

Class Room

How to Write a Paper

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Chettinad Health City Medical Journal 2015; 4(1): 40 - 41

Introduction

Publishing in peer reviewed journals is the hallmark of an accomplished doctor. As doctors, we have 3 responsibilities – to our patients by upholding the highest standards of care, to future generations of doctors by teaching them and to our profession by sharing our knowledge and experience. Publication of the results of clinical work and reviewing the results of studies published by others is the result of and proof of critical independent thought. These activities demonstrate that the author who is a doctor is not only capable of following e.g. I do because my chief told me so, but of being a leader – I do because I have analysed the evidence and the evidence shows so. But why is it important to think critically?

Well, only 150 years ago, a doctor called Semmelweis was taken to task for advocating hand washing between patients! At the time doctors would work between autopsy rooms and obstetric delivery rooms without bothering to wash their hands. Semmelweis observed and published on the fact that doctor - led obstetric delivery units had several fold puerperal sepsis rates as compared to midwifery - led units. He advocated hand washing and as a result, saved the lives of many mothers and babies¹. For making the link between dirty hands and puerperal sepsis, he was made an outcast! Semmelweis was committed to an asylum, where he died at a young age. More recent events include the thalidomide scandal and the autism link with MMR immunisation. In my opinion, the medical profession has one guardian angel – and that is the critical evaluation of data. Greater academic enterprise, critical analysis of results and academic research are therefore critical for a specialty to progress and a doctor to demonstrate to his/her peers that they are capable of good quality work. Of course, on a more practical note, academic institutions in the United States for instance mandate that the attending doctors (senior consultants) publish. This attracts patients and popularises the institution – so publishing papers can have a positive effect on the profile of the institution as well.

Defining the research question

The most important aspect of writing a paper is defining the research question. Framing a good question – one that will interest the reader and be worthy of investigation is the key to a good paper. A research question should be framed in the PICO or the PECO format; Patient – define the patient group,

Intervention or investigation - what is the intervention or investigation being evaluated, Comparator – what is the intervention or investigation being compared to and Outcome – what outcomes are defined as being of interest. Clearly defining each of these categories enables a well conducted study as well as clarity of presentation of results. The PICO/PECO also enables careful consideration of the most appropriate study design. Interventions are best evaluated in a randomised controlled trial; tests can be evaluated in a single arm prospective diagnostic test accuracy study, complex risk exposures are best assessed in a cohort study. Good online resources exist to guide study design selection and presentation (see www.cebm.net.) Dedicated courses (www.publishingclinic.co.uk) can help guide publication.

The null hypothesis and statistics

Deriving a hypothesis is helpful to calculate the numbers needed – usually the null hypothesis states that the new treatment is no different from the existing treatment for the defined outcomes. The study sample size then has to derive the number of treatment effects that are needed to demonstrate that the null hypothesis is disproved. A statistical expert may be helpful for this. Free web resources are also available (<https://www.sealedenvelope.com> and <https://www.youtube.com/watch?v=g3dkRsTqdDA>). Youtube also has some excellent tutorials on statistical tests. So let's assume that the research project is completed and the results need to be written up for publication. How does one get started?

Getting started

The figures and tables of the study are the best place to start. Collating the data into tables and the results into graphs for figures helps defining the results section of the manuscript. Figures should be labelled legibly, with clear legends and titles. Interestingly, it allows for reflection as well – do the results prove or disprove the hypothesis. Often, results of single institution experiences are not adequate to do either – hence the need for collaboration between institutions to generate large multicentre datasets for definitive conclusions. However, single institution case series can be extremely helpful as a starting point - the data may show a trend towards a significant result which may need to be proved in larger studies.

Choosing a title and targeting the most appropriate journal

The next step is to choose a title. There is a balance to be struck between short catchy titles that don't describe the study in anyway – e.g. Cervical cancer in India – the title doesn't make clear whether this is a narrative review or a randomised controlled trial and long unwieldy titles – e.g. A systematic review of factors affecting outcomes after treatment with antagonists of tumour necrosis factor- α in patients with rheumatoid conditions. Some journals have criteria for Titles and will provide clear direction to authors on the correct titles for the journal of choice.

