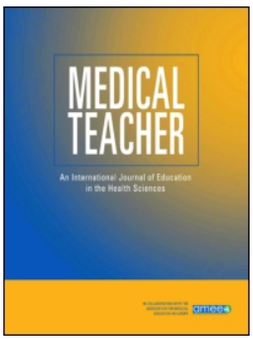

Medical Teacher

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/imte20

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To cite this article: Rajaei K Sharma & Harriet L Ogle (2021): Twelve tips for students who wish to write and publish, Medical Teacher, DOI: 10.1080/0142159X.2021.1908977

To link to this article: https://doi.org/10.1080/0142159X.2021.1908977

Published online: 09 Apr 2021.

MEDICAL TEACHER
https://doi.org/10.1080/0142159X.2021.1908977

MEDICAL TEACHER
Taylor & Francis
Taylor & Francis Group

TWELVE TIPS

Twelve tips for students who wish to write and publish

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ABSTRACT

Stepping into the world of research can be an overwhelming task, especially for those with relatively little experience, such as medical students. This article aims to provide students with tips for writing and publishing in all fields. The 12 tips are as follows: (1) find your why; (2) play to your strengths and be realistic; (3) be well read; (4) revisit missed opportunities; (5) talk to the doctors around you; (6) broaden your horizons; (7) get to grips with the submission process early; (8) pay attention to the details; (9) remember that submission is not the end; (10) the process can't be rushed; (11) consider the alternative paths to presenting research; (12) start writing. This writing is derived from personal experience with supporting evidence and is not designed to be encyclopaedic, simply a reference to help students alleviate any concerns and begin their own journey into the world of research.

KEYWORDS

International medical education; medical education research; undergraduate

Introduction

These 12 tips are written for medical students as an introduction to the world of research and publishing. They aim to clear up many of the inaccurate assumptions of how difficult publishing is and provide a clear guide for students to begin their own writing journeys. Although motivation is universally high amongst the student cohort, we know that barriers such as a lack of mentorship mean few are successful in publishing their work (Bonilla-Escobar et al. 2017). Largely derived from personal experience, these tips will demonstrate how many of those barriers can be overcome in order to produce high quality works that are not simply fulfilling a checkbox, but are informative, interesting and positive overall experiences. At times we use examples of medical practice and guidelines from specific countries such as the US or UK, but all of these tips are designed to be applicable in any setting.

Tip 1

Find your why

There are many different reasons for students to get involved with research. Learning about research and developing the associated skills of critical appraisal and writing are all skills thought to result in better doctors across the workforce (Cheung 2018). Evidence-based medicine means that these are vital skills, and it has long been thought that the habits should be learned from early on, at medical school (Hanratty and Lawlor 1999).

It is important to underscore the value of research and publications at every level of a medical career. This is not a venture or a learning opportunity that will be short lived. At every stage in your career, dedication and involvement with research is desired; for some positions it is essential. This work also goes beyond the country or healthcare system of origin - research and publications have global reach and relevance in healthcare. The benefits of early involvement will be realised at every stage of your career and will likely be hugely influential in your path (Amgad et al. 2015).

Unfortunately, research output has become a measurable achievement and so the most obvious reason many students begin to consider research is of course portfolio building. Globally, job applications from the very first residency or junior doctor post through to attending physician or consultant posts often have a specific section for the applicant to demonstrate work they have published. A new development in the UK means that the additional points gained for having publications will shortly be removed from the first job applications (Tonkin 2020). This is likely a recognition of the unintended consequences attributing points to extra-curricular achievements can have and we hope that it will reduce pressure on students, allowing them to explore research from a purely interest and enjoyment driven basis.

We are not by any means downplaying the importance of portfolio building and achievement, simply bringing attention to the innumerable other benefits and (potentially greater) motivational factors! Aside from professional development, we believe that there are a huge number of other reasons to begin to publish early on. These reasons can range from passion about a certain theme or inspiration from a clinical placement through to raising an important query from some journal reading. Any reason can be reason enough, but being mindful of your own personal drivers will only help to improve your efforts. In finding your why, you will have a base upon which to build an entire knowledge bank over time.

