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POINT OF VIEW

Strategies to successfully publish your first manuscript

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Summary

Applying published evidence is fundamental to the practice of medicine. However, the steps needed to undertake scientific research and generate a manuscript of publishable quality are often overwhelming for junior doctors. Undertaking research and publishing these findings are complementary. Clinicians often present research at college or scientific meetings as oral or poster presentations. Yet despite this, most research is not subsequently submitted for peer review publication in a scientific journal. Reasons put forward for research not being published include lack of time, ongoing study, difficulties with co-authors and a negative study. A lack of experience in the actual process of writing and publishing is also likely to be a contributing factor. The steps required in writing a successful manuscript are multiple and clinicians often lack awareness of the specific formatting requirements for submission to a scientific journal such as *JMIRO.* The aim of this article is to provide information for clinicians inexperienced in writing and submitting a manuscript with the intent of achieving a publication. It is not meant to be a step-by-step recipe in doing this but a guide as to what is required.

Introduction

Undertaking research and publishing findings are complementary. Clinicians often present research at college or scientific meetings, yet most research is not subsequently submitted to a peer review scientific journal. Between 1996 and 1999 in four consecutive annual general scientific meetings of the Royal Australian and New Zealand College of Radiologists, a total of 480 free paper research abstracts were presented.[1] However, only 35% were eventually published as full-text articles. In a Cochrane review of almost 30 000 scientific meeting abstracts, only 44.5% resulted in a publication.[2] Reasons put forward for research not being published include a lack of time, study still ongoing, difficulties with co-authors and a negative study.[3] A lack of experience in the actual process of writing and publishing is possibly also a contributing factor.

It is now an Australian and New Zealand radiation oncology curriculum requirement that Fellowship candidates submit a publishable quality manuscript prior to sitting their Fellowship exam. The definition of a manuscript of publishable quality is based on a peer review process using nine criteria as required for manuscripts submitted to *JMIRO*. In essence, the imperative is for registrars to write a manuscript as the first author and based on research they have undertaken. Despite this requirement, many lack the necessary skills and experience in performing this task. One useful resource to develop these skills, if available, are specific scientific writing training workshops[4] tailored to health professionals, or similar courses, available at some local universities.

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The aim of this article is to provide information for those inexperienced in writing and submitting a manuscript. It is not meant to be a step-by-step recipe in doing this but a guide as to what is generally required.

Methodology and authorship

A well-written manuscript is no substitute for bad science. The detailed process of undertaking quality research is beyond the scope of this article; however, the question frequently asked is 'What study or type of research should I do?' The research question is always important and should have the potential to be practice influencing or at least hypothesis generating. Despite this, embarking on a multicentre randomised trial as a first piece of research needs to be carefully considered. While not discouraging this type of research, such studies require a great deal of logistics to organise and often years to accrue, mature and report. Despite this, the experience gained from such research is invaluable and may result in the awarding of a Varian prize at a college meeting and a subsequent publication.

First authorship implies that you personally undertake much of the research and manuscript writing. Co-authors typically include a senior clinician with expertise in the area of research (a mentor) and perhaps other senior clinicians associated with the treatment of this condition. Working with an experienced and published co-author is invaluable for providing guidance throughout the process of writing up your research. It is not appropriate to include co-authors merely on the basis of departmental seniority or politics. All authors should have some involvement in the actual research (study design, data collection, analysis and interpretation) and manuscript writing. The most senior author is usually listed as the last author. Usually, the first author is the corresponding author and will correspond with the journal and with readers wanting article reprints following publication.

Most, but not all, clinicians interested in publishing will undertake clinical research. A retrospective clinical study, usually from a single institution and using data spanning many years, is frequently the first foray into clinical research. Most departments have accessible databases to identify patients with site-specific conditions. Although using retrospective data raises issues of variable data quality and missing data, the alternative of prospective data collection may take time to achieve in regards to accruing adequate numbers. Alternatives to a retrospective outcome study include surveys, quality of life studies, and technical or diagnostic-related studies. Observational studies such as case control or cross-sectional studies are options but usually require the input of an epidemiologist and statistician.

