

How to write a paper

Why write a paper? You would have started with an idea, developed a hypothesis, designed a study, and conducted your study to prove or disprove your hypothesis. Now you need to disseminate the results. 'If it is not published it never happened'.

Getting started

To get started, you should:

- Tell a story – engage the reader's attention
- Start writing as soon as you have the idea
- Write within a structured design (IMRAD)
- READ THE INSTRUCTIONS TO AUTHORS for the journal of your choice.
- Put headings in first, then fill sections

Before you start, assemble and READ the following documents:

1. your study protocol
2. your ethics application and approval
3. the appropriate reporting guideline (eg CONSORT, STROBE, STARD, ARRIVE), download from the equator network page <http://www.equator-network.org/reporting-guidelines/>. Note that all the guidelines have some sort of companion document which explains and gives examples of all the items.
4. the SAMPL guideline for statistical reporting, also from the equator network
5. the instructions to authors from the journal you have selected for submission.

Resources for writing your paper include your original study protocol, your approved application for ethics approval if relevant. These documents will contain much of the information you need. If these are well written all that might remain is for you to fill in the results and write your discussion! These steps can be envisioned as a cycle (Figure 24).

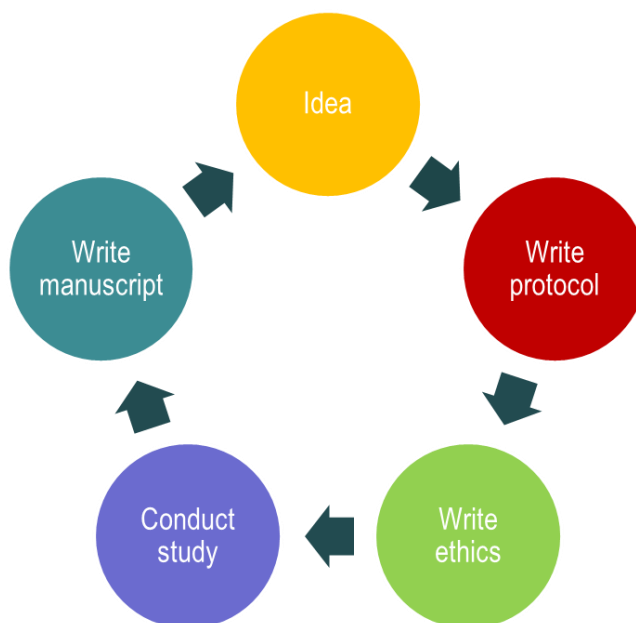


Figure 1. The cycle of research and manuscript writing.

The final step is to submit your manuscript to the journal of your choice.

Submitting your manuscript

- Choose a journal. Consider the readership, the journal's impact factor, and the purpose of journal
- READ THE INSTRUCTIONS TO AUTHORS
- Make sure the references are cited correctly for that journal
- Write a letter to editor saying what is novel and important about your paper and how it adds to current knowledge

Most journals require electronic submission. If the receiving editor decides your manuscript is good enough and meets the journal's policies, it will be sent out for review – usually two or three reviewers. The reviewers will make recommendations, which might be:

- Accept – usually with minor or major revision or
- Reject

You will be notified by the editor of the decision. The reviewer's comments, which will be sent to you, are invaluable! If your manuscript is accepted subject to revisions, it is very important to address each comment in detail and with professional courtesy and respect to the reviewer. Always thank them for their comments.

It is hard to get published in a high-ranking journal! For example, for Thorax (<http://thorax.bmj.com>), published by the British Thoracic Society and British Medical Journal group, the 'instant rejection rate' is 66%, and the acceptance rate 8% at the time of writing (November 2017).

