

## Research: From idea to publication

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We present a fifteen-step process to assist in taking an idea to a research publication. This process ensures that evidence-based medicine practice is followed to prevent redundant research questions. The steps are the following: Step 1 – Identify broad research ideas with a potentially ‘weak’ evidence base, rather than starting with a specific research question. Step 2 – Identify the knowledge gap within the intended field of research by examining the background literature. Step 3 – Focus on the ‘foreground knowledge’ to frame a potential research question. Step 4 – Conduct a comprehensive literature search, to determine whether the question has been asked before, and if so, if the research was robust. Step 5 – Write a study one-page summary which provides a succinct summary of what you intend to do. Step 6 – Learn how to pitch your research idea. Step 7 – Write the protocol. The rigid process of protocol writing will ensure that a number of important practical study issues are dealt with timeously. Step 8 – Discuss the protocol with experts. Their input will make your protocol more robust. Step 9 – Consider the data points, statistical analysis plan and a potential process evaluation. This will ensure no data redundancy which often compromises research projects in resource-limited environments. Step 10 – Make a ‘social contract’ committing oneself publicly to the project. Step 11 – Write a grant application. This allows identification of funding priorities of potential grant funding agencies, thereby allowing the researcher to frame their research in such a manner to hopefully ensure the financial support necessary for the success of the project. Step 12 – Ensure that the research protocol is publicly visible, which increases the integrity of the project. Step 13 – Conduct the research, which requires education, communication and steering committee meetings to ensure early identification of study conduct problems. Step 14 – Analyse the data according to the statistical analysis plan. Step 15 – Write a good manuscript.

**Keywords:** research, publishing, publications

### Introduction

This is an update of the work we originally published in 2014.<sup>1</sup> It is necessary to update, based on our subsequent successes and failures which have provided much learning for future publication success.

Research is integral to specialist training. The MMed is a requirement for specialist registration, although whether this is appropriate is questionable.<sup>2</sup> However, having a thorough knowledge of research methods and processes is essential to ensure that you can practice evidence-based medicine. An approach to produce high quality research even by first-time researchers is important, as we: i) do not want to waste our limited research resources;<sup>3</sup> ii) do not want to increase the burden of false evidence;<sup>4</sup> and iii) would like our research outputs to contribute to building evidence towards the ‘truth’. Finally, understanding the research principles and process allows us to understand both the strengths and limitations of published research. These updated notes on how to take an idea to a publication continue to focus on pragmatic research necessary in our resource-limited environment.<sup>5</sup>

A researcher should not conduct research for the sake of research alone, but rather with the intention of contributing to the greater body of existing knowledge. We believe that robust

investigator-initiated and investigator-led research is necessary to drive evidence-based practice in medicine.

### Fifteen suggested steps to take an idea to a publication

In this review, we present a fifteen-step process (Table I), focussed on the ‘first-time researcher’, although we believe the principles are relevant for all researchers in our environment. Importantly, for anyone with aspirations of developing a research career, it is important to realise that all good research is dependent on successful collaborations with colleagues from various disciplines.

#### Step 1 – Start with a broad idea

Most ideas start as general, nonspecific concepts or involve a broad area of interest, as opposed to a specific research question. The broad idea usually provides the setting in which the research will be conducted, but not the specifics of the research. For example, a potential investigator may express the desire to conduct research in vascular anaesthesia rather than starting with a specific question, such as: ‘Should all vascular surgical patients have angiotensin receptor blockers withdrawn prior to surgery to prevent major adverse cardiac events within 30 days of surgery?’