A case study of an interesting diagnostic or management problem is often considered the easiest means to a publication. However, many journals show little interest in publishing case studies, as these are the lowest form of scientific evidence, and unless they are of outstanding merit, authors risk writing a manuscript that may be difficult to publish. Despite this, if a case report illustrates important lessons, and is of acceptable quality, it may make a useful contribution to the literature.[5]

Journal editors like to see originality and readership interest in submitted manuscripts. Undertaking studies on topics already well documented (i.e. radiotherapy for early larynx cancer) may limit the prospects of acceptance. Attempting to find an 'angle', that is, a subset of patients within a larger group, often increases interest and may limit the number of patients to a more manageable number.

Manuscript format

An essential guideline for all authors writing a biomedical manuscript is detailed in the Uniform Requirements for Manuscripts Submitted to Biomedical Journals recommended by the International Committee of Medical Journal Editors (ICMJE).[6] Following the 1978 Vancouver meeting of medical journal editors it is now widely accepted by over 500 biomedical journals (including *JMIRO*), with the consequence that there are only minor format variations between participating journals. These guidelines detail the Introduction, Methods, Results and Discussion (IMRaD) format for writing a manuscript.

The IMRaD format is the widely accepted format for manuscripts reporting on observational (i.e. retrospective/descriptive studies) and experimental studies (i.e. randomised controlled study). Each journal has instructions to authors available on their website and it is imperative that authors download and read these. There are often subtle variations in each journal's format. Obtaining and reading recent articles from the intended journal is also useful in correctly formatting a manuscript.

The reporting of observational studies (cohort, case-control or cross-sectional studies) is enhanced by the widely supported 'Strengthening the Reporting of Observational Studies in Epidemiology Statement' and provides a useful checklist of 22 descriptors essential for reporting observational studies.[7]

Statistics input

A statistician with medical and/or oncology experience is invaluable but often not available. It is tempting to perform your own statistical analysis (e.g. Cox regression/survival analysis) using one of the many available statistical programs; however, statistical input should be obtained from a statistician and at the conceptual stage of a study.

For small observational studies (20–30 patients), descriptive statistics detailing the relevant means/

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medians, ranges and crude control rates is often acceptable. Most calculations can be easily obtained using hand-held calculators. Numerous books and journal articles (e.g. *MJA* series Trials on Trial)[8] are available to 'educate' researchers on the topic of clinical trials and statistics but none are a substitute for formal training or the assistance of a statistician.

Preparation for writing

It is essential to undertake a thorough literature search using databases such as MEDLINE/Ovid/Pubmed/Google Scholar and to aim for 15–20 relevant references. Peer reviewers are often content experts, and not citing important articles risks rejection. In most cases, less is often better (unless the study is a Systematic Review) as there may be hundreds of articles on the research topic. There should be an attempt to track down 'landmark' articles and try aim for contemporary (5–10 years old) articles. Older references usually reflect treatment practices, investigations and technology markedly different from current practice. Do not rely on just the abstracts but obtain full-text articles. Also search article reference sections for other useful articles that may have been missed on literature review.

Articles relevant to the research topic, and published in your intended submission journal, should be reviewed and cited. Be aware that recently published articles similar to yours may mean a journal is less likely to consider your manuscript unless the results reflect new or different findings. In this situation, sending an email to the journal editor canvassing their interest is worth considering.

It is useful to include a table summarising the results of other similar studies and comparing these with your own. These tables present data that may include: the study author(s), date of the study, study population, treatment and outcome (relapse or survival), and are an excellent means to summarise the evidence for the readership.

Writing

Authors should use a word processing program such as Microsoft Word.™ As a generalisation, manuscripts are submitted in A4 format, single page layout, 12 point font (Arial or Times New Roman), double spaced, left-margin justified, with 25-mm page border margins and pages numbered sequentially and often placed on the top-right corner. A typical word count for an IMRaD formatted manuscript is 3000–4000 words with 20–30 references, although journals may set word count and reference limits depending on the type of study. When referring to numbers less than or equal to nine, these are usually spelt out; for example, the number 3 is spelt out as three.

