

## Chapter 18

# MEDICAL WRITING

H Maisonneuve

"What is conceived well is clearly stated". The content ensures the validity of a scientific communication; the form ensures readability and transmission of the message. The content and the form must be rigorous.

What does a researcher want? Conduct research to contribute to the knowledge of the scientific community. You need a good idea, a precise and detailed protocol, and conduct the research rigorously. He wants to communicate the results to the scientific community. It wants to be read: it must be clear, precise, and concise.

Scientific writing comes from science, not from literature. It is guided by principles, which are part of scientific rigor itself. The proper use of the language and respect for grammatical rules are essential!

Newspapers have changed rapidly with the Internet since 1994 and with Web 2.0 since 2005. In 2009, more than 500 newspapers have an electronic format without paper support, and claim free access for readers. Social networks play a role in the dissemination of science and could jeopardize newspapers whose operation is highly criticized.

[www.h2mw.eu](http://www.h2mw.eu) for news in medical writing.

## I - THE DIFFERENT MEDICAL TEXTS

- **The original article** reports on research work. Its so-called IMRAD structure results from scientific logic: Introduction (why the work was done), Methods (how it was done), Results (what was observed) and (And) Discussion (what I think of my work ). Also incorporated are references, and if necessary figures and tables. The doctoral thesis has the same structure as the original article, its aims being the same.

- **The editorial** is usually requested by the editorial board of a journal from an author who is authoritative on the subject. The author freely expresses his opinion by analyzing the literature and by formulating hypotheses or research projects.

- The purpose of **the case report** is to report an observation and briefly comment on it. The anatomo-clinical discussion approaches it. The IMRAD structure must be respected.

- **The letter to the editor**, brief, concerns a short clinical case, the preliminary results of a research work, or the commentary of an article published in the same journal.

- **The general review** is a review that is as complete as possible of knowledge on a subject based on an exhaustive analysis of published works. **Focus** is shorter, "refresh" type of a subject. Systematic reviews should be encouraged because they are more rigorous than certain so-called 'authoritative' general reviews. The IMRAD structure must be respected. The author must explain how he selected the referenced articles.

- **Commented analysis** consists of analyzing and then commenting on articles that have appeared in recent months in other journals.

- **The educational article** is intended to teach readers; it corresponds to a teaching: well done, it allows the popularization and dissemination of knowledge.

Before writing an article, you must choose the journal, study the instructions to authors and formalize in writing who are the authors and in what order.

## II - THE TITLE

The title announces the content of the article with maximum precision and conciseness. This is the first element of attraction for the reader. Its writing, *done after finishing the article*, must be careful. It should be short (10 to 15 words) and precise. Informative words should be placed at the beginning, in a strong position. Useless expressions (about, contribution to the study of, ...) are to be avoided. A subtitle, such as "method used", is useful.

## III - THE AUTHORS

In theory, the author is the person who wrote the manuscript. In practice, an author very rarely works alone, and his co-workers want recognition. The first author is usually the editor of the article. He is the one who has done most of the work or who has directed it. The authors must have agreed between co-authors before starting to write, and it is prudent to formalize this authors' pact in writing. The name of the head of department or laboratory may appear since he initiated the work, brought the team together, and obtained the credits making it possible. But the number of authors should be limited. Any author must know the work and be able to replace the first author with an oral presentation of the work. *According to the group of editors of biomedical journals (Vancouver group)*, to be an author, three conditions are essential:

- 1) to have conceived and organized the work which led to the written text, or to have interpreted the results, or to have participated in these two steps;
- 2) to have participated in the drafting of successive versions of the manuscript,
- 3) to have approved the final version. In this design, the number of authors is reduced, and the number of people cited in acknowledgments is increased.

The controversies are numerous in the newspapers about two known phenomena whose extent is poorly assessed. *Gift authors* (concept of gift or guest authors) represent between 20 and 40% of authors. This is to add an author who does not have legitimacy to be an author, and to have a 'return of favor' in return. These small services between friends are frequent. On the other hand, authors are absent from the list of authors, either because they have been deliberately removed due to conflicts between authors, or because they are so-called *ghost*

*authors*. Mainly in industrial fields, service companies write articles that will be signed by opinion leaders who do not have time to write articles themselves. Opinion leaders accept this practice (against compensation), *while newspapers would like to make this practice transparent by publishing all the names of editors, because they cannot eliminate it.*

## IV - INTRODUCTION

The introduction of the original article is a bridge between the knowledge of the author and that of the reader. It gives the reader a concise and clear idea of the subject so that he understands why the work was done. The interest of the work is highlighted, so that the reader wants to continue reading.

The introduction is written knowing the journal to which the article will be submitted. The necessary and sufficient elements for understanding the work differ according to the public addressed. The amount of information in an introduction is inversely proportional to the supposed level of knowledge of the readers. It is also advisable to modulate the introduction according to the uses of the journal, which one apprehends by reading the journal.

