STRUCTURAL, LINGUISTIC, AND GRAMMATICAL COMPARISON OF FIVE BIOMEDICAL RESEARCH ARTICLES

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Abstract

The purpose of this case study is to compare five biomedical articles in the field of pathology, having the same topic, namely, renal cell carcinoma. The features under investigation are: structure of the article, names of substances, collocations with the term *histological*, and any possible inconsistencies from grammatical perspectives. All five articles were processed manually in order to highlight the aspects in which I was particularly interested.

Keywords: biomedical research article, IMRAD, terminology, mistakes.

Introduction

In order to compare the structure, the language, and the grammar of five biomedical articles, I included the following ones in my study, listed alphabetically according to their title:

1.*Aberrant Methylation of PCDH8 is a Potential Prognostic Biomarker for Patients with Clear Cell Renal Cell Carcinoma*, published in Medical Science Monitor;

2.*Clear cell papillary renal cell carcinoma with angiomyomatous stroma: a histological, immunohistochemical, and fluorescence in situ hybridization study*, published in Virchows Archiv;

3.*Differential expression of microRNA501-5p affects the aggressiveness of clear cell renal carcinoma*, published in FEBS Open Bio;

4.*Identification of Potential Serum Proteomic Biomarkers for Clear Cell Renal Cell Carcinoma*, published in PLOS ONE Journal;

5.*Stage pT3a of renal clear cell carcinoma: do tumors with sinus fat involvement behave the same as those with perinephric fat involvement?*, published in the Romanian Journal of Morphology and Embryology.

All five articles report findings on the same medical entity, clear cell renal carcinoma. Article 1 was authored by Chinese researchers, article 2 by American ones, article 3 by Italian doctors, article 4 was written by a Chinese team, while the authors of article 5 are Spanish.

Structure of the articles

The most widely-spread type of biomedical research article is the IMRAD structure, namely the acronym of the sections *Introduction*, *Materials and methods*, *Results*, and *Discussion*. Additional parts are an *Abstract* and a list of *Keywords*. All five articles included in the study conform to this type of structure but some discrepancies occur.

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Ideally, keywords should precede the body of a research article in order to identify the paper when online searches are performed. Selection of keywords is important because they are indexed and catalogued in electronic databases to facilitate their retrieval (Eaton 2012: 88) and such keywords should be chosen which appear in the National Library of Medicine's controlled vocabulary thesaurus (Eaton ibid., Enache 2007:55, Matthews & Matthews 2008: 48). Except for article 4, all the other ones are accompanied by a list of keywords. However, the reason is that the manuscript guidelines of the journal do not require such a list. The only article which uses MeSH (Medical Subject Headings) keywords is article 1, while article 2 uses only one such keyword, that is, *clear cell papillary renal cell carcinoma*, which is the medical condition investigated by the article.

The abstract of a biomedical research article has to clearly reflect the entire research described in the article. Although there may be word limits set by journals, ideally an abstract should not exceed 200 words (Stuart 2007: 65). The importance of the abstract as a component of biomedical research articles has risen due to the growth in the medical literature and emergence of online databases, many of which provide free access to abstracts but not to the articles (Ferguson 2013: 250).

In term of structure, the *Abstract* section varies throughout the five articles. Thus, the abstract of article 1 is divided into sections (*Background*, *Materials/ Methods*, *Results*, *Conclusions*), that of articles 2 and 3 is regular, not exceeding one paragraph, the abstract of article 4 is also divided into sections (*Objective*, *Methods*, *Results*, *Conclusion*), as is that of article 5 (*Introduction*, *Materials and Methods*, *Results*, *Conclusions*).

The purpose of the *Introduction* is to describe the broad area in which the research was conducted. In order to clarify the necessity of the study, the introductory part should answer the question "why was this work done?" (Mathews & Mathews 2008: 42). An introduction can cover three areas: the general field of interest, the background and previous advances in the area, and the novelty that the research brings. Important papers about previous studies are cited here, a good review of the literature to date being at the basis of a good introductory part. The closing sentences of the *Introduction* should broadly present the most significant findings as opposed to previous studies and the importance of the research described in the article.

