

How do you write an article?

Writing is hard work and takes time. Few have the talent to write effortlessly but all can learn to write a scientific paper. To get your article published it must be of scientific merit, topical, submitted to an appropriate journal, be written in the correct format and the reviewers answered correctly. In other words you must know the publication game. This step will attempt to help you write your article according to the “rules”.

To write successfully the following are helpful:

1. Start early. You can write the methods before analysis of the data.
2. Set aside a time to write. Take regular breaks, as writing is mentally tiring.
3. Have the most important articles you are to cite available.
4. Think clearly about the message you want to convey. Stick to the message.
5. Make sure all the collaborators agree with the message.

There are many articles and books to guide you on how to write successfully. This is just a brief synopsis of many articles and our experience. (See useful references for one-page articles on each step)

Who should be an author on your paper?

Who should be an author has been clearly set out by the International Committee of Medical Journal editors (www.icmje.org).

To be an author requires:

1. Making a substantial contribution to the design of the study, acquisition, analysis or interpretation of the data AND
2. Writing or critically revising the drafts and article AND
3. Approval of the final version AND
4. Agree to be accountable for all aspects of the work.

There is no place for guest authorship or politically correct authorship. The new recommendation expects all authors to be accountable for the accuracy and integrity of all the aspects of the article. If something goes wrong you cannot use the excuse that you were not involved in that part of the study.

Decide early in the study who will be authors and what their contribution will be to the study. Initially many will be interested in your study but as the hard work and critical thinking required by research arrive, they fall by the wayside.

How do you choose a journal?

Choose the journal in which you would like to publish your article. Your choice will depend on the message you are trying to get across and to whom you want to give this message (your audience). If you have an oncology patient with an unusual lung mass you would frame the message slightly differently if you were writing for an oncology journal than for a pulmonology journal. The next choice is whether you want to publish in an on-line journal, or in a traditional journal.

There has been a proliferation of on-line journals many of which are highly respectable journals. The advantage of on-line journals is that your article gets published quickly, if you can get past the editor and the reviewers and that the article is then freely available on-line for all people who want to read your article. Something to keep in mind is that on-line journals have a publication fee – Stellenbosch University will pay the pro-rata amount for the proportion of authors who are from the University.

Another factor that plays a part in choosing a journal is the journal's Impact Factor (IF). You should aim at the journal with the highest impact factor that is read by the audience you are aiming the article at. But be realistic – the chances of you publishing your first article in the New England Journal of Medicine with a very high impact factor (IF 54.4), is more or less zero.

Look at which journals have published similar articles or research and look at the references you are using in your literature review – these journals will normally be interested in your research subject.

Your mentor will help you choose the journal most likely to publish your paper. Decide on, write down and ensure all co-authors agree with 3 journals in order of preference. If the one journal rejects your article you know which is the next to go for without agonising or having major discussions with your co-authors again.

Follow an unconventional sequence of activities when writing

Most scientific journals follow the IMRAD (Introduction, materials/methods, results and discussion) format. While you have to stick to this format, we strongly advise that you do not start with Introduction, then methods etc. We advise that you follow a different sequence of writing as explained below.

 TIP:

While your final paper will contain this format, do not write the sections in this order.

The review of the literature which you have written for your scientific proposal (which will need to be updated) will form the basis of the introduction for your paper. Do not start your paper by refining your literature review. Start your paper by writing your research question/aim. This forms the basis of your whole paper and every section must relate to this and to this only. Once you have clearly written down your research question/aim, you can write the materials/methods section. The materials/methods section is normally the easiest to write, followed by the results section (where you will need help from the biostatistician). The introduction should be written once you have written the research question/aim, methods and results. The most difficult part of writing the introduction is to refine the literature review from your proposal and to leave out all the vague parts that do not directly relate to your research question/aim, methods and results. The discussion is the toughest to write. Write the abstract last.

Research question/aim:

This is the most important part of your paper and everything must relate to this. It is often useful to look back at your initial 2x2 table and refresh your memory regarding your question, your key determinant and your primary outcome.

Materials and method:

This is your research study's recipe. It must accurately describe exactly what you have done, how you have done it and how you have analysed your data. This section must be written in the past tense. You must find a balance between giving enough detail to allow another researcher to repeat the exact same study, and being brief enough as you cannot cover all the fine technical aspects. A major portion of your methods section will be in your research proposal. It is initially easier to describe the method section in great detail and then edit it later.

 TIP:

Do not copy and paste it from your research proposal, as the tenses will be wrong.

Remember PICOT? Well, back to it as it is essential to include all the PICOT criteria:

Population: This includes your study design, data sources as well as the setting where the study was performed including the context (e.g. high burden TB region). Patients that were studied and the inclusion and exclusion criteria used. A flow diagram is very useful to explain this and is often required by the journal (appendix 8). Sometimes the flow diagram fits better in the methods section, and

sometimes in the results section. You also have to describe your sample size and how you ensured that your study was not biased.

Intervention: Intervention or new diagnostic used.