A good introduction should have *3 paragraphs*:

- tell what is known on the subject by exposing specific points. There is no history or educational journal.

- The second part must specify what is not known, therefore a particular aspect of the problem which will be tackled in the original work.

- The third part is, in one or two sentences, the question that indicates the purpose of the work.

The tense of the verbs must be the past if another author is quoted, and the present for the presentation of accepted and/or proven facts. Any assertion must be based on one or more references, but these must not be too numerous.

Reviews argue that an overview of the results should be given at the outset. This is controversial, and most consider that the results should only be stated in the relevant section.

## V - THE METHODS

This chapter of an original article includes the presentation of working methods. It should be specific enough for the reader to reproduce or verify the work. In the descriptions, a logical order must be followed, which is usually chronological order: clinical characteristics before the radiological or biological examinations; early endpoints before late endpoints.

- **The first objective** (selection methods) of the chapter is to indicate on whom or on what the work was carried out: patient population, animals, cell strain. All details necessary to interpret the results should be given. The description should indicate the inclusion and exclusion criteria of the study population, and the period during which the patients were observed. The results depend on it. The chapter must specify whether it is a consecutive series or not, prospective or retrospective, randomized or not, open or blind. For any prospective experimental study in humans, it is necessary to state the agreement of an ethics committee. A study on a cell line must specify its method of obtaining and conservation. In animal studies, batches of animals should be described.

- **The second objective** (methods of intervention) is to specify what is being tested: action of a drug, results of a surgical intervention, value of a biological or radiological examination, etc. For a drug, the dose, the mode and administration times are specified. For known surgical techniques, biological examinations, or experimental methods, can only give the reference of the initial description. When the technique or method is new, it must be described precisely. Reagents or substrates must be designated by their chemical name, their origin must be specified. For devices, the type, origin, and name of the manufacturer must be indicated.

- **The third objective** (evaluation methods) is to describe the judgment criteria, and the methods used to validate the results, statistical inference tests for example. The description of the endpoints must be precise: weight loss must be quantified, diarrhea quantified. If the judgment criterion is a distant result, it is necessary to indicate how the subjects excluded from the analysis will be taken into account, giving the reasons without comment, and the same for those lost to follow-up. In the survival of operated patients, it must be stated whether or not operative mortality was included. If the judgment criterion is a biological evaluation, the nature of the sample (blood, plasma, etc.) and the units of measurement must be specified. The statistical methods must be described, and apart from the widely used tests, a reference must be cited.

There is an international biomedical terminology. To cite a drug, the use of the international non-proprietary name is preferable, without capital letters. If the trade name is used, it must be followed by the acronym ® (for registered). A coli bacillus is actually an *Escherichia coli*, the lower jawbone is the mandible. The name of a bacterium or an animal with two Latin words is written in italics. For microorganisms, only the first word is capitalized. For animals, capitalize if designating the species (Rat, Hamster), but not if designating the animals used (the rats were anesthetized).

The chapter on methods should not introduce comments or results. All marginal data not directly related to the work must be eliminated. All verbs must be in the past tense.

## VI - RESULTS

This chapter is the heart of the original article. The results presented are the culmination of the research described in the introduction, and the methods employed to achieve it; they are the basis of the discussion. It is appropriate to report all the results in this chapter and only him. A fault is to include results in the discussion. Do not give results that are not related to the purpose of the work. Only results should be reported: this chapter should not contain any comments, explanations or comparisons with other works. It should therefore not include any reference, because only the results of the authors are presented.

A difficulty created by the structure of research reports is the risk of repetition by recalling results in the Discussion chapter. This risk is limited by the use of figures and tables. In the Discussion, the results are commented on with reference to the figures and tables, and therefore without repeating these results. The other advantage of figures and tables is to provide the maximum amount of information in a minimum of space, in a synthetic and clear form. The text should not repeat data provided by figures and tables.

As in the previous chapter, the tense of the verbs must be the past tense. Accuracy must be reflected in the consistency of the numbers, in particular by ensuring that the totals are indeed equal to the sum of the parts, both in the text and in the figures and tables. The same number

of decimal places, and the same units are used for a parameter. Clarity requires following a rational order in the presentation of results: immediate then late, simple then complicated, normal then abnormal.

## VII - ILLUSTRATIONS

The terms "figure" and "table" are not synonymous. The table is in block letters. The figure is made of all materials that cannot be printed. But the illustrations evolved very quickly with the appearance of electronic tools. Video clips with sound, podcasts without images are accepted, even requested by newspapers. The technology related to these tools is not presented in this chapter.

Between the two methods, which to choose? The choice between figure and table depends in part on the intended objective: it responds to a precise intention. Each has advantages and disadvantages. The table has the advantage of mathematical precision, at the cost of aridity. The reader can redo the statistical tests, or compare the data with those of other authors, but the message is less easily apprehended than in a figure. The loss of information from a figure is acceptable if it is compensated for by the use of statistical indices, such as the standard deviation, which indicate the dispersion of the individual values. The message is easier to convey in a figure. A chart is rarely misleading; a figure can deceive: you must always clearly identify the scales.