In the case of the first article, the introductory part is entitled *Background* and it describes renal cell carcinoma and states the aim of the study. Some of the sentences of the *Introduction* to article 2 are identical to the ones that the authors used in the *Abstract*. Apart from a literature review, the aim of presenting some challenging cases is included here. The introductions of the other three articles conform to the general guidelines for editing this part of the medical research article.

The *Materials and Methods* section of the medical article fully describes the methodology used in the research and it should answer the question "how was the evidence obtained?" (Mathews 2008: 42). Accurate details of the procedures and explanations are necessary so that if another team decides to repeat the study, the same results should be obtained. The choice of methods in the experiment has to be explained,

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and it has to be justified and appropriate enough in order to convey reliable results. It is also stated here whether ethical approval and patient consent was obtained (Stuart 2007: 69). Depending on the needs of the article and the aim of the authors, this section is often subdivided. As such, the *Materials and Methods* part of articles 1, 3, and 4 is subdivided, the sections bearing such headings as *Patients and samples*, *Statistical analysis* (article 1), *Patients and sample preparation*, *Peptide identification by LC-ESI-MS/MS* (article 4). The section under discussion is divided into 10 parts in the case of article 3, the subdivisions bearing headings such as *Reagents*, *Collection of sample tissues and kidney cell lines*, *Apoptosis detection*, or *Cell imaging*.

With the exception of articles 3 and 5, all the other articles mention the fact that the study was performed with the approval of the ethics committee of the institution where it was conducted.

According to Eaton (2012: 89), the aim of the *Results* section is to present data and statistical results objectively and in a clear manner, excluding any comments, analysis or conclusions drawn from the results. This section can also be separated into subsections; such is the case of articles 3 and 4 having 4, and 5 subsections, respectively. Other elements such as charts, figures, tables are included in the *Results* section of all five articles.

The *Discussion* part is dedicated to a critical approach of the methodology used in the research and it also interprets the findings of the study, comparing the results of the current study with those of similar ones carried out previously, commenting on differences and similarities, and explaining their occurrence. Here, the authors are expected to state their consideration of the results. All five articles conform to the general guidelines of editing biomedical research articles as far as the *Discussion* section is concerned.

Generally, the *Discussion* part ends with a concluding paragraph which summarises the study and lists its key features. The *Discussion* section of articles 2, 3, and 4 conforms to this rule, while articles 1 and 5 present the conclusion under a distinct heading named *Conclusions*. Although article 5 includes a short conclusion, it stars, however, as if it were the introductory part of the article: "we herein report the results of our series of pT3a CCRC patients and analyze the factors that can influence prognosis".

Language

From a linguistic point of view, what is more interesting is the abbreviation of the medical condition under discussion, namely *clear cell renal cell carcinoma*. Except for article 5 which uses the acronym CCRC, the other ones abbreviate it as CCRCC (all capitals in articles 1 and 2), and ccRCC (articles 3 and 4). While I personally believe that Virchows Archiv, the journal of the European Society of Pathology in which article 2 was published, is a landmark in European pathological research, I decided to perform a search on Pubmed[2] in order to find articles authored by American researchers regarding the acronym. Thus, I found that authors from the renowned University of Texas MD

[2] http://www.ncbi.nlm.nih.gov/pubmed

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Anderson Cancer Center, Houston, prefer the acronym ccRCC, whilst the acronym CCPRCC (clear cell papillary renal cell carcinoma), which also appears in article 2, is preferred by American medical authors too. While, from the point of view of a translator, it is still unclear to me which acronym should be used CCRCC or ccRCC, I believe that the choice may depend on the intended journal of publication.

Also from a linguistic point of view, I was interested in the names of the substances that the research articles include. All five of them investigate the same medical condition, namely clear cell renal cell tumour, but because the focus and methods used vary from one research to another, so do the names of substances. As such, substance names include cytokeratin, vimentin, ethanol (articles 2 and 3); names of proteins such as p53, or CD34 (articles 3 and 5), and liquid nitrogen, used for freezing tissues sections, ethidium bromide (article 1), a staining dye.

