Writing articles in English

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General remarks

- An original work (a scientific article, a scientific publication) is a way presenting the outcome(s) of a study in writing. The way you prepare the manuscript should fulfil strict criteria.
- The guidelines for writing a manuscript were established by the International Committee of Medical Journal Editors – ICMJE, Vancouver Group, and are published as the Uniform Requirements for Manuscripts. http://www.icmje.org/urm_main.html
- The manuscript should be divided into the following sections: Introduction, Methods, Results And Discussion (the so-called IMRAD structure).
- The manuscript should be written in a coherent, concise and factual way, using simple and understandable language.
- Abbreviations:
    - Abbreviations should not be overused
    - Always define an abbreviation the first time you use it (put the abbreviation in brackets after the full name)
    - Certain commonly used abbreviations (e.g. SI units) can be used without definitions (the journal's Instructions to authors may list abbreviations that you can use without definition)
    - If you use abbreviations, use them consistently throughout the whole paper

- Before getting round to writing you should:
    - decide who the authors will be and in what order they should be listed
    - analyse, interpret and discuss all your results in the light of established hypotheses or the aim(s) of the study.
    - identify the most relevant results, i.e., those directly related to the aim(s) of the study and which convey most of the key information
    - draw initial conclusions and formulate a 'take-home' message
    - plan how best to present your results (text, charts, tables, etc.)
    - write an outline of the article, strictly based on your results, conclusions and the take-home message (see Section 5 a–d) taking into account: the key element(s) of the introduction (with references), the most important methods, the most relevant results and the essential parts of the discussion (also with references)
    - list potential journals to which the manuscript could be submitted and arrange them in an appropriate order
    - get acquainted with the instructions for authors for the journal you chose
- Remember that reprinting figures, charts, pictures, tables from published works (even your own) requires permission from the copyright holder (usually the publisher). If you do include something that has already been published always cite the author or source of the data and add ('Reproduced with permission of NNNN', where NNNN is the name of the copyright holder).

The elements of a scientific publication

Title page

The title page usually contains:

- The full title
- The authors' names and affiliations
- A short title
- Key words
- Contact information for the corresponding author
- Disclaimers/Conflicts of interest statements
- The numbers of words, figures and tables

Always read the journal's Instructions to authors. It contains detailed information about the structure and the content of the title page, as well as the limits to the numbers of words, figures and tables.

Title

If possible, it should be short and should clearly and concisely describe the gist of the study.

At the same it should be attractive and appealing to the reader.

It must also meet the journal's requirements and those of internationally accepted guidelines, e.g. the CONSORT guidelines for clinical trials (www.consort-statement.org)

Authors

- According to the ICMJE guidelines (see General Remarks) authorship credit should be based on:
    - making substantial contributions to the conception and design of a study
    - taking an active part in the acquisition, analysis and interpretation of data
    - drafting or revising the manuscript
    - approving the final version of the manuscript before submission to a journal
- The order of the authors should be agreed before you start writing – preferably even before starting the study. The first author is usually the one who designs and conducts the trial/experiment/ study and who writes the manuscript. The last author often has the greatest experience and is the most senior and acts as a mentor to the writer and the less experienced authors.
- Usually only the names of the authors are listed; professional titles are omitted, although some journals ask that the authors' include their most advanced qualifications.
- Affiliation is usually shown by superscripted numbers after each author's name and a corresponding list giving the authors' affiliations (see below). Authors from the same institution (same affiliation) are shown with the same number

Affiliations

- These are the names of institutions or departments the authors work in (or worked in at the time the research was carried out).
- They are usually arranged in the same order as the authors and are listed in a separate line below the authors names, e.g.

A.B. Smith[1], C.D. Brown[2], E.F. Nemo[1], G.H. Goldilocks[3]

[1]Institute for Original Research, Sometown, USA; 2National Centre for Important Research, Anytown, UK; 3The Blink and Blonk Foundation, Thistown, Poland.

Short title

- Also commonly referred to as the running title or abbreviated title.
- This is an abbreviated version of the full title that will usually appear at the top of each page of the printed paper.
- Each journal specifies the maximal number of words or characters allowed for the short title. If you are given a character count, you must count the spaces as well as the letters.