**Table 1:** The fifteen steps to a successful research publication

Step	First-time researcher	Researcher with longer-term research aspirations
1. Start with an idea	Do what interests you.	Take a proactive approach to idea generation. Aim to 'link' research ideas to create long-term research agendas.
2. Identify the 'knowledge gap'	1. Read narrative reviews. 2. Read with a critical frame of mind.	1. Write a narrative or scoping review. 2. Actively develop critical reading skills.
3. Frame a potential research question	1. FINER potential question screening. 2. Write a PICOT research question. 3. Ensure the question addresses patient care, or the underlying mechanisms of physiology, biology or pharmacology.	1. FINER potential question screening. 2. Write a PICOT research question. 3. Ensure the question addresses patient care, or the underlying mechanisms of physiology, biology or pharmacology.
4. Ensure your question has not been asked before	Look for meta-analyses.	Conduct a meta-analysis.
5. Write a one-page summary	-	-
6. Learn how to pitch your idea	If you can't pitch your research, then there is a problem with the proposed study.	Pitch your idea to recruit collaborators.
7. Write a protocol	Consider using similar published studies as templates.	1. Consider using similar published studies as templates. 2. Use EQUATOR checklists.
8. Discuss the protocol with experts	Experts will help you improve the protocol.	Build relationships with experts. Use their knowledge to develop your skills and understanding of relevant issues.
9. Data points, statistical analysis plan and process evaluation	Ensure all data points are accounted for in the statistical analysis plan.	1. Ensure all data points are accounted for in the statistical analysis plan. 2. Include a process evaluation in complex interventions.
10. Make a social contract	Make a public declaration of your research intentions.	Make a public declaration of your research intentions.
11. Write a grant application	-	This provides an insight into the funding priorities of potential funding agencies.
12. Ensure the protocol is publicly visible	Register the study and load the protocol and statistical analysis plan publicly.	Register the study and load the protocol and statistical analysis plan publicly.
13. Conduct the research	1. Provide educational material. 2. Communicate timeously and efficiently. 3. Track study progress proactively.	1. Provide educational material. 2. Communicate timeously and efficiently. 3. Track study progress proactively. 4. Never repeat a study design flaw in a future research project.
14. Analyse the data	Work according to a statistical analysis plan.	1. Work according to a statistical analysis plan. 2. Post hoc analyses should be clearly described in the methods, and ideally presented in appendices.
15. Write a good manuscript	1. Choose an appropriate journal. 2. Follow the journal guidelines. 3. Write according to the reporting guidelines. 4. Write to a message. 5. Always communicate respectfully.	1. Choose an appropriate journal. 2. Follow the journal guidelines. 3. Write according to the reporting guidelines. 4. Write to a message. 5. Always communicate respectfully.

While research ideas may occur to anyone, a proactive approach to idea generation is recommended for individuals interested in research. Research ideas can be generated from a number of different areas. Observing your own practice may identify anomalies or personal quandaries regarding appropriate patient management. Observing the practice of colleagues will further identify differences in opinion and management. Discussion with colleagues may identify unsubstantiated generalisations, opinions and reasonable concerns. Discussing your own practice with colleagues who are involved in different subspecialties, or discussions with colleagues from different geographical backgrounds or institutions (such as at congresses), often reveals a different perspective on relevant issues. Attending

poster sessions at congresses has the potential to alert you to areas of considerable interest and clinical uncertainty. For the researcher with longer-term research aspirations, these proactive approaches to idea generation may identify broad areas with a 'weak' evidence base. Furthermore, it is essential to consider whether these areas have a longer-term research potential. Potential research ideas which systematically address weak areas in a field are desirable and may contribute to the creation of a research agenda.

### **Step 2 – Identify the knowledge gap**

In order to understand what potential questions may exist within a field or setting, it is important to understand the 'background

knowledge' within the field of the intended research.<sup>6</sup> This is done to identify potential 'gaps' within the knowledge or evidence-based practice<sup>7</sup> related to the field of the idea. Undertaking this step can be daunting and it is best to do this in a structured and logical manner. For the first-time researcher, reading narrative reviews around the potential broad idea is essential. For researchers with longer-term ambitions, writing a critical narrative review or scoping review of the literature within the field will be very rewarding. This allows you to personally identify areas: i) which have not been examined critically; ii) where the evidence (or even literature) is silent; or iii) where there is equipoise regarding possible therapeutic interventions. It is also possible that a 'junior' reviewer may be more likely to give an accurate summary of the evidence than an older, more senior (and potentially biased) reviewer of current controversies.