Structure of a scientific manuscript

Your manuscript will include a title page, abstract, body of the manuscript, references and acknowledgements (Figure 25). The recommendations from the International Committee of Medical Journal Editors are particularly useful when embarking on writing your paper:

<http://www.icmje.org/recommendations/browse/manuscript-preparation/preparing-for-submission.html#d>

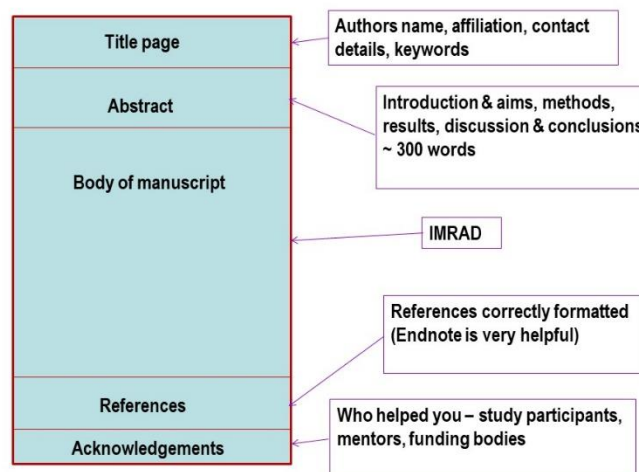


Figure 2. Structure of a scientific manuscript.

Title page

Title

- The title should be:
- Concise and descriptive
- Convey essential features of the article's content

- Include key words to be picked up by electronic search

For example, the following publications give a good sense of what the manuscript is about:

The medical management of missed miscarriage: outcomes from a prospective, single-centre, Australian cohort. Petersen SG, Perkins AR, Gibbons KS, Bertolone JI, Mahomed K. *Med J Aust.* 2013 Sep 2;199(5):341-6.

Serum vitamin D levels are lower in Australian children and adolescents with type 1 diabetes than in children without diabetes. Greer RM, Portelli SL, Hung BS, Cleghorn GJ, McMahon SK, Batch JA, Conwell LS. *Pediatr Diabetes.* 2013 Feb;14(1):31-41

Authors

Decide on the authors and order of authors BEFORE you begin any research study. This prevents misunderstandings and possibly arguments later. In the biomedical sciences, the person who did research and wrote the paper is conventionally the first author, the head or leader of the research group is last, and everyone else goes from first to middle or last to middle in decreasing order of importance/contribution.

Authorship must be justified. Authors must have contributed intellectually and substantially to the research and the manuscript. People who helped but did not contribute intellectually, for example technical people, may be included in 'acknowledgements' at the end of the paper

Use both or all initials of authors, to facilitate electronic searching. Make sure you have the correct qualifications, affiliation/s, and email address for each author.

Abstract

The abstract should follow the IMRAD format, as for the main body of the text. Features of the abstract:

- 200 – 300 words
- Check instructions to authors!
- Will be used for electronic searching
- Often the ONLY report of a study which is read.

Body of the Manuscript

The body of the manuscript should be structured around the IMRAD format:

I	Introduction
M	Methods
R	Results
A	and
D	Discussion and Conclusions

Introduction and background

The introduction should be short, usually just a few paragraphs. Avoid a detailed discussion of the literature – this comes in the discussion section. You only need to convey the following points which should be addressed:

- Why did you undertake your study? Relate your reasons to the clinical or research question
- Why is your study better than previous reported studies? Describe any problems, limitations, or gaps in knowledge from previous work
- Use only essential references

Be specific when citing previous work –readers find it helpful if you specify the author/s, subject numbers, year of publication and effect size. For example

‘Smith et al, in their 1965 study of 2000 mice, found that black mice had on average 20% (95% confidence interval 18-22%) higher problem solving ability than white mice’.....gives more complete information than ‘a study found that different coloured mice had different problem solving ability’....

The AIMS of the study are described at the end of the introduction, as well as specific hypotheses to be statistically tested.

Methods

The purpose of the ‘methods’ section in your manuscript is to enable the reader to understand what you have done, and to be able to reproduce your results.

The various standards of reporting are invaluable guides to structuring your methods section. Each standard, guideline or checklist has a list of items which should be addressed in the methods section.