This is a good time to select the journal of choice. It is advisable to select a first choice, second choice and a third choice journal. Most good journals have an acceptance rate of less than 10% - so it's pragmatic to aim slightly higher and use the reviewer feedback to hone the paper if needed. Is this journal interested in the kind of research that has been undertaken? One easy tip is to check through the papers that have been selected as references to see where they have been published. This allows for target journals to be identified. Understanding the importance of impact factor helps – the impact factor is a score published by the journal publishers which is an average of the number of times a paper published in the journal is cited i.e. referenced in another paper. The higher the Impact factor, the more significant the journal is considered to be. Impact factors range from the 35+ (Cell/Nature/Science/Lancet) journals to the very low.

Having said that, specialty journals tend to have lower impact factor reflecting the pool of readership – Obstetrics and Gynaecology (Green journal) the highest ranking journal in Obstetrics and Gynaecology has an impact factor of 4.3. Most doctors or medical students will start with publishing in institutional journals. These are useful stepping stones to national and then international publications. Nevertheless, the key is that once the target journal has been identified, the instructions are to be followed very carefully. This is one instance when 'following the rules' does pay!

The IMRAD format

Most research articles are written in the IMRAD format – Introduction, Methods, Results and Discussion². The Introduction sets the scene for the research question and is usually no more than 50 words. The Methods and Results section are perhaps the most important sections of the manuscript. The Methods should be straightforward to write if the study design has been selected after careful consideration. www.equator.net is a very useful site for this section and has compiled the relevant guidelines for each study design. Some journals will ask for a checklist to be completed to demonstrate that the relevant guidelines have been followed for each study type – e.g. PRISMA for systematic reviews, CONSORT for trials etc.

Results need to be a factual presentation - the interpretation of results is left to the discussion section. Again, this is presented in a concise fashion. Usually most

research papers will stipulate no more than 6 figures and tables, with the text in the results describing in detail the data presented in the figures and tables. Usually, most academic papers expect 3 results to be provided – ie the study showed that treatment x as compared to treatment y in the population of interest improves progression free survival (result 1), is associated with similar complications (result 2) but has a higher impact on patients quality of life (result 3).

The Discussion section provides the interpretation of the results. This section places the results in context, discusses the strengths and limitations of the study and suggests any impact on clinical practice as well as suggestions for future research. Journal editors will ask themselves three questions of each manuscript – are these results generalisable, valid and applicable?. The conclusion section is a balancing act – unless the study is a multicentre definitive randomised controlled trial, its best to show some caution in the interpretation of study findings. For instance, a conclusion might read 'In this pilot study outcomes from Robotic surgery were atleast comparable with laparoscopic surgery, with a trend towards reduced hospital stay. These findings need confirmation in a well designed larger trial'.

Tips and Tricks

It is a good idea to ask colleagues to review the paper before submission – one tip is to ask a colleague in an allied specialty to read the manuscript e.g. an anaesthetist for a surgical manuscript. If the paper is written with clarity, the colleague should be able to understand and convey the principles underlying the paper. Paying attention to language helps. Most international journals prefer concise language without flowery embellishment, for instance, 'conclusively show' is better than 'show without a shadow of doubt'. Of course, the spell-check function on the computer and remembering that American publishers insist on American English spelling is important.

Finally, writing and publishing papers takes time and practice. In my experience, it takes about 6 months from writing up through to submission and publication. Starting from a first draft through to submission will occupy precious hours of time. Remember also that rejection is very common – editors in reputed journals accept <10% of submissions. Others have faced rejection too - the manuscript describing the link between *H.pylori* and gastric cancer was rejected several times! Do use the reviewer's feedback to improve the submission and try again. Rest assured, seeing one's name in print and the results of hard work published and acknowledged by peers is worth it!