The author must conform to the presentation adopted by the journal for which he intends his article, when reading the recommendations to authors. There are general principles. Figures and tables must have information autonomy: legends, titles, and notes allow them to be read without the help of the text. If an abbreviation is used, it should be explained in a note. Figures and tables must be referred to in the text and numbered in their order of appearance. They must be prepared before writing the text. The maximum amount of data is expressed precisely and clearly, the text provides additional information.

The reproduction of a figure or a table from another publication requires the authorization of the holder of the "copyright", the author or more often the publisher of the publication. The caption reads: "reproduced with permission from...".

### A - Figures

The excellent quality of the figures makes an article more attractive. Each figure should have a legend, printed immediately below it. This legend is typed on a separate sheet, placed at the end of the manuscript, on which all the legends of all the figures of the article are grouped together. The figures must be sent to the journal in the form of photographs on glossy paper, or rather in electronic format such as jpeg. To identify a non-electronic figure, it is advisable to write on an adhesive label its number, its orientation, and the first two words of the title. Documents must not be folded, scratched or stapled.

- **The "pie chart"** presentation is suitable for percentages. It provides precise information on the respective importance of the different parts of a set. For better clarity, it is advisable not to exceed seven sectors, and to avoid representing sectors of less than 5%, which can also be shifted to highlight them better.

- **The histogram** consists of vertical or horizontal bars or rectangles. It allows a statistical comparison of different numbers. The number of rectangles or bars must not exceed seven. The histogram gains in precision if a scale is added. The bars can be juxtaposed, superimposed, or completely separated. Lines at the top of the bars show the standard deviation of the data.

- **In scatter charts and curve plots**, the *abscissa variable* is usually the controlled variable, and the *ordinate variable* is the explained variable. **Scatter plots**, not linked by curves, are very useful when you want to concretely show individual measurements, in particular their distribution or the existence or not of a correlation. The **regression line** should only be plotted if the correlation is statistically significant; it must not overflow the point cloud. The **minimum** and **maximum** of the scales must be chosen according to the values of the two variables, to make the best use of the space of the graph. A **scale break** or a mathematical transformation (eg logarithmic) are sometimes useful. A scale break must be indicated on the axis itself by a double slanted line //. The same is true when zero is not the origin of an axis. The end of the axes must not end in an arrowhead. The line of the axes must be thinner than that of the curves.

- **The curves** represent in a dynamic way, as opposed to the static character of the histogram, the evolution of a variable according to another. The points that result from a measurement are graphically more important than the line that connects them. Various symbols can be used to differentiate several curves, either points or lines. Do not mix the two systems in the same figure; attention must be paid to the homogeneity of the presentation on all the figures. The points must be accompanied by their statistical dispersion index. One can show on the same figure the evolution of two variables as a function of a third; the figure then has two ordinate axes.

- **The illustrations** are photographs of x-rays, histological sections, recordings (electrocardiographic, etc.) most often transmitted in electronic format. Overprinted symbols may be used, which must contrast sharply with the background. An accompanying diagram can be useful. The legend specifies the technical characteristics of the multiplier type (eyepiece, microscope objective, and camera objective). It specifies the colorations for a histological image, the technical parameters for an imaging technique. Photos on which a patient can be recognized must be accompanied by an authorization. Newspapers no longer agree to mask the eyes or veil the signs of recognition, because it never had the expected effect.

## **B - Tables**

Each table should be typed on a separate page.

The different parts of a table are: the title, the stub - at the top and left of the table, which must remain free and not be used as a header -, the column headers, the row headers, the body or the field of the table, and the notes at the bottom of the table.

A table requires no more than three horizontal lines to delimit its different parts: one separates the title and the column headings, one is below these, a third is below the body of the table, separating it notes at the bottom of the table. The use of vertical lines is not recommended.

Instructions to authors of medical journals do not always specify the format of the tables. Consultation of a few copies of the journal reveals whether the tables are published on a half-page (not to exceed 60 characters or intervals per line) or a full page (representing 120 characters). If the number of columns is greater than twice the number of rows, it is advisable to invert rows and columns, although this is not always desirable, since the column headers correspond to the measured variables, and the row headers to the variables controlled.

The composition of a table must be logical, that is to say respect the general mode of reading, from left to right and from top to bottom. Each table has a title, typed and printed above it. This title must be informative and respect the principle of the strong position, that is to say, put informative words at the beginning of the sentence or title. Do not begin the title with unnecessary or redundant words. Avoid repeating the information present in the headers of columns and rows. Tables showing comparable data should be consistent and use the same words, in the same order, and the same units. Often 2 or 3 tables can be grouped into one, more informative and more readable.