The following standards are commonly applicable:

- Randomised controlled trials – CONSORT
- Observational (cross sectional, cohort or case control) studies STROBE
- Studies of diagnostic tests STARD
- Studies involving animals ARRIVE

There are many other checklists available, for a comprehensive list as well as those above, see the Equator Network website <http://www.equator-network.org/>. As well as items in the appropriate checklist, make sure your methods section reports on:

- Ethics and governance
- Bias (remember the main types are selection, misclassification and confounding).

Describe the methods used for each aim/hypothesis in the same order as given in the introduction.

Results

In the results section you:

- Report what was found – in the first paragraph; make sure this corresponds to the aims and hypotheses stated at the end of the introduction.
- Describe participants/study units
- Describe in detail the ‘answers’ to main question/s in same order as in methods
- Write on one topic per paragraph

Don’t duplicate information in text and tables/figures. The results section is often quite short – a few paragraphs.

Tips:

- Give numerical results to appropriate decimal place
- Report numerator & denominator as well as percentage
- Give exact p-values, don’t use ‘NS’ for not significant
- Give p-values to appropriate decimal place - 0.64, 0.03, 0.003, 0.0005, <0.0001 (again, check the instructions to authors – some journals specify the use of <0.001 if the p value runs to four decimal places)
- Report the mean with standard deviation or mean with 95% confidence intervals for normally distributed data. Read the instructions to authors, many journals specify which summary statistic they prefer

- Report the median with interquartile range for skewed data (in some circumstances it is appropriate to also report the range).

To ensure that your statistical results are reported correctly, refer to the SAMPL guidelines, which can be downloaded from the equator network at <http://www.equator-network.org/reporting-guidelines/sampl/>.

Discussion and conclusion

The first paragraph should contain a brief summary of your main findings, without re-stating the results too much. Don't forget these conclusions should correspond to, and be in the same order as, your original aims and objectives. i.e. what was the 'answer' to your research questions/s?

Discuss each result in the same order as you reported aims, methods, and results, then give a global overview of the impact and meaning of your work in the context of current knowledge.

In discussing each result, give your interpretation of the meaning or implications of your work. Refer to previous work and explain whether your work agrees/supports or does not support previous results. Explain how your work expands on previous knowledge. When citing previous publications, mention any limitations or biases as well as strengths of previous work, i.e. do a mini critical appraisal. When describing results of your own or other author's work, be as specific as you can, giving number of subjects and effect sizes rather than general statements. For example, rather than saying 'caesarean section rates have risen', say 'Smith and Jones, in their UK study of 150,000 pregnancies from 1990 to 2010, found that the annual caesarean rate rose from 20% (95% CI 18 – 22%) to 35% (95% CI 33% - 37%)'.

Explain the limitations of your study. A good place to start is consideration of any biases – selection, misclassification or confounding biases. Discuss the generalisability (external validity) of your study, and whether it was study was adequately powered to find a positive result.

In conclusion, re-state the 'answers' to your research question/s and take-away message. Do NOT state that 'further research is required'! If you really must recommend further research, outline a specific study design and plan, and put it before the conclusions towards the end of the discussion.

Writing tips and the final check

- Put the manuscript away for a day or two then re-read
- Use short sentences
- Prune ruthlessly – ask yourself, can I say this in fewer words? Space in journals is at a premium; for both journal articles and longer documents such as theses, succinct phraseology enhances readability
- Delete extraneous words 'such that', 'however', 'significantly' (you have already defined statistical significance in the methods); distinguish between statistical significance and clinical or scientific importance
- Give informative citations – consider including author, year, number, effect size
- Get an educated 'lay' person to read your manuscript; if they can't understand it, revise!
- Do a final proof read to ensure that all numbers are consistent and add up appropriately, and that all percentages reported contain both numerator and denominator
- Double check the instructions to authors and make sure all the formatting is correct, the word limit is adhered to, and any other conditions are complied with.