stage of transforming an outstanding communication at a conference into an excellent original manuscript. This will allow a much larger audience to benefit from their findings and interpretations, forever.

Author contributions

Conception and design of the research, Acquisition of data, Analysis and interpretation of the data, Statistical analysis, Obtaining funding, Writing of the manuscript, Critical revision of the manuscript for intellectual content: Araújo CGS.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

This study was partly funded by CNPq and FAPERJ.

Study Association

This study is not associated with any thesis or dissertation work.

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