Chapter 1 How to get involved in research

1.1 Why do research?

Research involves logical and systematic investigation of a topic in order to reach new conclusions and to gain greater understanding. Research also fundamentally involves the recording of one's findings and the dissemination of the results to others, allowing for the research to be replicated. At its core, research is about finding the answer to meaningful questions. Research represents the backbone of progress within medicine. Becoming involved in research as a medical student, junior doctor, or healthcare professional is an incredibly valuable and rewarding tool to have in one's arsenal. The benefits offered by performing quality research are many; for example, research

- Demonstrates your interest in a topic.
- Allows you to build up your own knowledge base.
- Offers a stimulating reason to learn more about a topic.
- Can often keep you interested in your work.
- Allows you to become a better, more well-informed healthcare provider.
- May lead to improvements in your ability to provide patient care.
- Provides a great chance to improve your CV.

This book aims to offer a how to guide to starting your research career, whether you have any experience with research or not. Research involves time and effort. It is not always easy to start, continue, or to finish a project. However, if you are dedicated and invest your time wisely, you can succeed in medical research.

The goal of getting involved in research can be many of the above outlined benefits, but the main goal should be to gain experience in research, develop skills that will help you throughout your career, and decide how much of a research interest to pursue over the course of your career.

How to Succeed in Medical Research: A Practical Guide, First Edition.
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Companion website: www.wiley.com/go/foley/succeed

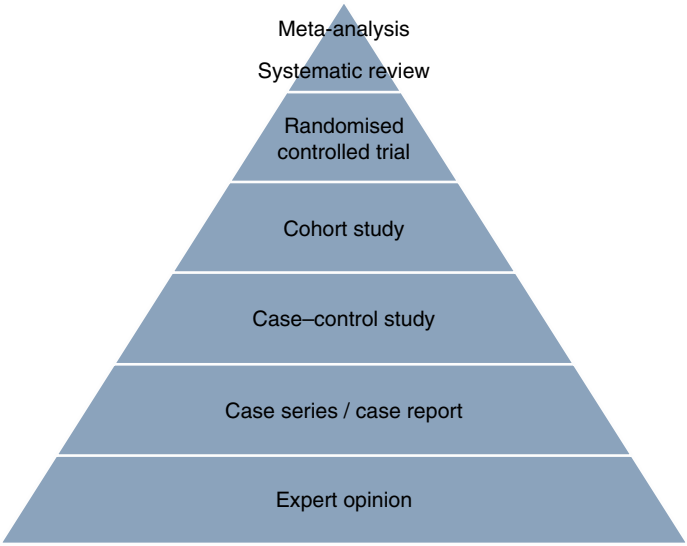

Figure 1.1 The hierarchy of evidence.

1.2 What can I become involved in?

There are a number of different areas of research within medicine. Broadly, there is pre-clinical research, which takes place in the laboratory, and clinical research, which takes place in a clinical setting such as a hospital. Clinical research will be the main focus of this book, and it is the easier branch to become involved in, especially if one is already working in the healthcare setting. We will also discuss pre-clinical research at various points throughout the course of the book.

Another important concept is the hierarchy of research (Figure 1.1). This hierarchy establishes what types of research publications are the most trustworthy and assigns each type a level of evidence. This is often represented as a pyramid and has evolved over the past few decades, guided by the principles of having the weakest study designs at the bottom and the most robust study designs at the top.

1.3 Different types of research

1.3.1 Case report

A case report involves the analysis of an interesting patient and the dissemination of the case and the interesting aspects of it to other healthcare professionals. It also generally involves a literature review to explain the context of the case

in light of the current research on this topic. Although low down on the hierarchy of evidence, this is one of the best places to start if you are new to research. A case report allows you to perform many of the important parts of research, including discussion with colleagues, data collection, presentation, manuscript preparation, and submission for peer review. A more detailed guide of how to perform a case report is given in Chapter 9.

1.3.2 Case series

A case series is essentially the same as a case report except that it looks at more than one patient. The topic of the case series is generally one that means it is difficult to recruit large numbers of patients, and so the number in the series is usually small. This is also an excellent starting point for one's research journey and is discussed in Chapter 9.