Each column heading or row heading designating numeric values must indicate the unit of measure applied to the data located in the column or row. Units should not be in the table field. If the unit is the same for all columns, it may be a good idea to include it in the title. When several column heads belong to the same set of information, it is desirable to group them together with a horizontal line located above them, and surmounted by a column head designating the set.

The body of a table must only include numbers, or simple acronyms (M for masculine, F for feminine for example). The numbers in the columns must be aligned on the comma if there is a decimal (or the point in the articles in English), and include the same number of decimals for identical variables. Numbers less than 1 must have a zero before the comma or period. There must be a second alignment on the acronym  $\pm$ , and a third alignment on the comma of the standard deviation.

When data is missing, a symbol, defined in a note at the bottom of the table, fills in the box. Notes at the bottom of the table inform the reader of the abbreviations used in the table. When two tables contain the same abbreviations, it is sufficient to indicate in one of the tables: "same abbreviations as in the table ...". Notes at the bottom of the table must be called by symbols located in the table itself, the order of calling being from left to right and from top to bottom. You can use lowercase letters in parentheses, but it is preferable to use symbols, which by convention must be called in the following order: \*, †, ‡, §, ||, ¶. If more symbols are needed, the same can be used by doubling them.

## VIII - DISCUSSION

Along with the summary, this chapter is the one in which French authors find it most difficult to disregard their pedagogical impulses. The most common mistake is to discuss the whole subject and not the work itself.

The purpose of the discussion is to interpret the work that has been done, and that alone, that is to say the means implemented, the work method, and the results. The discussion differs from the previous chapters in its design: it is appropriate to express personally what one thinks. The quality and interest of the discussion reflect the scientific culture and intelligence of the authors. This chapter serves three purposes.

- **The first objective** is to say whether the goal of the work exposed at the end of the introduction has been achieved or not. This involves summarizing the main results, the only acceptable repetition in a research report. No new results should appear.

- **The second objective** is to judge the quality and validity of the results. The critical and objective discussion of the work covers each of the chapters of the article, identifying in particular the biases that may have occurred. Was the number of subjects sufficient? Was there a bias in the selection of subjects? Was the working method best suited to the question? This part should not be too severe a self-criticism, which would lead to the rejection of the article, its purpose is to meet the critics by explaining the choices we have made.

- **The third objective** is to compare the results with those of other authors. If there are differences, try to explain them. The authors have here to share their personal contribution in the way they approached the problem. This is not a review of the literature.

A paragraph can anticipate readers' questions: have you observed the expected results? Do you have any hypotheses or mechanisms explaining the observations? Have you changed practices since the end of this work? Are there public health risks requiring precautions? Each topic should have you talking about specific issues the reader would like to know your opinion on.

How to build a discussion? Usage develops starting with its first objective. No rule provides an order in which the elements of a discussion must be presented. Successive attempts at arranging the paragraphs are essential for a logical and clear presentation. Some journals allow the article to end with a conclusion, but this is not recommended: a conclusion risks being a repetition, or an attempt to salvage a poorly elaborated discussion. Nor should the discussion end with a summary. Assumptions for future work can be made.

Another mistake is to repeat in the discussion what was said in the introduction. The principle is to recall in the introduction the state of our knowledge, and in the discussion to compare its results with those of other authors. Another error is the inaccuracy of citations, in the transcription of the results of other authors, or in what they are made to say. To avoid this error, never quote authors without having read the original article. Do not cite an author without giving a reference. Emotional expressions should be banned. The present tense should only be used for well-established notions. If the discussion exceeds half the total length of the article, it is too long and probably poorly conducted.

## **IX - THE SUMMARY**

Its purpose is to present to the reader, in a reduced space, the substance of the information in the article. This is the most read part of an article. It is, along with the title, what will entice the reader to read the whole article. It is likely to be reproduced in many documents without the article. It must therefore be understandable in itself. The summary should be informative. Its construction uses the IMRAD structure, and answers the four questions: why, how was this work done, what were the results, what conclusions or generalizations can be drawn from it?

The abstract of an original article is not a test of synthesis as in the case of political science studies. This is an exercise in copying and pasting from 4 elements of your article:



- 1) the last sentence of the introduction;
- 2) the first sentence of each paragraph of the methods;
- 3) one sentence per illustration for the results;
- 4) the first sentence of the discussion.

The summary does not require any reflection or synthesis in order to present exactly the data of the article. The summary must not contain references, figures, tables, or notes, or even abbreviations not explained in the summary itself. Its length is often indicated in instructions to authors, often 250 to 300 words, or about one double-spaced typed page. Most journals have adopted so-called structured abstracts. Six to eight paragraphs are identified: study goals, protocol, study method, study location, selection methods, intervention methods, evaluation methods, primary endpoint, results, conclusions. JAMA's Instructions for Authors explains in one page how to write such an abstract. These summaries are very long, very detailed.