Although a narrative review provides the researcher with background knowledge to a research field and is invaluable in identifying 'knowledge gaps', it is important that the researcher be aware that these narrative reviews are prone to bias. Keep in mind that if something has not been formally and rigorously tested, then any comment on the efficacy of the intervention must be seen as potentially biased. As an example: in the perioperative literature, the assertion is made that acute perioperative beta-blockade, started many weeks before surgery, is associated with less perioperative hypotension and therefore stroke, as compared to starting beta-blockers on the day of surgery. In reality, this has not been tested, is potentially biased, and could be a reasonable research question.

For the researcher with long-term research aspirations, it is important to learn how to read the literature objectively. There are some excellent, simple books on this topic.<sup>6,9</sup> This skill makes it easier to identify limitations of current studies and the 'background knowledge', which would allow for the identification of further research ideas. The resources available at <https://www.equator-network.org/> provide the current reporting standards for any health research design. In addition, conducting a critical review will ensure that resources are not wasted on redundant research, and that the question being asked is relevant to the field of research.

### **Step 3 – Focus on the 'foreground knowledge' to frame a potential research question**

Once a 'knowledge gap' has been identified by examining the 'background knowledge', it is then appropriate to phrase a potential research question. Posing a question which will potentially result in the generation of new clinical knowledge identifies the clinician as now working within the realms of 'foreground knowledge'<sup>6</sup> within a field. When considering potential 'foreground questions', use the FINER (feasible, interesting, novel, ethical and relevant) screening tool to determine whether it is worth pursuing this research question.<sup>10</sup>

If the FINER tool suggests that it is acceptable to pursue the potential research question, the question should be framed using the PICOT format (population, intervention, comparison,

outcome and time).<sup>10</sup> This question framework ensures the development of a detailed and specific research question. Spending time to understand what is meant by each of the PICOT components will ensure that the question is specific, with well-defined boundaries, which will leave little room for ambiguity about the intentions of the research.

Steve Shafer has wisely suggested that there are two categories of good research questions; those where the answer will improve patient care, and those where the answer will explain an important mechanism of physiology, biology, or pharmacology.

### **Step 4 – Determine if the proposed 'foreground question' has been asked before**

The 'foreground' PICOT question can now be used to identify whether any data exists on the proposed research question. Components of the PICOT question can now be used as MeSH (Medical Subject Headings) terms for a comprehensive literature search. The researcher should specifically attempt to identify the following potential publications on the proposed question in descending order of priority: meta-analyses, clinical trials, and then reviews. Identification of published meta-analyses on the proposed topic is a key process for the first-time researcher. For the aspiring career researcher, if a meta-analysis on the topic does not exist, this presents the opportunity to conduct a meta-analysis prior to embarking on the research project. In order to do this, the researcher needs to identify appropriate studies or trials. We would strongly encourage engaging a librarian to assist with the formal literature search. If a systematic review or meta-analysis is to be conducted, then this should be prospectively registered on PROSPERO (<https://www.crd.york.ac.uk/prospéro/>).

The role of identifying or conducting meta-analyses on the proposed research is to confirm either that there is equipoise regarding the proposed research, or that the data do not currently exist. Either of these findings would suggest that the proposed study would be appropriate. Conducting a meta-analysis, allows for the opportunity to work collaboratively with others who may be keen collaborators in the field, and provide a network for future work in the field.