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This article has been corrected with minor changes. These changes do not impact the academic content of the article.

Tip 2

Play to your strengths and be realistic

A little bit of thought and planning at this stage will create a much friendlier introduction to research. Take a little time to reflect and think about the skills or interests you have that may translate into research work. This could be an old fondness of maths and statistics, strong analytical skills or even an innate passion for any particular field of medicine.

The medical student viewpoint is one that we will all experience for a finite time, however it is incredibly important and influential. This is especially relevant for the field of research focusing on medical education, academic medicine. Huge proportions of the literature are focused on improving outcomes for students – goals that are inconsequential without the students themselves.

Later we will come to types of work and types of opportunities that may arise, but we should be mindful of the numerable benefits to starting writing during medical school as opposed to during the training years of being a doctor. Medicine is an academically intense degree so you must be honest and aware of your limitations, but you are unlikely to ever have as much free time in your career, at least in training. Also, we've discussed the relevance of the student perspective in research, but it is just as pertinent in all other aspects of research and project work. Bringing a fresh and unbiased point of view can positively influence all sorts of decisions from the direction of a project through to more realistic goal setting and even maximising cost/time efficacy. Always consider the positives that your student perspective can bring.

Tip 3

Be well read

In order to produce research, you have to read research. This should not be a chore! There are thousands of medical journals to choose from. If you have already started to consider what you personally may enjoy, have a look around! There is much more out there than you may realise; university-provided access means that the amount of research available at your fingertips is astonishing.

Now that you are finding and reading papers of interest, be analytical. These are skills that are easily developed but only with practice. We will come to it in detail later, but perhaps pay special attention to letters written in response to articles and consider the purpose they serve.

In turn, reading leads to discussion. The very definition of a discussion is the process of talking about something to reach a decision or exchange ideas. From any one discussion as a medical student, you may well be able to come up with a dozen research questions for medical education. On your first reading of a new paper, you may have lots of questions to pose to the authors. Instead of addressing all of these, a simple conversation with a colleague is an easy way to identify which of these questions is actually the most important. Many medical schools and hospitals have journal clubs that meet specifically for this reason - to discuss the latest literature. Attending a journal club does not only open up discussion about literature, but it can also be a great environment to develop skills essential for research including the ability to critically appraise articles (McLeod et al. 2010).

Tip 4

Revisit missed opportunities

Across the world, there is an increasing emphasis on the role of research in medical education. One example of this is some American universities now have guided modules covering all aspects of research from developing the research plan through to ethics approval, completion, and presentation (Kramer 2005). In other countries, such as the UK and Australia, medical schools are expected to encourage student participation in research, but it is not mandatory. They do, however, need to equip students with the skills to navigate the world of research and critically appraise evidence presented to them in order to become safe doctors (AMC 2015; GMC 2015). In the UK, student selected components are the way in which teaching about research is incorporated into the curriculum (Murdoch-Eaton et al. 2004), however, these are utilised in very different ways across medical schools and evidence shows that they can lead to disheartened or disillusioned student experiences (Murphy et al. 2008).

No matter where you are based and how research is incorporated into your curriculum, some aspects of the course can be easy to overlook or view as a tick-box exercise, so your first thought now should be 'did I get everything I could out of that project?'. Given the range of medical journals, any well written and up to date piece of work is likely to have a worthwhile target journal, if only with a little bit of tweaking. Have you already constructed your first publication? Is it worth sending an email to a supervisor to explore further?

Many of the avenues available to students and ways of improving participation in research have been detailed in Mabvuure's twelve tips article from 2012. This is highly recommended for all students exploring the different possibilities, as well as for educators looking to increase student engagement in this field (Mabvuure 2012).

If you have further SSCs or research modules in the future, publication opportunity should be a factor in your decision-making. A common misnomer is that one has to do an entire research project and write everything themselves in order to be successful. In reality, most research publications are comprised of many separate parts that all need to come together. In line with playing to strengths, you may in fact be well suited to carrying out a thorough literature review or even the statistical analysis of a project which several other parties will also contribute to (Alexander 2020). It may even be that some original research has been completed but no one has yet had the chance to analyse the data and write it up as an article. These are all common situations that present to medical students in their SSC blocks; being able to recognise the opportunity is key (Riley et al. 2009).