## **X - REFERENCES**

Their purpose is to substantiate any stated fact. This is a fundamental principle of scientific research. The reference is called as soon as possible after the statement of the fact, it is not necessarily at the end of a sentence. The same reference can be called several times in the article. There should be no reference in the results chapter. The references are given at the end of the article, and must be distinguished from the bibliography. The references chapter contains the listing of articles cited in the text. A bibliography concerns all the articles and books written on a specific subject. The term "bibliographic references" is incorrect. Many journals limit the number of references, except for general review articles. The editors of journals control the call for references: errors are extremely frequent there, of two kinds: errors in transcription of the wording of the reference, errors in the citation of the content of the reference.

References that are not accessible to the reader should be avoided: thesis, conference abstract when not published in a periodical supplement, personal communication, article in press or submitted for publication, unpublished oral communication, reference of second hand.

The recommendations to the authors of the journals indicate the system they use. Three are mainly used: the author-year system, called the Harvard system; the sequential number system, the known variant of which is the Vancouver system; the alphabetic-numerical system, which is hybrid.

### **A - The Harvard system**

In the body of the text, the author(s) are cited, with the year of publication, a letter following the year if several articles by the same cited authors were published in the same year. The author and year may be cited in parentheses in the body or at the end of the sentence. In the list of references, the references are classified alphabetically without order number. The typing of the references is precise for the use of italics, bold typefaces, and acronyms (&, et al., ...). This system adopted by many journals, mainly British, reduces the readability of the text, but it is appreciated by many authors and readers. It is practical when preparing a manuscript, because a forgotten reference can be easily introduced without having to shift the number of the following references.

## **B - The sequential number system**

In the body of the text, the references are numbered by an Arabic number according to their order of appearance. If a reference is cited several times, it keeps its first call number. The numbers are quoted in parentheses. If several references are cited in the same parenthesis, they are listed in ascending order and separated by commas. If several successive references are cited in the same parenthesis, only the first and the last appear, separated by a hyphen. In the list of references, the references are in the order in which they are called in the text. Typing is simplified, with only six authors at most, with abbreviations for journal titles and specific punctuation. This system makes it easier to read. It is recommended by many editors of international journals. The major drawback for the authors is the necessary renumbering, and therefore the risk of error, in the event of the introduction of a new reference.

## **C - The alphabetic-numerical system**

In the body of the text, the references are cited by their serial number, indicated in parentheses. In the list of references, the references are classified in alphabetical order, and the serial number is assigned according to this classification. This system is being phased out.

Whatever the system, the references should be transcribed according to the recommendations of the journal. Some books specify how to transcribe a reference. It is advisable to send an article to a journal with the references typed according to the recommendations of that journal.

To reference a periodical article, the following order must be respected: the authors are all cited up to six authors, followed by "et al" if there are more than six. The name of the authors, of which only the initial is capitalized, is followed by the initials of the first name, in capital letters, contiguous, and a comma; the last name is followed by a dot. The title of the article is transcribed in its original language (specified in brackets if it is different from the language of the article sent to the journal), and is followed by a period. The name of the journal is indicated in abbreviated form according to the Index Medicus, and is followed, without a period, by the year of publication, followed by a semicolon, then by the number of the volume or volume, followed by a colon, then of the first page of the article, separated from the last page by a dash, of which only the figures different from those of the first page are transcribed. There are no spaces between the various numbers contrary to the usual typing rules. If the reference comes from a supplement, the mention "[suppl ...]" follows the volume number. There is no line break after each element of the references.

The reference of a book must include in this order the name and the initials of the first name of the authors, the title of the book, the number of the edition (from the second), the city and the name of the publishing house. edition, the year of publication, and the number of pages or the exact pages (first and last) to consult. To reference a chapter in a book, if the authors of each chapter are identified, the reference includes the surnames and the initials of the first names of the authors followed by a point, then the title of the chapter followed by a point, then the mention " Dans" or "In" followed by a colon. Then come the names and initials of the first names of the writers of the book, followed by "ed" or "eds", followed by a period. The title of the book is then transcribed in full in its original language, followed by a period. The city then the name of the publishing house are cited, then the year of publication, and the first and last page of the chapter.

References to electronic links are accepted and many rules have been proposed. It is established that their half-life would be around 4 years in the major logs. It is desirable that they are a complement and do not represent all the references. It is customary to specify the last date of consultation, and especially to check them all on the latest version of an article.

The quality of the references is generally poor because the authors do not pay enough attention to their selection and do not read them completely. We evoke the social role of the references which must please the colleagues we quote and the newspaper which wants to increase its impact factor by citing itself. It has been shown that these inadequate citations were the source of bias and also of the transformation of hypotheses into facts. This is regrettable and it harms the quality of science and the patients.