Finally, should a meta-analysis exist which is similar to the proposed research, it is still possible that attempting to answer the research question may be potentially valid, especially if the studies are of low quality, or the meta-analysis is of low quality. The validity of the meta-analysis should be evaluated using the 'External validation of a measurement tool to assess systematic reviews' or AMSTAR-2 recommendations.<sup>11</sup> The AMSTAR-2 tool assesses 16 factors which examine the validity of a systematic review. These include: i) whether the research questions and inclusion criteria included PICO components; ii) that the review methods were established prior to the conduct of the review and report deviations from the review protocol; iii) an explanation of the selection of study designs; iv) a comprehensive literature search strategy; v) study selection in duplicate; vi) data extraction in duplicate; vii) provision of a list of excluded studies and justification of the exclusions; viii) a description of

the included studies in adequate detail; ix) an assessment of the risk of bias of individual studies; x) sources of funding for the studies included in the review; xi) appropriate methods for statistical combination of results; xii) assessment of the potential impact of risk of bias (RoB) in individual studies on the results of the meta-analysis; xiii) accounting for RoB in primary studies when interpreting/discussing the results of the review; xiv) explanation for any heterogeneity observed; xv) investigation of publication bias (small study bias); and xvi) a report by authors of any potential sources of conflict of interest.<sup>11</sup>

Data from meta-analyses may aid the researcher in understanding the potential research question. This would then provide an opportunity to refine the PICOT question, while simultaneously providing an evidence base for the question to be tested.<sup>7</sup>

### Step 5 – Write a one-page summary of the proposed study

Writing a one-page summary provides an opportunity to make a succinct statement of intent. It is an opportunity to present a clear précis of the proposed research. It should specifically cover: i) the background to the study; ii) the study objectives; iii) the preparatory work that has been done; iv) the proposed study design; and v) the reasons for the importance of this research. This one-page summary can be used to 'advertise' the research project, either through a basic education of colleagues about the research, or to 'whet the appetite' of desirable potential collaborators.

### Step 6 – Learn how to pitch your idea

Ideally, you should be able to present an 'elevator pitch' of your proposed research. Within 30 seconds, you should be able to state the following points simply and clearly about your proposed research: i) why there is a real and important problem; ii) that your research adds substantially to what we already know; iii) that it is pragmatic; iv) that it includes outcomes that matter; v) that the intervention is 'value for money'; vi) that the intervention matters; and vii) that the data will be available and verifiable.<sup>12</sup> If you can't do this, then there is a problem with your study. The problem may be because you need to build your background knowledge further, or your research idea is good, but the research study foundations are poor. You will need to address these issues urgently before continuing. Whether your question is to improve patient care and/or to elucidate fundamental mechanisms, we believe the research approach should be pragmatic, focussing on a simple, clear strategy, without an unnecessary drain on resources, in order to answer the question.

### Step 7 – Write the protocol

By writing a protocol, the investigator moves through a number of important processes. First and foremost, the researcher takes ownership of the study. This is important, as it creates a personal imperative to ensure the success of the project.

Furthermore, the rigidity of the protocol process means that a number of important issues have to be dealt with timeously.

These include: i) the aims and objectives; ii) the study design; iii) inclusion and exclusion criteria; iv) planned interventions or procedures; v) ethical considerations; vi) powering and sample size; and vii) statistical analyses. It is useful to go back to your literature review at this time in order to identify other studies which may be similar to your proposed study. Such studies provide valuable information on a number of these important protocol considerations. The basic structure of a research protocol is shown in Table II. In South Africa, we often still differentiate between study 'aims' and 'objectives'. An aim is what you 'hope to achieve in your research project' and objectives are the 'actions you need to do in order to achieve your aims'.<sup>13</sup>

Remember that the basic study designs are usually easily determined by the proposed research question (Table III).<sup>13</sup> In order to ensure that you have a robust protocol, there are three strategies to improve the chance of success. Firstly, look at the study designs of published studies of work that is similar to what you plan to do. This may help with understanding the basic study design. Secondly, if you know people who have successfully obtained ethical approval for similar protocol designs, it is useful to discuss and view these submissions. They will enable you to understand the potential ethical concerns prior to submission, so that you are able to comprehensively address these prior to submission. Thirdly, it is important to consider the checklists for publication of the various study designs which are all available on the EQUATOR webpage (<https://www.equator-network.org/>). This will ensure that you do not have a glaring omission in the

