

The road to research

Research is an essential aspect of medicine and a rewarding career path for medical graduates. **Sundip D Udani** and **K R Haylett** explain what research is all about and what opportunities exist for medical students and qualified doctors

As I sat down at the British Society of Gastroenterology's annual conference in Glasgow, my tachycardia was finally subsiding. I was excited and feeling the buzz from having just given a successful presentation—well I hoped so. But how did I get there?

The Manchester medical school training required completion of a three month project option. This included a small research project in an area I was interested in.

My research was multidisciplinary. I worked with several departments in the hospital, including gastrointestinal investigations, radiology, and the university department of surgery. The study entailed using a new device to measure

oesophageal lumen diameters during barium swallows. We were looking at new parameters: what was a good swallow and how did it relate to the patient's oesophagitis and history? I made measurements, searched patient medical records, examined endoscopy reports, and determined drug history. It was often an assault course of reports and really bad handwriting.

Back in Glasgow, my head cleared and I started to listen to the next speaker as she took the limelight. I began to see the amount of work that had been carried out. The statistics made sense. I wondered about the questions and methods being used. But was research a future career path? How did it fit into medicine?

of this model is that it shows that one might enter the process at a number of points. It also shows that the experience of later stages might lead to a revision of earlier knowledge and methods, mirroring the general process of learning.

Why research?

There are many reasons why you may want to participate in research. It may just be simple curiosity. There may be a question about the physiology, natural history, or the treatment, diagnosis, and prevention of disease that interests you. Or importantly, it may be about how you can do the best for your patient.

Alternatively, you may be testing the water and trying to find out whether you are suited to research and a career in academic medicine. Interestingly, the BMA found that the main reason given by doctors currently working in research was to enhance their future career prospects, or as a means of securing a national training number (fig 2).²

You may want to undertake research to improve your own training and knowledge, possibly as part of your continuing professional development. For example:

- To learn how to design experiments and how scientific and clinical investigations differ in their aims and methods
- To undertake a range of investigative techniques, including the application of statistics to the design and analysis of experiments
- To learn how to write scientific papers and to present data at meetings
- To learn how to assess scientific papers critically
- To obtain a higher research degree, such as a PhD or MD (box 1).

When to do research?

Most of us come into contact with research in our early student days. In the United Kingdom, medical students complete special study modules. These projects allow students to delve deeper into areas of particular interest and research the relevant literature.

Medical schools such as Manchester have a period 

Box 1: Research degrees

- A doctor of philosophy (PhD) is typically a research degree that lasts three years. It can be taken part time, in which case it can take up to six years. When applying for a PhD you choose a research topic in conjunction with your supervisor. During the next three years your goal is to find and develop significant new knowledge regarding the topic. You will have to write a thesis and defend your work at a viva voce, an oral examination where your work is critically questioned. If you are considering following an academic career, a PhD is usually the preferred postgraduate qualification.
- A medical doctorate (MD) might often be regarded by appointments committees as the preferable degree for those wishing to become an NHS consultant. An MD is a research degree that lasts two years part time (or, exceptionally, a year full time). You choose a research topic in conjunction with your supervisor and spend the duration researching your topic. Often, but not always, the subject is more clinically oriented. You are assessed on your dissertation, which you will produce in the final stages of your research.

What is research?

Research affects each and every one of us. At medical school, we may have written essays and assignments which “critically appraise” the research of others. This is all research, whether we gather and analyse new data or examine and study previous work. Our goal is to ask questions, find answers, and ask new questions.

Despite this wealth of experience, many of us do not even consider research as a career. Even worse, we often think we're not capable. In fact, we already have many of the skills we need: the ability to ask questions, to listen and write down the answers, and, importantly, to think critically.