1.3.3 Commentary

A commentary is a publication that offers the opinion of the authors on another newly published article. It usually will be offered by the editor of a journal to an expert on a particular topic. This may be difficult to become involved in; however, if you find a research mentor that is an expert in his or her field, it may be a potential opportunity to write a short but interesting piece.

1.3.4 Interesting approach

These articles are published in journals to highlight a technical skill or a new way of performing a common procedure. Because the focus is on a procedure, these are usually written by those who specialise in a surgical or interventional specialty. Again, this type of article will need heavy input from the senior colleague who performs the skill or technique, but it is a great opportunity to work in tandem with an expert and get started in research. Skills in manuscript preparation can be gained, and due to the technical nature of the article, it also offers the chance to develop skills in image editing/production for publication.

1.3.5 Letter

Ask senior colleagues if they have read a recent paper on which they have some opinions they would like to share or questions they would like to ask the author. In this way, you can become involved in writing a letter to the editor outlining these points. Letters can often be quite succinct and not take too much time to produce. However, often your mentor will not have the time to write a letter despite having excellent opinions and points on the topic. It is also a good chance for you to practice your writing and literature review.

Case Study 1.1 Letter to the editor [1]

One of my earliest mentors in research once commented that 'we should all be writing more letters to the editor'. Although it still happens, the concept is much less common than it was previously. It is an excellent opportunity to sum up one's thoughts on an article, to offer an alternative point of view, to ask any pressing questions of the authors, or to disagree with their conclusions. Often a letter to the editor and a reply from the original author can make for very interesting debate. While I was reading on the topic of quality of life in patients with a specific type of brain tumour (an acoustic neuroma), I came across a recently published paper by Lodder and colleagues [2]. I had written a similar paper previously and had read a number of similar papers in the preceding months. I was struck by how the paper and the conclusion focused on the same topic as everyone else. The authors found that patients with an acoustic neuroma had a similar quality of life outcome, whether they underwent treatment with surgery, radiotherapy, or both. However, the authors also found that overall, the quality of life scores were low in all patients. Unfortunately, this was not addressed in the article. Many papers with similar findings merely compared quality of life outcomes with different treatments rather than focus on the big picture – which is, that quality of life outcomes in these patients are low. It was my feeling that doctors should be aware that all patients with this disease may have a low quality of life, and so we must try to identify problems in every patient. It felt to me that many authors were ignoring the elephant in the room, and so I wrote to the editor to explain this point of view. Because it was something I felt strongly about, it was fun and relatively easy to write the letter.

1.3.6 Collaborative

Collaborative studies can be an excellent way to ease yourself into the research world. The main advantage is that it is simple! The lead authors will take care of most of the work, including the literature review, the research proposal, the ethical application, the data analysis, the write-up, and the submission process. The disadvantage is that in essence you can only be involved in the data collection. However, despite this obvious downside, it can still be quite a useful experience. The lead authors will provide lots of collaborators with a data collection plan, and you can follow this at your local institution. Usually, because collaborative studies use patients from lots of different areas, there is not too much data collection to be done, and so it may not take too much time. The reward can be gained without too much effort. The first thing to do is to find a collaborative study to become involved in. A number of different collaboratives exist, and there are often a number of options out there. For example:

- STARSurg – A student-led research collaborative with the aim to carry out large and impactful studies within surgery.
- BURST – A urology collaborative that will be discussed in the following case study.
- GlobalSurg – A research collaborative that aims to improve surgical outcomes through research on a global scale.

Case Study 1.2 MIMIC collaborative study [3]

I received an email advert for a new collaborative study being undertaken in the UK, called the MIMIC study, run by the BURST collaborative. The study was looking at patients presenting to the emergency department with renal colic (pain secondary to a kidney stone). I emailed the study lead to register my interest in collecting data on 50 patients at my local hospital. I also found one of the urology consultants at my hospital to ask if he would be interested in being the supervisor for this project. I then applied for ethical approval in my hospital, using the ethical application letter provided for me by the lead author.