Such opportunities are not confined to SSCs and research modules, an intercalated degree could be the first real exposure to research. This could be a great time to delve into the world of research further. It is always worth questioning whether the essays you write are relevant for

the wider research community and whether there are researchers who you can work with beyond the scope of your chosen degree.

Tip 5

Talk to the doctors around you

As a medical student, you are meeting new doctors all the time! Has there been a single one that you have had a great experience with? Has there been a lecturer (many of whom dabble in research too) who is particularly approachable or in a specialty that you love? This should not be restricted to the most senior specialists. As soon as they qualify, doctors are undertaking all sorts of research from audits through to meta-analyses. In the UK, the GMC dictates that foundation year doctors must have 'knowledge of the theory of an audit and be able to explain how to contribute to an audit' as a part of maintaining good practice (GMC 2015). In your clinical years, you will undoubtedly meet junior doctors who will be undertaking audits. You can be sure they would appreciate your help!

The UK is not alone in its emphasis on the role of audits in training, quality improvement training is mandated for medical students in the US. This continues throughout their careers with mandatory completion of a practical improvement module that requires recertification every six to ten years depending on specialty (The Health Foundation 2012). Therefore, no matter where you are training, getting an understanding of these processes early on can only be to your benefit.

Opportunities lead to opportunities; think twice before ignoring the chance to get involved in an audit or research because it does not lead to an instantaneous publication. Working as part of a team has been shown to be more fruitful for medical students (Cheung 2018) and, as mentioned previously, these are skills that will serve you throughout your career. A small audit for presentation at a weekly specialty team meeting could easily lead to more lessons learned and, in turn, this may lead to more research opportunities than you may initially believe.

Having clinical role models to interact with and learn from is also known to have positive implications for career development (Wright et al. 1997). Often considered for professional development, but perhaps less so for educational development, seeking a mentor to guide you through these ventures can sometimes be of great long-term benefit. Becoming part of a team may not only expose you to further opportunities, but the likely learning outcomes would be immeasurable. Developing these professional relationships will undoubtably be of huge benefit beyond just research and publishing.

Tip 6

Broaden your horizons

When approaching publishing for the first time, it is easy to become solely focused on research papers and ways in which to participate with teams of researchers or large projects. In reality, this is only one aspect of medical literature and by delving into the word of research and becoming more well-read (as described in tip 3), the variety of publications and types of writing will quickly become apparent. In broad terms, this range includes original research, review articles, clinical trials, clinical case studies, and opinion pieces. As alluded to previously, the 'opinion pieces' areas of literature including perspectives, commentaries and letters can be an ideal place to begin as a student. It means that work can be done individually or with a small team and is often quicker to action (relative to large works). It also enables critical analysis to be demonstrated in a public forum; there isn't a better way to develop these skills!

Many students can become exposed to research in SSCs or dedicated research modules throughout the course (as mentioned in tip 4); if you wish to publish a piece of work created in these blocks, review articles or even original research may be ideal depending on the type of project you are doing. Majumder has written a great series on the types of articles and comparing the different formats – a great read for students planning their approach to publishing and deciding how to devote their time (Majumder 2015).

It's also very easy to become overwhelmed by the task you have now set yourself. We have often talked of this publication work as a journey, and it really should be seen that way, and it does not even have to start with research or a journal publication! Those are both things that can come with time, and the journey is often more educational than the result. Writing is the skill that should first be considered and developed. Therefore, spend some time considering how this can be done. Essay competitions are one such way, and medical student essay competitions are innumerable. Most Royal Colleges have some student prizes available annually. The Royal College of Medicine 'prizes for students' page is a great place to start as it is regularly updated and lists many of the individual College's prizes. University administrators are also quite good at circulating any national and local opportunities – don't ignore those emails!