Title and abstract

The extent of evidence–based medicine is reflected by the 20 000 000 titles and abstracts on MEDLINE that are easily accessible to anyone with Internet access.

The title of a manuscript sets the scene for what is to follow and depends much on the type of study and the results. Remember that readers may only skim through the titles of published articles to select those of relevance. Therefore, it is important to present a title that reflects the type of study, the patient population and the intervention.

The abstract may be the only part of the manuscript, including the title, read by others. Abstracts are published on MEDLINE and available to readers without cost. The majority are structured along the lines of the IMRaD format and are nearly always strictly word limited (250–300 words). Authors need to select the most important results for the abstract and present a concise and relevant conclusion. One approach is to a use a cut and paste technique to construct an abstract as the manuscript nears completion. Alternatively, abstracts may be written at the beginning of the writing process. Abstracts never contain references and some journals do not allow abbreviations or acronyms.

Manuscript introduction

The aim of the introduction is to introduce the topic to the readership without being overly narrow, that is, assume many readers are not well versed on this topic. You should try and engage interest in both the readers and reviewers from the beginning. Present what is already known about the topic so that this can lead up to the hypothesis that is being tested.

Long introductions are not necessary so aim to be concise (300–400 words and five to six references), with usually only three paragraphs required. The first paragraph presents a general background on the topic, often presenting the aetiology and/or epidemiology of a particular disease (if relevant). The second paragraph discusses the patient population of interest, management and any relevant controversies (briefly), and the third paragraph details the research question, that is, the gap in the literature that your study is addressing. Most importantly, the aim of the study should be explicitly stated here. Authors may elect to use present tense here and past tense when writing the results section.

Acronyms

Acronyms and abbreviations limit the word count for words that are used frequently: for example, head and neck squamous cell carcinoma (HNSCC), radiotherapy (RT) and chemotherapy (CT). An acronym is when an abbreviation forms a word in itself, for example, Trans Tasman Radiation Oncology Group (TROG). Acronyms

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are placed in brackets first and used thereafter in the manuscript. A common mistake is to not continue using an acronym once it is created.

Methods (and materials)

In this section, there needs to be enough detail to allow other investigators to repeat your study. The use of subheadings to document relevant aspects of the study (e.g. patient details, treatment details, tumour details) is very useful. In this section, the eligible study population and time frame of study must be detailed. Use past tense when writing this section. Study design must be stated and if randomised, use the Consolidated Standards of Reporting Trials[9] guidelines, which detail 22 descriptors. Any ethics approval should be documented and include the name of the actual committee.

The statistical analysis should be documented and any statistical software package utilised must be detailed. If the study was only descriptive and reported median/mean and ranges, this should also be stated. Note that results are not presented here and usually no references are required, excepting statistical references.

Results

Present general findings first (how many patients, how old, duration of follow up) and become specific. Using subheadings and paragraphs allows readers to better follow this section. Authors should present raw numbers and percentages with summary statistics, if relevant, accompanied by 95% confidence intervals. If multivariate analysis is undertaken, then variables used in univariate/multivariate models must be stated along with *P*-values, hazard ratios and confidence intervals. Survival analysis and curves are described here but discussed in more depth later, with the actual curves placed at the end of the manuscript as a labelled figure.

Tables

Tables are a useful way to present large amounts of data and it is usual to have at least two to three tables inserted after the reference section, with each table occupying a single page. Tables also allow you to cross tabulate, for example, different types of relapse from different types of treatment. The first table often details the demographics and clinicopathologic data of any study. The data presented in tables should not be overly repeated in the results section. Tables should be stand alone, that is, title and footnote with abbreviations and comments. Tables should be sequentially numbered in the results section, and placed in brackets at the end of a sentence as each is referred to, for example, '(Table 1)'.