Comparator: If an intervention or new diagnostic was used you must indicate what it was compared with. Most junior researchers do not embark on an intervention study as their first research study and then your key determinant is used as your comparator.

Outcome: What was the primary outcome investigated and what was the outcome definition used.

Time: When was the study performed? By convention this is given near the beginning of the methods section.

If the method(s) have previously been well described in a scientific publication, a brief description of the method with a reference will suffice.

You also have to describe the data management and the statistical methods used to analyse the results of your study, as your conclusions are dependent on the correct analysis.

Ethics permission should finally be included. If there are specific ethical considerations, it should be mentioned e.g. how you maintained confidentiality or that a waiver of written informed consent was obtained as you used already collected data from hospital records. Permission from the hospital or health authority to do and publish the study is normally included in the acknowledgements.

Results:

The results section should mirror the methods section. For each part in the methods section there must be a corresponding result. In the result section you just give the results and do not comment on them (that belongs in the discussion).

 **TIP:** If your study was a cricket match, in the results section you would only give the score, each batsman and bowler's contribution but no comment on how lucky they were etc. The commentator's comment on how lucky the batsman was or whether he was better than someone else, will go into the discussion section.

The results are normally written in the following order:

- Description of the population studied. You must account for all the children that possibly could have been included in your sample (including excluded subjects). Flow charts are very useful for this purpose (see appendix 8).
- The results of your primary outcome. This would include the variables that influenced the primary outcome.
- Results of your secondary outcome(s).
- Finally write about the unexpected results.

Useful points to remember in reporting your results:

- Use Tables/Figures if you have a lot of data and highlight the findings in the text.
- Do not duplicate data given in Tables/Figures in the text.
- Use linking sentences in the text to draw attention to the Tables/Figures. (“The characteristics of the HIV infected and uninfected children are given in Table 1”)
- Do not only give the p values but also give the odds ratios / risk ratios with their 95% confidence intervals or ranges as applicable.
- Restrict the numbers to one decimal point e.g. 10.5 not 10.532597.
- Report percentages together with absolute numbers (50% (10/20) children).
- Use the term statistically significant rather than significant, as they do not mean the same.
- Do not blame the poor data by writing “xxx did not reach statistical significance”. Rather write “... was not statistically different from xxx”.

Using Tables and Figures:

Editors have limited space in their journals so an effective way of reporting large amounts of data is to use a Table or Figure. It is often easier for the reader (editor and reviewer) to get a grasp of the results of your study by examining a good table(s) or figure(s).

A good table or figure must have the following characteristics:

- The table together with its heading should be able to be read without reference to the paper and be self-explanatory.
- The title of the table/figure should clearly indicate what the data is in the Table/Figure.
- The legend is used to explain abbreviations used in the table and what the symbols indicate (* = $p < 0,05$) (# = children with bacterial pneumonia).
- The Tables and Figures must be clear and easy to read.
- The Table/Figure must be in the format required by the journal (.tiff .jpeg etc.)
- Tables and Figures are inserted after the references and each table and figure must be on a separate page.
- Ensure that the numbers in the tables make sense and reflect what you mention in the text. Reviewers do quick checks on this, and mistakes indicate

that you have not been careful (that in fact you have been sloppy) and can cast doubt on the quality of your work.

Discussion:

This is the most difficult part to write but is not impossible if you follow these suggestions:

In the first paragraph you describe your primary outcome followed by the secondary outcomes substantiated by statistics. In other words you answer your research question but substantiate your answer.

TIP: Back to the cricket match – this is the section where the commentator (that is you) interprets the results on the scoreboard and interprets the results by making reference to other players in this cricket match (in your case other data of your study) or to previous cricket matches (or in your case previously published studies).

In the following paragraph(s) you critically compare your findings to those available in the literature. You will point out what your study adds to the subject. You can consider why the findings of the other studies differ from your study.

If you have interesting secondary outcomes these are discussed in the next paragraph or two. Do not over-emphasise these findings, as your study was probably not designed/ powered to answer them.

The next paragraph or two you discuss the strengths, limitations and difficulties of your study and compare your limitations to those in the literature.

In the final paragraph you briefly summarise your findings and point out the clinical significance of these findings.

Points to consider when writing the discussion:

- Do not over-emphasise your findings. Your study will not prove but rather demonstrate, show or suggest (be modest).
- Do not go off on a tangent (on your pet subject) that is not substantiated by your data and that does not relate to your research question/aim/hypothesis.
- You may point out interesting findings that were not significant but do not draw any conclusions from this data.
- Do not try and sell other interesting observations you may have made but are not included in the results section.
- Do not duplicate your results in the discussion.
- Do not add new findings that were not given in your results.
- Read the discussion over to make sure it follows a logical theme.

How to start writing the discussion:

Follow the above recipe but first only write one key word or thought in each of the suggested sections of the discussion.

It is easier to now expand on the key words or thoughts.

Now for the Introduction:

It is now time to insert your funnel shaped introduction leading to your research question with your primary and secondary outcomes.

You must carefully recheck your introduction to ensure that new articles published since you wrote the introduction for your research proposal are included.

Ensure that the theme of your article is carried through from the introduction to the discussion.