Another linguistic feature that I wanted to investigate in the five articles included in the case studies was the use of the adjective *histological*. The term is absent from articles 1 and 4, but it collocates with *pattern*, *study*, and *features* (article 2), with *subtypes* (article 3), and with *factors*, *parameter*, *samples*, and *variables* (article 5).

From the point of view of consistency in using the same term throughout the article, article 1 uses *clinicopathologic* (*features*, *parameters*) along with *clinicopathological* (*features*, *characteristics*, *parameters*). *Clinicopathologic* also appears in article 2 (in combination with *findings*, and *correlation*); and two different spellings *clinico-pathological* (*characteristics*) along with *clinicopathological* (*characteristics*) in article 4. The Merriam Webster online dictionary[3] lists *clinicopathological* as a variant of *clinicopathologic*. Other online dictionaries do not retrieve any results on the search for *clinicopathological* (Cambridge Dictionaries Online[4], Macmillan Dictionary[5], Oxford Dictionaries[6]). On the other hand, the *Dicţionar medical englez-român* only lists *clinicopathologic*, while the *Dictionary of Medical Terms* does not include it. However, both *pathologic* and *pathological* are listed by *Dictionary of Medical Terms* and *Dicţionar medical englez-român*, respectively.

Grammar

From a grammatical point of view, not all five articles are free of mistakes or improper use of the English tense system. Hence, the *Materials and Methods* section of article 4 mentions the fact that "each subject has been provided signed informed consent before the work." To my mind, what the authors meant is that each subject provided signed informed consent. Moreover, another problem regarding tense is given by "clinico-pathological characteristics of all patients were shown in Table 1" where present tense should be used whenever reference to tables or graphical illustrations is made.

Another rather hard to decode sentence is "with a complex array of peptides, human serum could be value of diagnostic or prognostic markers identification" which

[3] http://www.merriam-webster.com/dictionary/clinicopathologic
[4] http://dictionary.cambridge.org/
[5] http://www.macmillandictionary.com/
[6] http://www.oxforddictionaries.com/

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should have been rendered as: human serum could be of value for diagnostic or prognostic marker identification, or as: human serum could be of value for the identification of diagnostic or prognostic markers.

Tense problems occur in article 5 as well, such as "since the 50's the tumor node metastasis (TNM) staging system is widely used to stage the tumors of almost every organ", instead of the present perfect tense. The present perfect is used instead of the past tense when the study is described: "with these inclusion criteria, we have found 30 patients with a diagnosis of CCRC", "two urologists (DSA and JJG) have reviewed the clinical data", "in these cases we have collected clinical data", "the immunohistochemical panel has been performed following a standardized methodology", "the pathologists participating in the study have counted 400 cells", and "we have established three homogeneous groups of patients".

The same articles also includes wrongly used prepositions "patients can be divided in three groups" instead of the preposition *into*, "based their groups in the presence or absence of caval invasion" instead of the preposition *on* which collocates with the verb *to base*, and "the comorbidities associated to the tumor" instead of the preposition *with*.

However, the most striking problem I encountered in article 5 is the name of the medical condition which it investigates: clear cell renal cell carcinoma. The terms that denote the entity appear in three different combinations: *clear renal cell carcinoma*, *renal clear cell carcinoma*, and *clear cell renal carcinoma*. It is intriguing to me how the authors used the term so differently throughout the entire article, and how the reviewers failed to notice the variations.

Conclusion

To conclude, biomedical research articles have a somewhat fixed and rigid structure, namely IMRAD, which is currently the most widespread one because of the chronological and logical organisation of the information. Nevertheless, journals may have different requirements as far as the structure is concerned, and authors may have a certain degree of flexibility in editing and dividing some of the sections.

From the point of view of terminological consistency, not all five articles included in the study follow this basic rule of any written research, the same concept being referred to by variants of the same terms. Although medical articles are expected to be correct, some linguistic and grammatical mistakes may occur, as proven by the case studies. There may be several reasons: most frequently English is not the native language of the authors, these articles may be translations performed by non-specialists in medicine, insufficient language review on the side of the journal, nevertheless, no such mistakes or inconsistencies should come out in print.

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