Once this was approved by the ethics department, I was given an Excel file by the lead authors, with a number of pieces of information to collect on each of the 50 patients. Doing this took some time, including figuring out which IT systems to use. The MIMIC study involved 71 hospitals worldwide. The study was a great success, led to a number of presentations at national and international conferences, and received a number of prizes as well. The presentations were shared among the collaborators so that a number of people had the opportunity to present. I presented the findings of the study to my local hospital's urology department. The findings were also published in the *British Journal of Urology,* with all of the collaborators named. Although I took a peripheral role, the study was a worthwhile endeavour and a good chance to gain experience in research without having to do it all alone!

One alternative to becoming involved in a collaborative research project is to lead your own collaborative study. It is without doubt more work to do so, so I would recommend becoming involved as a collaborator first. However, the rewards can be immense, and if you have the time and the motivation, leading a collaborative is a great experience.

As you can see, the creation of a collaborative project gives the opportunity to engage in a multi-institutional project with a large number of clinical and research teams, to prepare and present research proposals, to complete

Case Study 1.3 Prostate cancer research collaborative

During some dedicated research time, I had the opportunity to lead a nationwide study throughout Ireland that sought to collect information on men undergoing prostate biopsy and to create an Irish prostate cancer risk assessment tool. Under the guidance of my MSc supervisor, I met with each of the department leads in urology at all eight tertiary urology centres operating under the National Cancer Control Programme in Ireland. I presented a research proposal to the heads of department, seeking to recruit patients for the study from each centre. I then completed the ethical review board applications for each hospital and recruited members to assist with the data collection. The number of patients recruited to this study was more than 4000. My role also included working on the statistical analysis of the data and enlisting the help of the biostatistics department at my university. The next step was the dissemination of the research findings and presentations at local, national, and international meetings. The project has led to a number of publications, and the research project has continued with patient recruitment and the development of more refined risk models, an ongoing interest in my research team.

ethical review board applications, to collect large numbers of data, to analyse and interpret the results with the appropriate statistical methodology, and to disseminate the findings. Although it may seem like a daunting task, it is incredibly rewarding, and throughout the sections in this text, we will discuss each of these stages and how to do it for yourself.

Collaboratives don't need to be big, formal organisations with national or international interests, as previously described. And, while large collaboratives are a great way to get started in research, or indeed, get your name on a publication, the topic of research chosen by collaborative leads may not be of particular interest to you, and being listed along with a very long list of co-authors may not appeal to you.

Therefore, it may be best to form what we term a 'pseudo-collaborative'. This is a small group of individuals who may share the same interest in a topic as you but are at other geographical locales and have different key skills and knowledge to bring to a research project.

Case Study 1.4 Learning outcomes in surgery collaborative [4]

I decided to pursue my interest in the teaching of surgical skills to Foundation Year 1 (FY1) doctors. This was important to me because this was the level at which I was working, and I was keen to find the best and easiest way to

acquire surgical skills to help me on the way to becoming an ENT surgeon. I discussed this with my mentor, a foundation training programme director who was also a surgical consultant, and we came up with a curriculum of work-based assessments that, we felt, would prepare FY1 doctors for surgical training as well as allow them to enjoy their surgical FY rotations.

With the idea formed, it was important to recruit team members with expertise and reach that I lacked. I created a PowerPoint presentation with the idea and pitched it to colleagues at my level with greater statistics and recruitment expertise than I, as well as my former professor of surgery, all of whom I found to be receptive. The paper was later published, with data from across the UK and Ireland, which would not have been possible if working without collaboration.

1.3.7 Case–control study and cohort study

Original research is arguably the most important type of research to perform and should be the goal. The first step in original research will be to identify an interesting clinical question and then design a study to attempt to answer the question. For example, if we consider migraine-type headache, we could ask: what is the relationship between patients' migraine headache and patient clinical features? Are there any risk factors that predispose patients to migraine headache, such as age or weight? We can then look at a group of patients with migraine and a group of patients without migraine and compare the findings in both groups. This would be termed a 'case–control study'. These sorts of studies are retrospective in design and look back at risk factors in patients with a defined outcome (i.e. a diagnosis of migraine headache or not). Case–control studies can be an excellent starting point for original research because they are cheap and easy to perform.