**Table II:** The basic structure of a good research protocol

1.	Introduction
2.	Background and rationale
3.	Aims and objectives
4.	Methods
4.1	Design
4.2	Study outcomes
4.3	Definitions of study outcomes
4.4	Eligibility criteria
4.4.1	Inclusion criteria
4.4.2	Exclusion criteria
4.5	Outcome assessment
4.6	Follow-up and data collection
5.	Statistical methods
5.1	Sample size, statistical power and variable selection
5.2	Statistical analysis plan
6.	Methodological challenges
6.1	Selection bias
6.2	Loss to follow-up
7.	Ethics
8.	Feasibility
8.1	Recruitment
8.2	Study team
8.3	Participating centres
8.4	Study funding and progress
9.	Study organisation and ensuring data quality
9.1	Organisation and management
9.2	Investigator responsibilities
9.3	Central coordination
9.4	Ethical considerations
9.5	Ensuring data quality
9.6	Data monitoring and safety board
10.	Study significance

**Table III:** The research question and the study design<sup>13</sup>

Research	Question	Study design
Observational-descriptive	Prevalence	Cross-sectional
	Incidence	Cohort
Observational-analytical	Prevalence (rare)	Case-control
	Prevalence (common)	Cross-sectional
	Incidence	Cohort
Interventional/experimental		Randomised controlled trial

protocol, which will later compromise the ability to publish the research.

### **Step 8 – Discuss the protocol**

It is important to discuss the protocol with experts in fields allied to your study. For example, this may include cardiology or haematology in a study of perioperative cardiovascular outcomes. It is useful to present your protocol and your argument for the need for the proposed study. This provides a unique opportunity to view your protocol through the eyes of others. They will identify areas where your explanation is poor, where you are being misinterpreted, and where you have made mistakes or errors in your interpretation or presentation of salient issues. Finally, it provides an opportunity to develop your understanding of the equipoise in the research question, a crucial part of the future success of your research project.

Discussion will also provide some insight into how other ‘experts’ have managed potentially similar projects. This will help in determining the feasibility of the proposed research design and the methods employed.<sup>7</sup> We have found that discussing projects which are still in the early design phase in an open forum with senior researchers can be beneficial. These meetings highlight potential study-destroying limitations, which can be addressed early, or the project abandoned if it is not considered remediable.

For developing researchers, these personal interactions provide the opportunity to build relationships vital to the successful implementation and completion of research endeavours. These individuals provide access to relevant skills and knowledge. For example, it is particularly beneficial to develop a working relationship with a biostatistician.<sup>7</sup> Asking questions and trying to repeat the analyses oneself develops a competence going forward. Simple biostatistics are not difficult, as there are currently a number of relatively easy-to-use statistics packages. We have found a simple statistical text to be invaluable in navigating easy statistical problems. What is more important is the knowledge of the appropriate statistical analysis that is required, and it is here that close interaction with a biostatistician will provide invaluable insight. Involving a biostatistician in the design phase is therefore essential, as they will provide guidance on sample size, power, the type of analyses needed, and hence the type of variables that need to be collected.

In summary, consultation with experts will help in making your research project more robust. High quality researchers improve

research productivity,<sup>14</sup> and consultation with experts indirectly ‘recruits’ quality researchers into the development of your project.

### **Step 9 – Data points, the statistical analysis plan and process evaluation**

An important principle is to never collect redundant data, because ‘it would be nice to have’. The hardest part of any research project is data collection. One way to break any team is to have unnecessary data points to collect. Every data point should be used in the study analysis and publication. Writing the statistical analysis plan early is therefore essential, as the statistical analysis plan can account for the use of each data point needed for: i) Table I, which is the study demographics table; ii) the primary outcome; iii) subgroup or sensitivity analyses for the primary outcome; and iv) secondary outcomes. We would strongly encourage including some simple process evaluation data in the data collection sheet, when evaluating a complex intervention within a pragmatic randomised trial.<sup>15</sup> Complex interventions are subject to factors which may impact upon intervention fidelity, and it is the understanding of the dose and reach of an intervention, and how the intervention was delivered, that is necessary to properly interpret the main trial outcome.<sup>15</sup> This would allow an understanding of the study findings, particularly if it failed to achieve the primary outcome.<sup>15,16</sup>

### **Step 10 – Make a social contract**

At this point it is important to tell people what you intend to do. This social contract equates to a public declaration of your research intentions, and it provides a catalyst to personal commitment to the project. It is here that the elevator pitch is important.