Key words

- Usually 3 to 5.
- They should identify the most important aspects of the study.
- At the same time they constitute search criteria for this publication in literature databases such as PubMed.
- Try not to repeat words from the title or abstract, as most people do their initial search on terms in the title and abstract.
- There is a vocabulary/thesaurus for indexing articles for PubMed (Medline) called MeSH (Medical Subject Headings).

The corresponding author

This is the author responsible for correspondence with the editorial office and who is prepared to receive and reply to communications from other scientists interested in the work. He or she:

- submits the manuscript.
- receives correspondence from the editorial office.
- co-ordinates the replies to the reviewers' comments.
- is responsible for proofreading and the final approval of the manuscript.
- is often, although not always, the person responsible for dealing with copyright issues and reprint permissions.
- is usually the first author of the article.
- must provide full contact information (mailing address, telephone and fax numbers, e-mail address). Some or all of this information will appear in the published article.

Conflict of interest

- This refers to any financial support (e.g. project funding, honoraria, shares) or personal relationships that an author has or has had that could be perceived to inappropriately influence (bias) his or her actions (running the trial, interpreting results, drawing conclusions, writing the manuscript).

- According to the ICMJE requirements, any potential conflict of interest should be reported to the publisher at submission, usually on a separate form.
- On the title page there should appear a summary of any potential conflicts of interest or a note stating that there are none.
- Reporting conflict of interest does not influence the editor's decision about accepting or rejecting the paper.
- Concealing conflict of interest may lead to serious professional trouble. Usually it is impossible to submit a paper without having filled this form.

Abstract

Always read the journal's Instructions to authors. It contains detailed requirements about the form and length of the abstract (word or character limit). It is the most important part of the article, because:

- it usually determines whether a person will read the article
- it is often the only open-access part of an article
- it is frequently the only part that is ever read
- the initial judgement about a manuscript you submit may be on the basis of the abstract
- It should contain all most relevant data from the study, but at the same time allow the reader to follow the idea of the study and understand the conclusions without reading to the full article.
- Abstracts are of two different forms:
    - non-structured – with no headings or specific paragraphs
    - structured – divided into separate sections, often with headings, typically Introduction (or Aim of the study), Methods, Results and Conclusions
- Structured abstract:
    - Introduction, often comprising the aim of the study – 10%
    - Methods – 2–3 sentences presenting the methodology (e.g. group characteristics, performed experiments) – 30%
    - Results – this is the most important part of the abstract and should contain specific results (values etc.), not just descriptions – 40%
    - Conclusion(s) – a brief and concise summary of the results and what they mean – 20%
- Almost all journals set a word limit for abstracts – usually 250–300. Some journals specify a character limit rather than a word limit
- The abstract must only contain results from the study it describes and these must be identical with the values in the full manuscript
- It's a good idea to only write the abstract after you have finalised the full manuscript
- Once you have dealt with the reviewers' comments and before submitting the finalised manuscript, carefully check whether the contents of the abstract and the article are consistent, especially if you have made many changes in the review process
- Note: Even if the journal specifies that you should not use headings in your abstract, it's a good idea to use the 'structured-abstract' approach – just omit the headings

Main manuscript

Introduction

This should be a relatively short part of a paper (usually ½–1½pages) that introduces the reader to the topic, and puts the paper into context by summarising what is known already.

Generally the introduction consists of three parts:

- An outline of the state of the art, with a few appropriate references
- A brief section defining any ambiguities and questions in the field, explaining why they should be answered
- A final brief definition of the goal(s) of the study, setting it(them) against current issues that need clarification.

The introduction should define the aims of the study and explain its significance. It should also anticipate your final conclusion.

The Introduction provides the foundations on which you will base your Discussion.

Materials/Methods

- This is a description of the way the study has been conducted. It should contain enough details to be enable to reader to understand what you did. It does not need to be a complete recipe containing all the minute details of what you did.
- Required elements of this section include:
    - a step-by-step description of the plan of the study
    - if your study was a clinical trial, include a CONSORT flow-chart
    - descriptions of all of the material you used (patients, animals, viruses etc.);
    - ethical issues – e.g. ethical approval from the ethical committee, written informed consent, Helsinki Declaration (version current when you designed the study)
    - statistical methods (sample size, tests used, critical level of significance chosen, etc.)
    - if the method(s) you used has(have) already been published, include the reference(s)

The Materials and Methods section should contain all the information about the experimental procedures, but NO information results. However, some journals ask that (if you are publishing a clinical trial) you should describe the disposition of patients in this section. This most easily done with a CONSORT flow diagram.