In contrast to this, cohort studies look at a population of patients and compare those who were exposed to something and those that were not and then see what the outcomes are in each group. A classic example of this type of research is the Framingham Heart Study [5], which began in the 1940s. This study followed large numbers of patients from the beginning of the study and waited to see which patients developed heart disease. The researchers then looked back at the clinical features that differed between those patients who developed heart disease and those patients who did not. This study found correlations between heart disease and risk factors such as smoking, high cholesterol, and high blood pressure. The disadvantage of this type of study is that it requires large amounts of funding and takes a long time to conduct. Therefore, although this type of research can be very valuable, it is not the ideal place to start.

1.3.8 Randomised controlled trial

A randomised controlled trial (or RCT) is a very important study design utilised in medical research. It involves recruiting a cohort and randomly assigning the patients in the study to receive one treatment or another. In a double-blind trial design, the patients and the researchers also don't know which treatment the patient has been assigned. These trials are the best method of determining the optimal treatment strategy for patients in medicine. This method is commonly used in oncology for comparing new cancer treatments to the current gold standard treatment.

1.3.9 Systematic review and meta-analysis

This type of research involves summarising all of the research that has already taken place on a particular topic. There is a very detailed methodology to follow in conducting this sort of research, and the meta-analysis is also carried out in a particular fashion. This type of research can be very time-consuming when performed for the first time, but it can be an excellent way to gain an in-depth understanding of a topic and can also be very useful if you cannot identify a research question for a piece of original research.

1.4 Clinical vs laboratory

There is an important distinction between clinical and laboratory research. Clinical is undoubtedly easier to perform if you are new to research. Laboratory research is usually undertaken as part of a research degree, or sometimes an extended period of time is allocated to a research project in medical or biomedical degrees. Laboratory research takes time and can rarely be properly performed on a part-time basis while attempting to continue your regular studies or work. Laboratory research is discussed in more detail in Chapter 10.

1.5 Getting ideas for research

The ideas needed for research will depend on the type of research you plan to perform. For example, ideas for a case report or a case series may arise from time spent meeting patients in clinic or on the wards. Ideas may come from discussing your interest in getting involved in research with a senior colleague (more in Chapter 2), or you may not need to come up with the idea at all, such as in the case of a collaborative project.

Ask yourself: what interests or excites me in research? This is one of the main things to bear in mind when thinking of ideas for your research. It can be difficult to stay motivated in research at times; however, if you pick a topic that you have genuine interest in, it will be far easier to continue with the

project until the end. Another excellent way to get ideas for research is to draw on the experience of your seniors. Try to identify those people who have been involved in research in the past and discuss it with them. What led them to become involved in research? How did they start? Who did they talk to? This kind of discussion can be very important, and if your senior is receptive, then you can use this person as a role model/mentor over the course of your research career.

Case Study 1.5 Identifying areas for research

I had the idea for a research study in patients with acoustic neuroma (a brain tumour) because a family member of mine was diagnosed with the condition. I obviously had a big interest in this disease, and I was particularly interested if patients with this tumour experienced a big impact on their quality of life. I discussed the idea with a colleague of mine, and this project was also perfect for him, as it allowed him to demonstrate his interest in ear, nose, and throat surgery, because that is who commonly looks after patients with acoustic neuroma. But we didn't know much about quality of life in research, so we asked for help from our hospital's psychiatric team, particularly concerning how to perform a quality of life assessment, and they gave us ideas of questionnaires we could use. From there, we spent some time reviewing the literature on the topic. We found that some research had been conducted on the topic, but that we could approach it from a different angle. We were interested in whether the quality of life was different in patients who had undergone a different treatment strategy, and if alcohol was used as a coping mechanism. We thought that our question was clinically interesting, and we decided that we would proceed to the next step in this study and try to identify a supervisor for the project.

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