Examples of how to type references in the 2 most widespread systems:

**- Number System (Vancouver)**

1. Greenberg SA. How citation distortions create unfounded authority: analysis of a citation network. *BMJ* 2009;339:b2680. doi 10.1136/bmj.b2680

2. Sox HC, Rennie D. Research misconduct, retraction, cleaning the medical literature: lessons from the Poehlman case. *Annals of Internal Medicine*. 2006;144:609-613.

3. Goetzsche PC, Kassirer JP, Woolley KL, Wager E, Jacobs A, Gertel A, et al. What should be done to tackle ghostwriting in the medical literature? *PLoS Med* 2009;6(2): e1000023. doi:10.1371/journal.pmed.1000023

**- Alphabetical system (Harvard)**

Goetzsche PC, & al. (2009) What should be done to tackle ghostwriting in the medical literature? *PLoS Med* 6(2): e1000023. doi:10.1371/journal.pmed.1000023

Greenberg SA (2009). How citation distortions create unfounded authority: analysis of a citation network. *BMJ*339:b2680. doi 10.1136/bmj.b2680

Sox HC & Rennie D. (2006) Research misconduct, retraction, cleaning the medical literature: lessons from the Poehlman case. *Annals of Internal Medicine* 144:609-613.

## **XI - THE STYLE**

The scientific style differs from the literary style. Scientific logic requires verbs to use past tenses for all events that have occurred in the past, and to use the present tense only for well-established notions. The future tense is not used in scientific writing. The passive of modesty brings ambiguity and should likewise be avoided. You have to use 'I' or 'we' to avoid these vague modesty passives.

Although we have learned to avoid using the same word at close intervals, and therefore to look for elegant variations, scientific rigor means using the same word for the same thing. Expressions of emotion or courtesy should be avoided.

- **Accuracy**, always present during the course of the research, must also guide the writing of the article. An experimental method must be described precisely enough to be reproducible by the reader. A weight loss of 10 kg does not have the same significance in a subject of 100

kg or 50 kg, or if it occurred in a month or a year. Accuracy requires checking all numbers, and their consistency between the text and the tables. Totals must be exact. Imprecise or useless adjectives and adverbs (careful examination, large tumour, recent study, often, a lot, etc.) should be deleted.

- **Clarity** is the second virtue of a scientific article. It involves using simple words and syntax. It is improved by placing in a strong position - at the beginning of a sentence, a paragraph, a title - the most informative words. The comma clarifies the meaning of a sentence: what can be deduced from the following sentence: "the three patients had pain, nausea and vomiting and diarrhoea, respectively"? The comma, placed after "nausea" or after "vomiting" would remove the ambiguity. Contrary to literary usage, a comma should be placed before the "and"; this policy has been adopted by major biomedical journals. "Et cetera", like "such as" and "for example" are imprecise unless logically the reader can deduce all that is implied.

International unit abbreviations are legal, even recommended, when they follow a number, but not otherwise. The spelling of an abbreviation should be checked if it is uncertain. A unit abbreviation is invariable. The interest of abbreviations is to shorten a text, and to make it more readable by replacing an expression, or a word that is too long, often used. Their use must not be abusive. Any abbreviation must be announced on first use, even if it seems obvious.

- **Conciseness** is the third quality of a scientific article. Nouns, adverbs, adjectives and hollow expressions (it goes without saying that, it is appropriate to point out that, ...) must be deleted, like marginal data. Repetition goes against the principle of brevity, and must be avoided, except the only authorized, and even necessary, of the summary compared to the text. Avoid repeating the title in the abstract, repeating the results or parts of the introduction in the discussion. But it is also necessary to avoid an excess of conciseness: the ellipse is detrimental to clarity.

## **XII - FROM THE PREPARATION OF A MANUSCRIPT TO THE CORRECTION OF PROOFS**

The choice of the journal is guided by the adequacy between the subject of the article and the objectives of the journal. It is essential to consult and know a journal before submitting an article to it. Another element of choice is the circulation of the newspaper. An author has an interest in sending his article to a journal with a wide circulation, but which is more likely to refuse it. Before writing, it is necessary to have the elements of information which are the substance of the article, whether it is the material and the methods of the work, the results, and the bibliography from which the references are chosen. A copy of the journal and its recommendations to authors should be readily available.

In what order to write? Finish by writing the title and summary. The discussion is written after the methods and results chapters. These last two chapters and the introduction are written in a various order according to the preferences of each one.

Once written, a first version is never the last. When preparing the manuscript, references are placed in parentheses using the Harvard system (names of authors in the text). When it is certain not to modify the text any more, the names of the authors are replaced by numbers according to the wishes of the journal.