Results

- This is where you report what you found. It should be written in a factual, concise, clear and objective way.
- Results can be presented in a descriptive way in plain text, but also in the form of tables and figures (illustrations, charts).

Tables

- Tables are a convenient way of presenting detailed numerical data, e.g. for reporting characteristics of experimental groups or reporting a large amount of numerical values.
- You should think carefully about which data are best presented in tables and which in graphs or charts.
- Tables should be simple; complicated tables do not make it easier to understand complex ideas.
- It is easier to compare data in tables horizontally. You should therefore give brief summaries of the groups you are comparing as column headings, with the characteristics or parameters you are comparing in the first column
- It is usual to present the results from the experimental group(s) in the first data column(s) and the data from the comparison group (control group) in the next column.
- A table with group characteristics does not necessarily need statistics of significance.
- When you are comparing values between groups, always give the probability. Unless the journal specifies otherwise, summarise these to $p<0.05$; $p<0.01$ or $p<0.001$ rather than reporting the exact probability. Arrange these to be as close to the values they refer to as possible
- Arithmetic precision (decimal places) depends on the magnitude of investigated parameter. For example, HDL-cholesterol concentrations can be rounded to two decimal places, whereas height (in cm) can be rounded to whole number. Similarly it is pointed to report a value as 14,193,201 – 14.2 million is usually sufficient. It also depends on the topic of the study and sizes of the differences between groups. The smaller the differences, the more precisely the results should be reported.
- Experimental results should usually be presented with more significant figures than group characteristics.
- By convention, means are usually presented to one less significant figure that standard deviations or standard errors of the mean.
- Remember to include:
    - the sizes of the groups being compared (e.g. in brackets after the value or the name of the group – n=XX)
    - the units next to the values and to use the correct SI abbreviation,
    - the type of data you are reporting, e.g. mean (± standard deviation or confidence interval) or median with percentiles.

- Unless the journal specifies otherwise, type the titles of the rows and columns in bold. Avoid vertical lines to separate cells and only use horizontal lines if the journal allows them, and then only if necessary to separate different blocks of rows
- Align the titles of the rows to the left, especially if they are uneven in different rows. The titles of the columns should be centred horizontally. For data, either centre or use decimal alignment. All cells should be centred vertically
- The title of the table should fully describe the content of the table, so that it can be understood without reading the main text of the article. However, do not repeat information from the table in the main text.
- Additional explanations should be given in footnotes beneath the table, e.g. symbols representing p or information about the type of results in the table. Some results can be marked with superscript symbols and here is also the appropriate place to explain them. If you use asterisks to represent probabilities, the convention is: *=$p<0.05$; **=$p<0.01$; ***=$p<0.001$

A table with group characteristics:

	N	Age (y)	Weight (kg)	Height (cm)
Women with growth failure	45	44 (8.9)	46 (3.2)	138 (8.2)
Healthy women	67	48 (10.2)	68 (6.4)	164 (15.1)
Men with growth failure	69	51 (9.0)	62 (10.1)	154 (7.0)
Healthy men	86	54 (11.4)	92 (15.1)	181 (18.2)

A table showing results (a comparison of a group of patients with a healthy population):

	Women with growth failure (n=45)	Healthy women (n=67)	P	Men with growth failure (n=69)	Healthy men (n=86)	P
Age (y)	44	48	NS	51	54	>0.05
Weight (kg)	45.8 (3.23)	68.1 (6.38)	< 0.001	61.9 (10.08)	92.4 (15.14)	< 0.001
Height (cm)	138.1 (8.23)	163.9 (15.12)	< 0.001	154.3 (7.03)	181.4 (18.19)	< 0.001

The values are presented as mean (standard deviation).

Charts

- Are an way of presenting your most important results
- However, they cannot convey detailed information. You need to use tables to do this.
- What kind of chart should you use? This depends on:
    - the type of statistical variables, e.g. nominal scale variables (categorical variables) or cardinal variables (discrete or continuous),
    - the relevance of the results: the most relevant results should be presented in the clearest and most appealing way
    - charts should be as simple and intelligible as possible.