Discussion and conclusion

This is the most difficult section to write as it requires the author to interpret (but not over-interpret) his/her results, to formulate a relevant discussion based on these and also discuss the results of other researchers. Retrospective studies are hypothesis generating and therefore clinically and statistically significant results usually require further validation, although this is not always possible. However, do not suggest that the results from one small study are necessarily practice altering. The temptation may also be to launch into a lengthy treatise on the research subject; however, less is often better. There should be no subheadings and usually no direct reference to tables or figures, although data from these can certainly be discussed.

The first paragraph should reiterate important aspects of the topic, with subsequent paragraphs discussing important results (e.g. relapse, survival, important variables). Authors should compare and contrast their results with that of others and discuss important findings from their own study. Any controversies on the research topic should also be presented. Potential weaknesses/biases of the study (e.g. retrospective data, missing data, selection bias, short follow-up) should be discussed, possibly avoiding comment from peer reviewers. Be concise and to the point. Manuscripts are rarely rejected because they are too short; conversely, long and verbose manuscripts may require shortening.

The conclusion is a separate last paragraph, sometimes with a subheading, and should present a concise 'take home' message. It should be confined to several sentences and not a paragraph of rehash. Avoid bland generalisations such as '. . . and we conclude there is a need for further research'. Are there implications for current clinical practice and can you make any recommendations? If there is a need for further research on the topic, be specific about the type of research you suggest and whether you feel this is achievable.

Referencing

This requires the writer to formally cite the work of others as they refer to it. Avoid plagiarism by repeating word for word the work of others. Many journals use the Vancouver system of sequential superscripts as each article is cited with the actual journal is then detailed in full in the reference section. Superscripts are usually placed at the end of a cited sentence or after *et al*. if using the first author's surname, for example, 'Smith *et al*.[1] report on a study they . . .'. In the reference section, the usual convention if there are more than six authors is to list the first three only and use *et al*., for example, Smith A, Brown B, Johnston C *et al*. It is also convention to italicise a *Journal* name and pay attention to different formats for each journal, as there are often subtle format differences when detailing actual references.

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It is polite to acknowledge others who, although not co-authors, may have provided assistance. Examples might include a data manager that helped collect a large amount of data or a senior colleague who proofread multiple drafts of your manuscript and also provided advice. These are placed at the end of the manuscript.

Pre-submission

Authors should anticipate undertaking multiple drafts prior to submission. Plan to delete words and shorten sentences at any opportunity. It is important to save copies of each draft and to read and re-read thoroughly. Initial drafts are best sent to one co-author for comment with final drafts sent to all co-authors with a deadline (i.e. 2 weeks) to be sent back to you with comments/suggestions. It is better to obtain criticism, usually constructive, now rather than at the time of peer review. Authors should aim for an accurate, grammatically error-free and correctly formatted submission. Do not rely entirely on spell check or you will be disappointed. Note also that US journals will prefer American wording, for example, tumor instead of tumour and randomized instead of randomised.

What journal should I send it to?

For a first manuscript, authors should be realistic and consider local journals that are more likely to consider their manuscript and have a local target audience of peers. Many speciality colleges have journals and encourage submissions from its membership, for example, *JMIRO*. In areas of multidisciplinary research, it is also worth considering other colleges' journals, for example, *ANZ J Surg.* Subspecialty journals are alternatives for relevant research, although most are international journals. Of note, not all journals are listed on MEDLINE (*JMIRO* is), and a journal not listed will not be widely accessible to other researchers.

Occasionally, manuscripts that are rejected by local journals are accepted in international journals but the reverse tends to be the case. If resubmitting a rejected manuscript to another journal, take care to correctly reformat for the new journal. Be aware that resubmitted manuscripts sent to another journal may still be sent to the initial reviewer. It is blatantly obvious to editors and reviewers when rejected manuscripts have been sent on to them with little attention to reformatting and revising.