There are rules for writing numbers. A number is written in letters if it begins a sentence, in figures in the body of the sentence. Numbers less than 10 are written in letters, the others in numbers. The rule also applies to ordinal numbers. In a series with both numbers less than and greater than 10, all numbers are written in digits. Numbers are used to write dates and in front of a unit of measurement. According to reviews, 4-digit numbers are written with or without a space (comma in English) between the third and fourth digit; from five digits, spaces (or commas) are systematic. There are many recommendations for the use of punctuation, hyphens, spaces, hyphens, etc. and exhaustive works in this field. The typing must be adapted to that of the journal. When the author has written his "definitive" version, which may be the sixth, eighth, or even more, he submits it to his co-authors who review it in substance and form.

Electronic submissions will do part of the work described in this paragraph. On the title page are the title of the article and the names of the authors, the first names in full or their initials preceding the names (unlike the section of the references). If the authors have different addresses, an asterisk or a number must be added after each name to indicate the address of each. The name, address, and telephone number of the author who handles the correspondence, and of the one who sends the reprints, are specified. The institutions that have provided financial support must also be mentioned, with the references of the contract.

Before sending the article to the journal, seven final checks are recommended:

- the tense of the verbs in the Methods and Results chapters is in the past tense; the tense of the verbs in the Introduction and Discussion chapters is in the past and sometimes in the present (generalization);
- all hollow words, adjectives and adverbs are removed;
- references, tables, and figures are all referred to in the text;
- the Methods and Results chapters do not contain any comments;
- figures and tables are self-explanatory;
- the totals are consistent;
- for an article in French, the words used are likely to be understood by a French-speaking foreign reader.

After sending, the journal acknowledges receipt of the article, which it generally sends to one or more scientific experts. The answer reaches the author after 6 to 10 weeks. If the article is accepted with modifications, the author must make these modifications and accompany the corrected article with a letter responding point by point to the criticisms. Later, do not neglect proofreading, comparative reading with the manuscript.

Thus the author will see in a periodical the fruit of a long labor, of which the drafting of the article will have been a painful but very enriching stage. Respecting a few rules greatly increases your chances of being published.

### **XIII – INSTRUCTIONS TO AUTHORS**

Since 1978, the so-called Vancouver group has regularly updated the standard guidelines for manuscripts submitted to biomedical journals. This group, which is called the International Committee of Biomedical Journal Editors, includes the major international journals, and especially the 'big five' (two English, BMJ and Lancet; three American Annals of Internal Medicine, JAMA, NEJM). Their recommendations contain above all ethical

principles for all actors: authors, journal editors, reviewers, journal owners. They are updated with links on a site [www.icmje.org](http://www.icmje.org).

Instructions for submitting manuscripts are a writing course, with the IMRAD format as the basis. The other instructions in this text cannot all be quoted: criteria for being an author; list of contributors and people to thank; role of the editor and editorial freedom; peer-review; conflicts of interest ; confidentiality and protection of people and animals; obligation to publish so-called negative studies; corrections, retractions and expressions of doubts; ownership of items; bad practices for double publications, and principles for accepting secondary publications; correspondence; supplements; electronic publications; advertising ; mainstream media relations; registration of clinical trials.

Other statements have been prepared over time, starting with CONSORT which also has a dedicated site [www.consort-statement.org](http://www.consort-statement.org). A French translation by Paris 5 teams is an excellent initiative: <http://eb.medecine.univ-paris5.fr/moodle/course/view.php?id=2>. We quote some of these instructions and suggest that you use a search engine or the [www.icmje.org](http://www.icmje.org) site to locate them. These are CONSORT for Consolidated Standards of Reporting Trials, STARD for STAndards for the Reporting of Diagnostic accuracy studies, TREND for Transparent Reporting of Evaluations with Nonrandomized Designs, MOOSE for Meta-analysis of observational studies in epidemiology, SQUIRE for Standards for QUality Improvement Reporting Excellence, EQUATOR for Enhancing the QUALity and Transparency Of health Research, and PRISMA for Preferred Reporting Items for Systematic reviews and Meta-Analyses.

## **XIV – ELECTRONIC NEWSPAPERS**

These last ten years have modified the economy of the system without having led to major restructuring, but these could occur. The key facts at the origin of these upheavals are:

1) the very strong rise of the Internet: so-called electronic journals have significant competitive advantages over so-called paper journals (for example, the possibility of including videos in the illustrations or podcasts commenting on the number, etc.); web 2.0 accentuates these differences;

2) the strong pressure for free access to the content of journals: if for some this principle seems acquired, nothing is yet definitive. If this principle became reality, the resources of publishing houses would no longer come from readers (individuals, hospital services, libraries), but from other actors who will have to bear the costs of publishing (authors, institutions, pharmaceutical companies, etc.). ?);

3) the possibility for any Internet user (e-patient) to access the same information as healthcare professionals. The public, together with scientists, contributed to the increase in consultations of the Medline database after it was made available free of charge on the Internet: 163,000 searches in January 1997, 12.5 million in January 1999, 64.8 million in January 2005, and 82.3 million in March 2007; since 2007, growth has ceased;

4) the possibility of quantifying more and more finely the notoriety of each author; the calculation of the notoriety of a journal (the famous impact factor) should give way to the calculation of the notoriety of each article (and therefore of their authors) via the number of "hits" (consultation) for example for an article on a given website. Lists of the most viewed or

downloaded articles are already available on many sites; the rise of innovative communication tools with social networks were quickly adopted by newspapers and younger generations; many newspapers provide access to Facebook-type networks to discuss articles.