- Most commonly used types of charts:
    - Bar chart: used to show distribution of nominal or discrete variables, e.g. gender distribution in the investigated group. It can be presented in absolute values (the number of men and women) or relative values (the proportion of men to women). In this case it should be remembered that the sum has to be 1.0 or 100% and the maximum on the y-axis must also be 1.0 or 100%. Put absolute values or percentages on the y-axis and categories on the x-axis.

    - Pie charts: good alternatives to bar charts for showing relative values (proportions). If you use pie charts, ensure you include the numerical values for each 'slice'
    - Histograms: convenient for presenting distributions of continuous variables, e.g. number of patients in a given interval.
    - Cumulative density plots: these allow the reader to easily judge the size of a group in comparison to the whole sample, at the same time estimating the size of the other groups. For instance, subjective judgements on a nominal scale (evident deterioration, vs. deterioration, vs. no change, vs. improvement, vs. evident improvement). These plots make it easy to estimate the number/proportion of patients whose condition has not improved .
    - Line graphs: are useful for displaying changes in continuous variables over time. You can present data from several groups on the same graph, differentiating each group by using different data-point symbols and line types for each group. Some journals allow you to use different colours to differentiate the different lines.
- Detailed information about the appropriate choice of chart type can be found in many statistical textbooks.
- You can add the exact values of variables to graphs and charts, but this can make it too complicated and difficult for the reader to extract the information.
- You should:
    - include the titles of x- and y-axes or include these in the legend,
    - report the statistical significance of any comparisons. For single comparions use asterisks (*). By convention * means <0.05, ** means <0.01, *** means <0.001 and **** means <0.0001. Include an explanation of any symbols you use in a footnote under the chart. You can do this in a smaller font,
    - use the same symbols for data points and line types or colour for the same group for all the charts in your manuscript in different charts,

- If possible, align all explanations horizontally; vertical ones are to be avoided as.
- Avoid extra lines/frames/boxes, e.g. a frames around legends, keys or charts
- The title of the chart should describe the chart's content accurately, so that the reader can understand the figure without reading the main text. Use the legend to explain all the symbols etc., again so that the reader does not have to refer to the main text.

Figures

- Embedding explanatory figures or pictures/photographs is often necessary to present the results (e.g. in genetics or molecular biology).
- Make sure that the description in the legend is concise, but sufficiently to make the figure understandable.
- Photographs should be cropped to remove unimportant parts of the image.
- Relevant details can be underlined, circled or marked with an arrow in a distinctive colour (or solid black or white in a black and white publication).
- It is important to provide the publisher with figures/photographs of the highest resolution. The instructions for authors usually give all the technical requirements. Many journals have graphical software to assess the quality of figures and photographs.

Discussion

- This section discusses the results in the light of your initial hypotheses and the literature.
- It should be neatly and logically planned, so that the arguments are appealing to the reader and at the same time easy to follow.

- You should write this section in an objective and balanced way; be relatively brief and coherent.
- All relevant published papers on the topic should be mentioned here; regardless of whether they support your results or not.
- This is the right place to present your own point of view based on methodologically sound studies.
- It is NOT, however, the right place to repeat the results – those stay in the “Results” section.
- Nor is it appropriate to introduce new data that you have not reported in the “Results” section. These belong in the “Results”.
- End your Discussion with an explicit conclusion (or rarely conclusions) drawn solely from the study. It is also a good place to speculate about the practical implications of your findings.

Acknowledgment

In this section you should acknowledge:

- contributions from those who do not fulfil the criteria of authorship – make sure you have their permission,
- financial support for you and/or the study,
- information about potential conflicts of interest (obligatory).

References

- List of all the works you cite with enough details for the reader to find them.
- Your bibliography should be comprehensive but not excessive – many journals limit the number of citations (check the Instructions to authors).
- References should help make the Discussion interesting and constructive.
- Scientists usually cite relevant papers that represent are milestones in the field, but they also usually cite the most recent papers.
- Avoid citing unpublished works.
- Always check the Instructions to authors and format the references accordingly.
- Consider using bibliographic management software when writing your manuscript. Such packages ensure that your references are cited correctly and automatically renumber or re-order your references when you modify your document. Examples of such software are Reference Manager, Procite and EndNote