The research process has many representations. Philosophers through the ages have tried to pin it down and describe things such as the “scientific method.” However, it isn't that easy and it's likely to be a messy process. One particular model is the research spiral (fig 1). An advantage

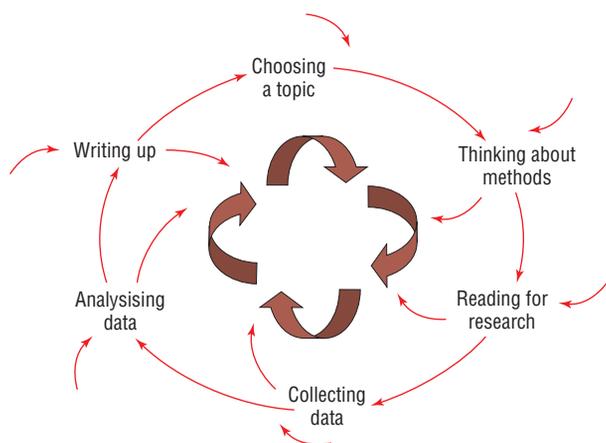


Fig 1 The research spiral

dedicated to the completion of a small research project. This is how I started. It is a good opportunity to experience research methods and test the water. Medical students may also choose to intercalate a second degree as part of their course. During the intercalated year, considerable time is used to complete a research project. Another opportunity to experience research as a medical student is to integrate research as part of an elective. This does not mean you can't go to exotic locations—your research subject may entail travelling to an interesting part of the world trying to answer stimulating questions. Furthermore, dedicated funding is often available for these types of electives; the Wellcome Trust, for example, offers a special “research elective” bursary (see further information box).

Research is often carried out during postgraduate training. This can be during the general professional or specialist stages. Figure 3 shows the percentage of doctors considering an academic career, by hospital specialty. Many universities offer postgraduate degree courses such as an MD or PhD (described later), and these may also be combined with postgraduate training.

Types of research

As you become involved in research, two main divisions become apparent: clinical research and basic science.

Clinical research

Clinical research can be described as “bedside” research, and is defined as studies requiring live patients (or healthy subjects) and live doctors (that is, medical graduates who are practising clinical medicine).

Questions are asked at the bedside and then the appropriate measurement techniques or scientific disciplines are selected to answer them. The excitement of clinical research is that, on occasion, whole areas of research can open up from the careful study of a single patient.

Once a research hypothesis has been formed, the study is ideally a matter of teamwork. It can include a mix of healthcare professionals working in laboratories or in the field. While less likely to lead to the cause of disease, clinical research is always important in challenging and developing the scientific basis of medical practice. Clinical research is vital for the critical evaluation of existing treatments and for the responsible introduction of new ones.

Basic science

Unlike clinical research, basic science research does not require a medical qualification. However, research carried out by a clinical research fellow or healthcare professional is likely to be supervised by a full time scientist. This type of research is conducted mainly in the laboratory using *in vitro* and *in vivo* techniques. The main questions are developed to examine and understand a physiological process and find the parameters that may alter it. A major attraction of basic research is that fundamental advances in the understanding

of disease mechanisms can be achieved.

From my experience, the environments in which the two types of research are carried out differ markedly. My clinical research took place solely in the hospital. The research team were from different professions working within the NHS. I also required help from people not directly related to the research, ranging from the medical records staff to the medical secretaries. All members of the team were essential for the final outcome.

My experience of basic science included molecular research as part of my intercalated degree. This was laboratory based, working with mostly non-medical researchers. The availability of these skilled researchers had many benefits as they helped me with the details and methods used, even though they had no overall knowledge of my specific project.

A clinician entering a basic science environment needs resilience: having been an experienced registrar with responsibility, he or she is likely to be the most inexperienced person in the laboratory.