Cover letter

This is an often-neglected aspect of submitting a manuscript. It is important to again read the author guidelines, as certain aspects of the study may need to be detailed, such as what contribution each author made. Aim for a one-page cover letter and address the editor by name. Authors should emphasise important aspects of their research and put forward an argument why the journal should consider their research for publication. A short sentence detailing one or two important findings from the study is useful.

Online submission

You will have to register online prior to commencing the submission process. There are online tutorials available to assist authors. Most sites request the abstract and title page to be entered into separate fields along with the email addresses/affiliations of all co-authors. You will be requested to upload separate files that include the manuscript and the figures and tables. You will receive an acknowledgement email and the manuscript is sent to an editorial assistant to check for correct formatting. Manuscripts that are incorrectly formatted will be returned to the author. Once considered by the editorial office, it will be sent out to peer review and you can track its progress online.

Peer review

The peer review process is an independent and blinded review involving two reviewers that are usually content experts. Following invitation, the manuscript is sent out electronically with a deadline for reviewers to complete within a defined time period (2–4 weeks). Most journals will provide a list of scored criteria for reviewers to apply. Following review, a decision on acceptance, with or without revision, or rejection is made based on the two reviews but may also include input from the editors.

Decision

Many manuscripts are initially rejected outright and others are subsequently accepted after revision (major or minor). If rejected outright, the authors should objectively consider the reasons stated and consider resubmission to another journal. However, it is worth noting the comments/suggestions from the rejected journal as these often relate to the likelihood of acceptance in another journal. Authors who feel unfairly treated by reviewers may approach an editor with their grievances. Editors have the power to rescind a review although this may mean sending your manuscript to another reviewer who may merely concur with the initial review.

If major or minor review is recommended, this does not guarantee acceptance but does provide a reasonable likelihood this will be the case. It is important to appreciate that reviewers' reports may not be as negative as they appear and a list of minor revisions is still a (provisional) success. When resubmitting, authors will be requested to detail clearly each reviewers' comments/

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suggestions and how these have been addressed in the resubmitted manuscript. In cases of major revision, the initial reviewers will be invited again to peer review your manuscript and it is therefore important you take care in responding to their review.

Conclusion

Writing a good quality manuscript is a marriage of art and science. With time and experience, the art of writing will develop. The science of writing requires meticulous detail to the 'nuts and bolts' of developing a manuscript. Attention to detail such as following closely the instruction to authors and thorough proof reading are essential. The ultimate reward will be a first author publication and more importantly, you will have made a contribution to the scientific literature.

References

1. Bydder S, Joseph DJ, Spry NA. Publication rates of abstracts presented at annual scientific meetings: how does the Royal Australian and New Zealand College of Radiologists compare? *Austal Radiol* 2004; **48**: 25–8.
2. Scherer RW, Langenberg P, von Elm E. Full publication of results initially presented in abstracts. *Cochrane Database Syst Rev* 2007; (2): 1–80.
3. Sprague S, Bhandari M, Devereaux PJ *et al*. Barriers to full-text publication following presentation of abstracts at annual orthopaedic meetings. *J Bone Joint Surg* 2003; **85**: 158–63.
4. Bydder S, Packer D, Semmens J. The value of a scientific writing training workshop for radiologists and radiation oncologists. *Australas Radiol* 2006; **50**: 29–32.
5. Bydder S. Ten years of radiation oncology case reports. *J Med Imaging Radiat Oncol* 2008; **52**: 527.
6. Barron J P. The uniform requirements for manuscripts submitted to biomedical journals recommended by the International Committee of Medical Editors. *Chest* 2006; **129**: 1098–9.
7. Vandenbroucke JP, von Elm E, Altman D *et al*. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *Ann Intern Med* 2007; **147**: 573–7.
8. Gebski V J, Keech AC. Statistical methods in clinical trials. *MJA* 2003; **178**: 182–4.
9. Rennie D. CONSORT revised-improving the reporting of randomised trials. *JAMA* 2001; **285**: 2006–7.

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