### **Step 11 – Write a grant application**

Research success and productivity has been associated with grant funding.<sup>17-19</sup> Indeed, this association appears to be correlated with both the number of successful grant applications and the financial value of these grants.<sup>20</sup> Therefore, for the researcher with longer-term aspirations, it is now desirable to write a grant application. This is an important step, as it provides an insight into the funding priorities of different grant funding agencies. A clear understanding of these funding priorities will allow the researcher to frame their research in such a manner as to address the funding priorities of legitimate grant funding

bodies, such as universities, the Medical Research Council and the National Research Foundation, and thereby hopefully secure long-term access to funding streams.

### **Step 12 – Ensure that the research protocol is publicly visible**

For research to be considered robust, it needs to have visible, public integrity. This involves putting as much of the protocol in the public domain as soon as possible, preferably prior to conducting the research. This includes: i) registration of the study and loading the protocol on a registry such as <https://clinicaltrials.gov/>; ii) publishing the protocol in a methodology journal; and iii) loading the statistical analysis plan on the registry or including it in the published protocol.

These activities ensure that the public can verify: i) that the primary outcome was not changed during the course of the study; ii) the definition of clinical importance for an intervention; iii) and the statistical analysis plan for the primary outcome was not altered, and it included *a priori*, the proposed subgroup analysis (for potential differences in efficacy), and sensitivity analyses (to confirm the robustness and consistency of findings). If these boxes are ticked, the ability to publish in a high impact journal is possible.

### **Step 13 – Conduct the research**

To conduct research, a good research team is needed. The team needs education about the study. Simple study educational material is therefore important. Presented in a short slide set, and shared with sites, allows local site leaders to edit for local site relevance and education.

Furthermore, teams need a means of rapid communication, in order to address ethics, regulatory and other hurdles timeously. We have found respectful use of WhatsApp groups to be most beneficial. Developing frequently asked questions (FAQs) in responding to queries is useful, as these can be rapidly shared, with minor editing with other sites if necessary. Regular study meetings by the steering committee are necessary, where focussing on site performance and data completeness, may assist in early identification of difficulties a site may be experiencing. This ensures early proactive intervention by study leadership.

With these systems in place, it will allow you to focus on the quality of the data. Any study is only as good as the quality of the data. It is important that data are submitted timeously to ensure data quality. Missing data that are retrieved retrospectively are often of a lower quality, and ultimately incomplete.

Finally, don't beat yourself up if you realise afterwards that the study could have been conducted better. This invariably happens, so rather ensure that you do not repeat the same mistakes in your next project. That would be unforgivable.

### **Step 14 – Analysing the data**

Analyse the data strictly according to the statistical analysis plan. Remember you want to show that: i) your work is transparent and consistent with your original protocol and statistical analysis plan; and ii) that your work is robust. If you find any weaknesses in your analysis and results, it is acceptable to add a post hoc analysis to explain these limitations. This post hoc analysis must be stated clearly in the methods, and presented clearly in the appendices.

### **Step 15 – Write a good manuscript**

In writing the paper, your first decision is to choose your journal appropriately. You need to put your best foot forward. Remember that journal editors are busy, and most reviewers are reviewing your manuscript in their own time with no reward. Therefore, you need to ensure that the paper is consistent with the vision and ethos of the journal, and the editors. The manuscript must follow the manuscript guidelines (which are always available online), and avoid irritating formatting, spacing, spelling and grammatical errors. To the editor and reviewers these errors come across as sloppy and unprofessional, and subconsciously negatively affect the perception of the quality of your research conduct.