Likewise, there are numerous student journals, these are often very well advertised to students. These should be especially considered for smaller pieces of work or oral presentations/audits that can be written up. Although the opportunity presented can be incredibly attractive, student journals can have poor visibility and some even have more hurdles than many regular journals. It is important to note that once a piece of work is published it cannot be submitted elsewhere; look around and weigh up your options carefully before committing.

In the pandemic era there has been an explosion of online resources created by everyone from institutions through to student societies. Many medical schools are calling for a more collaborative approach to medical education (Rashid et al. 2020) which has led to cohesion among medical schools never seen before (Medical Schools Council 2020). It's not just the medical schools that are collaborating, student-led societies are working together to produce great resources to continue education during lockdown (University of Exeter 2020). If you have ideas and musings that you really can't find a place for, why not look here or create your own space? In turn, this could then

create a whole new scientific bubble for students to share ideas and collaborate on a theme of your choosing!

Tip 7

Get to grips with the submission process early

Choosing a journal is not always a simple task and finding an experienced mentor can be extremely helpful here. Whether it be the co-authors, supervisors or a librarian – guidance as to which journal to apply to is vital. Journals often receive far higher levels of submissions than can be accepted, making informed choices is of huge benefit for all parties involved.

The submission process for journals can be daunting at first, but it is not overly complex or difficult, just time consuming! The best thing to do for any journal is to find and carefully read the author guidelines. Every journal is slightly different, but here they will set out everything from word counts, reference styles and formats through to other required documents. A submission folder will often comprise of several documents including a cover letter, cover page, manuscript, figures and a declarations of interest form. Each journal has their own submission site which usually guides you though the process – it's good to have all the requirements covered before you get here. It can be frustrating to have the review process delayed because the editorial criteria weren't met.

Of note, it's also important to read the aims and scope of a journal to ensure your content is best suited there. In addition, read articles that they have recently published – this will give you a better feel for the usual content of the journal. The majority of journals will accept a cover letter and, although optional, it is highly recommended. Addressing the editors directly allows you to sell your research and explain why it would be a good fit for their journal.

In circumstances where you are just one of multiple parties involved, it can still be hugely beneficial to take on the submission tasks. Not only does it lessen the burden for others, but it can be a great opportunity to learn about all of the other details and steps required for scientific publication. This in turn can pay huge dividends when you have any further works that require resubmission; it will be a much less arduous process once you know how to navigate it with ease.

Tip 8

Pay attention to the details

This tip aims to draw attention to all the minute queries that can arise and things to look out for when submitting to your chosen journal.

DOI: This is a digital object identifier that is unique and attributed to an online document. It is important as it is a permanent link whereas URL's can change. You should keep a record of the DOI's for every publication you ever have and is usually the easiest way for others to verify your list of publications.

Indexing: Databases such as PubMed don't simply scour the web for all scientific content. Journals have to be indexed by a secondary service (such as MEDLINE) in order to show up in these search engines. Many journals obviously are, but there are thousands more that either aren't indexed or are indexed by other services. Hence, don't limit your searching to one place. The further you look, the more resources you will find. For your CV this is not an important factor (the DOI is) but it can be for certain applications, for example the Foundation Programme in the UK requires publications to have a PubMed ID before they can be counted towards the application.

Declarations of interest/funding: An easily overlooked checkpoint that is usually required before an article can be considered. This can vary from a single line of text on the cover page, to a whole separate form. You may not have any conflicts of interest or funding, but make sure you confirm whether any of your collaborators do before submission.

Article processing charges (APCs): This is an important consideration for all authors, but especially students. Due to running costs, many journals do not charge submission fees but do charge APCs if the works are accepted. They can often be over £2000! As medical students don't often have access to funding, it is another important early consideration before submission as it would be incredibly disappointing to be accepted only to then find out there is an APC that you cannot meet. This is just one of the many benefits of seeking pre-submission guidance (tip 7). Many journals have various criteria for waiving the fee, this would be assessed on a case-by-case basis. If the work is with senior academics, then they may have access to institution funding specifically for APCs.