References

- 1) Stone S P. Hand hygiene - the case for evidence-based education. J R Soc Med; 2001; 94(6): p. 278-81.
- 2) Docherty M, R Smith. The case for structuring the discussion of scientific papers. BMJ. 1999; 318(7193): p. 1224-5.

Editorial note

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The 'Vancouver' protocol was first laid down in 1978 by an informal meeting of a group of Medical journal editors in Vancouver, British Columbia. This group has now evolved into the International Committee of Medical Journal Editors (ICMJE), which meets annually and presents periodically revised Uniform requirements for manuscripts submitted to biomedical journals.

Authorship - credit should be based on:

- Contributions to conception and design, acquisition of data, or analysis and interpretation of data
- Drafting the article or revising it critically
- final approval of the version to be published

However general supervision of the effort does not constitute authorship. It is recommended that the editorial freedom involves full authority over the editorial content and timing of publication.

When a study involves use of a drug, commercially available equipment or a trademarked test kit, it is the responsibility of the author to disclose all financial and personal relationship with the concerned company. If financial support is availed of, the study design, execution, analysis and results should be independent of the finance source and should be kept private. Reviewers should disclose financial and personal affiliation with regards to the reviewed study. Duplicate publication in two journals, redundant publication with repetition of data and results should be avoided at all cost.

Manuscript Preparation and Submission

The sections should be divided into the IMRAD format, introduction, methods, results and discussion. All portions of the manuscript should be double spaced and serially numbered. Case reports, 'how to do it' articles, correspondence, editorials and perspectives do not require an abstract.

Cover letter : The cover letter should state the purpose of the study and why is it important. It also states the participation of all the authors, originality of the work and conflict of interest if any.

Title page : The title page should include a title that describes the study in a concise manner as possible. Abbreviation and long convoluted titles should be avoided. The authors name, designations, departmental and institutional affiliations should be clearly stated. The contact information for the corresponding author should appear clearly. Word count, number of figures, tables, pages, and keys words should be included. A concise 100 word write up on the first author with a passport size photograph should be included.

Abstract : The abstract should follow the IMRAC format with introduction, methods, results and conclusion. It should not exceed 250 words. Abbreviations are generally avoided in an abstract.

Introduction : The introduction should be brief and focused and should contain a background to the study in question and hypothesis to be tested with relevant references.

Methods:

- This section is important and should include
- Time duration and location of study
- Institutional review / ethics committee approval (review articles and case reports can dispense with approval)
- Patient demographics – this is best presented with tables. with texts noting only the submit points.
- Details of inclusion and exclusion criteria
- End points both primary and secondary should be stated with description of statistical method used.
- Technical details of the clinical procedures and investigations, questionnaires should be described with focus.

Results

The results section is best presented with graphs and tables. long lengthy paragraphs with numerous figures and numbers should be avoided. Salient findings can be described with significance, in brief. Repetitions of data from table should be avoided.

Discussion & References

The discussion itself must be structured to lend clarity to the reader. Most discussion are begun by reiterating the background, historical details of the device or procedure and epidemiological data. Following which data from similar literature on the subject of the study is detailed impartially with minimal reference to current study, highlighting similarities or contrast. The application of the result to the general population needs to be discussed.

Always follow this with the small description of the limitations, drawbacks and biases and make short, concise, clear conclusions. References from journals and books should be formulated as per guidelines set by the Vancouver group. References should be to the point and relevant to the study. There is no requirement for numerous references unless it is a review article.

Bibliography

- 1) Holmes DR, Hodgson PK, Nishimura RA, Simari RD. Manuscript Preparation and Publication. Circulation. 2009; 120: 906-913
- 2) Uniform requirements for manuscripts submitted to biomedical journals: Writing and editing for biomedical publication. J Pharmacol Pharmacother. 2010 Jan-Jun; 1(1): 42-58.