Title:

You have probably been dreaming of the title of your article for months. Your title should have all the key elements of your article in it but not be too long. It should be interesting enough to draw the editor and readers' attention. Writing the title is not as easy as it seems. A useful aid to developing a title is to write down the key elements of your study and then develop a title from these elements. It is seldom that the title of your article is exactly the same as the title of your research proposal.

Authors:

See first section of this step as to who should be an author on your article.

When you write the final version of your article, ensure that all authors' names, affiliations and titles are correct. You should be the first author and your mentor the last/senior author.

References: surely not a problem?

If you have been using a reference manager it is relatively easy to complete the references.

Carefully examine the references to ensure:

- That the correct reference is included.
- That you have actually read the primary reference and have correctly quoted from it.
- That the spelling of the authors, title of the article and journal is correct.

- That when you are ready to submit your article recheck that the references have not moved.
- That the numbering of your references has not changed after inserting the introduction – correct the numbering if needed.

It is very irritating for a reviewer to find faults in the references as this indicates that the author is sloppy and should not be taken seriously (and the reviewer will very likely wonder: “What else in the study is sloppy?”)

Who should be included in the acknowledgements?

This is the time to thank those who helped you. Include acknowledging the health authorities for allowing you to perform the study and publish the paper.

What next?

Even though you have been in constant discussions with your mentor, it is now time for you to give your article to your mentor for critical review. Do not feel despondent if it is returned looking like a blood bath from all the red ink or track changes. This is quite normal and it takes most of us 5-7 drafts to get the article to such a stage that we can submit to a journal.

How can you keep the bloodbath to a minimum?

- Read the article for logic of thought and structure.
- Then re-read the article for language and spelling.
- Then make sure the numbers in the article add up. Are all the participants accounted for? Especially check your tables for correct data.
- Then check your references.
- Ask a colleague to critically read it for you. (Rather do not ask your partner as this could spell the end of your relationship).
- Then re-write the article again.

TIP: When writing scientifically, avoid unnecessary words and write clearly rather than beautifully.

TIP: Do not use jargon e.g. do not write “the aetiological factor” – rather write “the cause”. If you write about children, write about “boys and girls” rather than about “male and female participants”.

TIP: Do not use unnecessary words. E.g. write “history” and not “past history” and write “unique” and not “very unique”. And for a sentence describing the study population write “There were 120 children, of whom 60 were boys” rather than “The 120 participants were divided into two groups consisting of 60 boys and 60 girls”.

How to manage your mentor's suggestion?

Your mentor is there to help you and probably likes you. Your mentor is not the enemy. So sit down and carefully read your mentor's suggestions/criticism. If you think your mentor is wrong you have more likely than not expressed yourself incorrectly.

Now it is the time to carefully address every single one of the mentor's suggestions and improve your manuscript.

This will probably require you to re-write the article. (Now you have written it 4 or 5 times: you are getting there.)

Return the manuscript to your mentor as well as all the other authors. Give them a reasonable time in which to reply (1-2 weeks).

Time to start writing the abstract.

How do I write an abstract?

The recipe for writing an abstract is:

- One or two short sentences stating the context/background.
- One sentence stating the research question.
- One or two sentences stating the methods.
- One or two sentences stating the most important findings including statistical significance. Start with the answer to your research question.
- One sentence modestly stating the clinical significance of your study.

Many journals require a structured abstract and will give you exactly the sub-headings to use.

Points to consider in writing the abstract:

Check the word count of the abstract. Online submissions (all journals) do not let you exceed the word count.

Make sure the abstract can be read as a stand-alone and makes sense. Remember the majority of readers will only read your abstract. You have to draw them to your article via the abstract.

Make sure your abstract has the following elements:

- Why you did the study?
- What did you do?
- What did you find?
- What does it mean?

TIP: If a journal gives you sub-headings to use, and the number of words to use in your abstract, they actually expect you to use these and best advice is to do so!

Ready for submission?

Now that your mentor and fellow authors have returned your article you need to make the corrections, add the abstract, re-read and re-check the article and return to all the authors with a shorter deadline than the previous deadline.

In the mean time you can get all the instructions together for submission. Make sure the Tables/Figures meet the requirements of the journal etc.

You are now ready to submit. But remember that with online submission, it often takes quite a long time (a hour or two) to fill in all the necessary information needed by the journal and it can be quite frustrating if the journal requires information that you do not have. So make sure when you go onto the website and you have all the information (e.g. some journals need the qualifications of all the authors) before you start the submission process.

Lastly, your article may never be submitted to more than one journal at a time.

TIP: After you have pressed the “submit” button, make sure that you know where your final locked database used for the analysis of your article is and that you have made a copy of the database. It is very frustrating when you get the reviewers’ comments and you have to do some more analyses and guess what? You do not know or cannot find the correct database and you get different values from the results submitted – trust us – it happens!

Gie, R., & Beyers, N. (2014). Getting started in clinical research: Guidance for junior researchers. Cape Town: Department of Paediatrics and Child Health, Faculty of Medicine and Health Sciences, Stellenbosch University.