Open access: Aside from the high impact journals, many do not publish fully open access. This means that all or some degree of content is hidden behind a pay wall. This can often be overlooked as medical students often have institutional access through their university. Despite this, open access should be an important consideration as making works open access can lead to APCs but without it, the exposure of works is reduced.

Tip 9

Remember that submission is not the end

It is relatively uncommon for any journal submissions to be accepted without any revisions. There are 4 decisions that can be given, these are: acceptance, minor revisions, major revisions and rejection.

Acceptance is obviously the ideal! Minor revisions are common and still very positive. Sometimes this can be a provisional acceptance pending certain changes that the editors/reviewers will request. Major revisions mean that the editors still feel the article may be suitable for their journal, but the reviewers have highlighted many serious issues that need addressing. Sometimes, this is not always possible and so you may need to have a dialogue with the editors.

Rejection is obviously the most disappointing as there is no further recourse (appeals are very unlikely to succeed). It is not uncommon, and any author should be completely aware of this reality. Some journals report rejection rates of as high as 90–95%, but don't lose hope (Khadilkar 2018), depending on the details of the work it can often be resubmitted elsewhere, in fact it is reported that 62% of

articles accepted have been rejected elsewhere (Khadilkar 2018). It is good practice to aim high and have several suitable journals in mind for each article. The feedback, even if rejected can be incredibly helpful and sometimes editors will suggest partner journals that would be better suited to the work.

For further insights into how to approach and prepare for the submission process, consider the 'Twelve tips for getting your manuscript published' which carefully addresses many of the key details and expectations a new author should have (Cook 2016).

Tip 10

The process cannot be rushed

This can sometimes be a surprise when newly venturing into research; things take time. It's not only the writing of an article that can be time consuming, once submitted, it can be days before the paper is assessed by an editor and many weeks before a first reply is received. There is some relativity between the size and scope of an article and the time frames, but essentially, don't ever expect quick turn arounds.

This is one of the reasons why it pays to have plans as to what to do if the work is rejected, as it can be difficult to return to an article many weeks after the fact. Also, it is something to consider if the piece of work is relatively time sensitive.

Tip 11

Consider the alternative paths to presenting research

It is important to highlight the importance of other scientific modalities. A full paper is incredibly time consuming and can have relatively poor success rates (Cheung 2018); however the vast proportion of research projects can be presented as scientific posters or oral presentations but simply aren't. If you have collaborated on a research project that has been submitted (or hasn't) – always consider how else it can be used and what other outputs are possible. Work that never results in a publication can still often result in presentations at relevant conferences. Both oral and poster presentations usually require the submission of an abstract – thus they are widely accessible as the final presentation must only be finalised if and when accepted. These opportunities are hugely educational and just as beneficial for career development, with poster presentations being recognised and rewarded in most speciality applications (Salice 2020).

Tip 12

Start writing

If nothing so far has appealed to you, or you're just eager to get started right now and not take time to find some helpful supervisors, you can always take a leap and pursue an original concept! Even this doesn't mean you have to do everything single-handedly. By having those all-important discussions, you may be able to find one or more peers who you can collaborate with. There are many article formats that are perfectly suited to student authors. This doesn't have to be a dive into the deep, smaller pieces may really help to whet your appetite and develop key writing skills or interests. The letters section of a journal can be a great target for students. Critical appraisal is a core skill that most students are taught early on, it will serve you well throughout your career (Mhaskar et al. 2009). Critical appraisal is not only central to informed decision making in practice, but letters are the manifestation of this skill in the world of research and they are vital for raising important questions and furthering scientific development.

Conclusion

This article provides evidence-based tips on all steps of research, from preparation to submission. It aims to provide guidance to ensure that delving into the world of research and publications does not have to be as daunting as it first seems. Whatever a person's motivation for getting involved with research, with a bit of preparation and reading, anyone who is enthusiastic can do it. As discussed, this does not have to be a solo project or a large article, first steps into research can involve writing letters or collaborating with peers to break up larger pieces of work. Research takes time, but by taking these tips into consideration it does not have to be an overwhelming task.

Disclosure statement

The authors have no declarations of interest to report.

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