Once you have chosen your journal, you need to write your paper according to the EQUATOR reporting guidelines (<https://www.equator-network.org/>) applicable to your study design. We find it easiest to paste each reporting requirement into the manuscript as subheadings. This allows us to write according to the guidelines, and specifically address each point. It is also important to include the reporting checklist, as an appendix in the submission.

You need to write a manuscript with a message. If you cannot describe your message clearly, your writing will probably fail. A message is a single sentence which contains a verb, and it is not your objective or your title. Often presenting and explaining sensitivity analyses, subgroup analyses and secondary outcomes detract from the message of the manuscript. Any result which detracts from the message, should preferably be included in the appendix. Hopefully a simple statement in the manuscript results, to the effect that '*the sensitivity and subgroup analyses were consistent with the findings of the primary outcome*' means that the reader is not confused by all the analyses, and does not lose sight of the main message, while all the data remains freely available. The second thing a manuscript requires is an excellent abstract, as this is probably all that most editors will read before considering to reject a paper outright.

Writing the paper requires attention to each section. For the title, follow the reporting guideline. Please note that the title is not 'the message' of the paper. The introduction should be short with three paragraphs: i) what we know; ii) what we don't know; and iii) what we hope to answer with this study. The methods should nearly replicate the protocol, and statistical analysis plan, and the results should follow the statistical

analysis plan. Remember the results should be reported without interpretation. Do not use adjectives in the results, e.g. 'highly' significant. The discussion should follow the principles laid out by Docherty and Smith.<sup>21</sup> This structure follows: i) a statement of principal findings; ii) strengths and weaknesses of the study; iii) strengths and weaknesses in relation to other studies, which also addresses any differences in results between studies; iv) the implication of the study for clinicians or policymakers; and v) a description of what the remaining unanswered questions are, and the implications for the future research. Avoid inappropriate claims, and don't overplay the data or findings. Finally, ensure that all disclosures are declared.

The cover letter to the editor is important. It should not be a hard sell. It should help the editor navigate your paper, by presenting your message and its potential novelty, context, and relevance. It should also flag any conflicts of interest. An ideal cover letter should have three paragraphs: i) what you found; ii) why it matters; and iii) why it is relevant to this journal. Editors consider the importance and originality of the work, the relevance to their audience, an assessment of the likelihood that it is 'true', the excitement factor, and whether it is clearly written.

During the submission process, if there is an option for an open access preprint, we would suggest in most instances accepting the open access preprint will provide more positives for the paper than negatives. The number of downloads will inform the interest in the paper, and may provide leverage when describing the interest in the paper. Furthermore, comments will provide a free critical review, which may help in further revisions, or submissions to other journals.

Finally, if the editor requests revisions for your paper, they have essentially opened the door for publication. You must push through. You will need a revisions rebuttal letter, which addresses each query, and includes all text revisions shown in red font. Do not take any query personally, and always respond respectfully.

### Supervisors and mentors

While this paper has focussed on the process of taking an idea to publication, the importance of a young researcher working with a mentor or supervisor cannot be overestimated. Senior researchers generally have a vast knowledge of the background and are able to rapidly provide insights about the relevance and feasibility of your research question. In addition, they are able to assist with study design aspects, statistical insight, and accessing research infrastructure. For the first-time researcher a research supervisor is able to adequately fulfil this role, but someone with long-term research aspirations should seek out a mentor with whom they can develop a stronger relationship, and ultimately become a colleague.

### Conclusion

It is hoped that following these fifteen steps will provide aspiring researchers with the tools necessary to initiate meaningful

research within South Africa. To do this, you need to be thorough and diligent during the process of setting up a research project. If you do this, and your study question is focussed on improving patient care, or understanding the underlying mechanisms of physiology, biology or pharmacology, you will be successful.

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