### **There are three types of electronic journals:**

1) electronic publications of a periodical published on paper with all its sections, accessible on a website; these are generally newspapers that continue their editorial activity and have added electronic functionality by putting their articles in downloadable pdf format; the electronic content is identical to that of the existing journal; this model has been adopted by many newspapers;

2) hybrid newspapers which correspond to the previous format but with additional headings and/or data which are added to the website. The so-called ELPS concept (Electronic Long/Paper Short), promoted by the BMJ since 1999, is developing: a long article is published in electronic form, a shorter article (prepared by the editorial staff) in the printed journal. The electronic format, longer than the text printed in the newspaper, includes more references, additional data (Excel files, annexed documents - operating protocol, questionnaires, video clips of a surgical technique, etc.). In 2009, the BMJ introduced the 'Pico' model (Pico; because it is a small unit (10-12) and also for the acronym 'Population, Intervention, Comparison, Outcomes'). It is an evolution of the ELPS format. The complete research article, with its multimedia complements, is free and exclusively electronic; a very standardized format of the long summary type is prepared by the author for publication in print. The paper format becomes a compilation of information and long summaries for the original articles;

3) "e-journals" which have no publication in paper form and only exist on a website; the first journals of this type were created in the mid-1990s (several are dominating like PLoS and BioMed Central, others are coming like Bentham Open). The online publication is made in real time without waiting for the delays necessary for a paper printing. The pdf of the accepted manuscript is sometimes posted online before the article is revised, prepared and formatted. Online updates no longer have a regular frequency (weekly, monthly, etc.) since the site is updated continuously. Upon publication, the opinions of the reviewers and the successive versions of the article (from the submitted version to the final version) can be put online (on [www.biomedcentral.com](http://www.biomedcentral.com) for example).

## **XV – A PUBLICATION SYSTEM WITH AN UNCERTAIN FUTURE**

With Richard Smith, former editor of the BMJ who published a pamphlet entitled 'The trouble with medical journals', I believe that the main objectives of a journal are not always to disseminate good science which is very rare, and that biomedical journals are for authors, not readers. Owning a newspaper is accompanied by a strategy specific to shareholders or opinion leaders. Journals belong to commercial companies or professional societies (known as learned societies).

The owner is the decision maker and he should give full editorial freedom to the editorial board, but that board always gets some guidance. It is in the interest of the editorial board to please the owner. To improve the famous impact factor, the strategies are numerous, and the subject of unscientific discussions within the editorial boards. A newspaper prefers to accept a mediocre article which will then be published in the mainstream press rather than a quality,

austere study without media coverage. A newspaper has competitors: "Let's accept this article because otherwise it will be published by a competitor.... ". Profitability may lead to accepting items that will generate reprints sold to a manufacturer.

The 5 actors (authors, editor-in-chief, editorial board, proofreaders, owners) each have their particular interests, sometimes contradictory with those of the other actors. Most have an academic position that generates competition. I have not mentioned the most important of the actors because his role is minimal and he has no way of expressing himself: he is the reader. We do not know if he reads, we know little about his needs, and besides, he is not the one who pays for the system. Institutions, and even more often authors, pay for the system.

Richard Smith argues that journals publish bad papers because good science is scarce, and the whole system is made for authors. He finds it abnormal that public research results in the publication of articles in newspapers paid for by subscription or pay-per-view (à la carte) and campaigns for free access. Let us cite, without commenting on, some of his grievances, to let you be the judge: the peer-review system does not work; newspapers are interested in their impact factor; there is a conflict between medicine (do no harm) and journalism, which consists in disseminating all opinions to generate dialogue; industry and other funders influence newspapers too much; conflicts of interest are not managed; fabrication, data falsification and plagiarism are all too common; duplicate publications are wasteful; inappropriate citations turn assumptions into facts; publishing is one of the criteria used to progress in a career and authors accept everything from journals;...

**Biomedical journals are intended to fulfill five missions:**

- 1) to ensure the best possible quality of the texts published thanks to the peer review system;
- 2) communicating original research results;
- 3) bring together scientific and medical communities;
- 4) archiving knowledge;
- 5) work to establish a scientific consensus around a problem independently of the commercial, political, professional and economic pressures of the moment. It seems essential to us that these missions, which are the basis of the legitimacy of the existence of journals, continue and that new technologies, despite the changes they induce, remain at the service of the dissemination of information, without modifying its meaning.

Know the system and you will know how to seize opportunities to publish your work well, never losing in mind that acceptance by a journal is as much emotional as scientific.