Choosing a supervisor

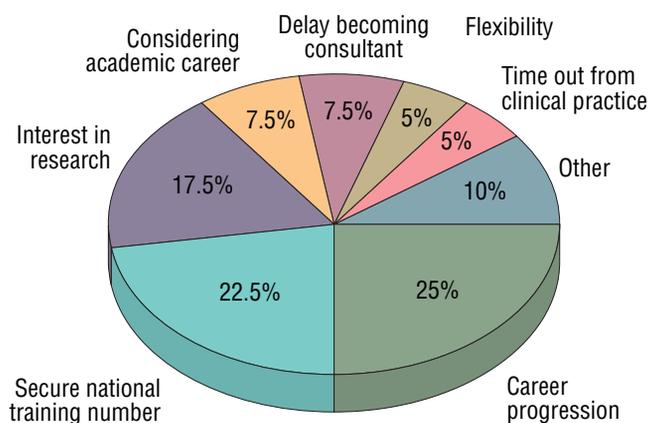
We've all had experience with supervisors, some good and some bad. They may have been consultants on our current firm or lecturers supervising projects.

Supervisors are important. The relationship with your supervisor is critical to your research. With a good supervisor you will find research a lot easier, more stimulating, and very rewarding. So my most important advice to anyone thinking of doing a research project as a student is to try to choose a good supervisor. What makes a good supervisor? That's a difficult question, and may need some research. Do the research, make appointments, look at different people, and try to get an impression of how valuable and supportive they will be. Did they have time for you? Did they give the impression they enjoyed research? Do you think the research questions were plausible? Don't forget you are part of the research process. What is their style? Hands on or hands off?

Funding

Funding is another important factor to consider when thinking about research. Who is going to pay for it? The good news is that there are many good funding bodies. These include the research councils and charities, such as the Medical Research Council, the Health Foundation, and the Wellcome Trust. The bad news is that most full time research fellowship funding is based on fixed time grants that have to be won. Grant competitions require detailed submissions of your potential research topic. Completion of a successful grant application is a fine art and can take many weeks if not months. The NHS research and development programme also provides research training opportunities to specialist registrars and lecturers, and is one of the dominant influences in research.

Fig 2 Percentage of doctors considering an academic career, by hospital specialty (BMA, 2004²)



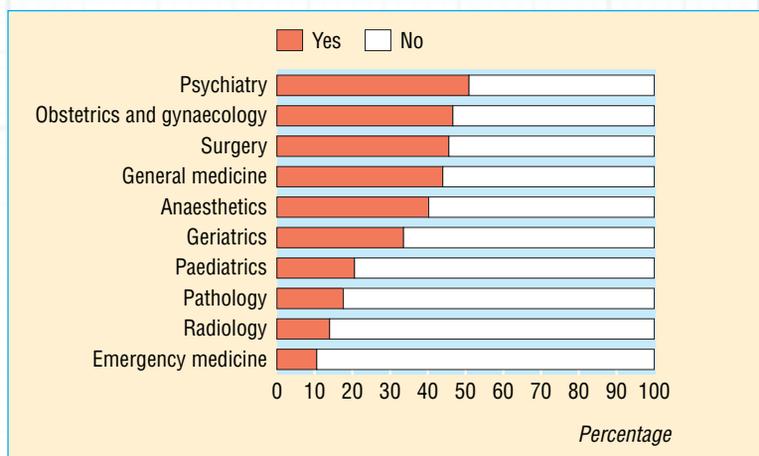


Fig 3 Whether doctors considered an academic career by medical specialty

One small step

Research can be a daunting and sometimes frustrating experience. However, research can also be exciting, stimulating, and, above all, fun.

After being successful with some of my own research and having been fortunate enough to give both oral and poster presentations, and despite the tachycardia when getting up and presenting, I am now an addict. The research meeting in Glasgow left a good feeling and I can't wait for the next opportunity to attend and hopefully present some future findings. Who knows, maybe next time I'll get to go abroad!

Anybody can do research. It is fundamental to medicine. It is also vital to practise your skills, reading, critical thinking, analysis, and keeping up to date. Hopefully, the thoughts and information offered here will encourage you to put a first foot on the road to discovering the exciting possibilities research has to offer.

The next step

Your university will be able to offer you advice on whom to contact and will be able to give you the names of researchers you can talk to. Most royal colleges have research committees, which may be consulted about research opportunities within a given specialty. Additionally, regional postgraduate deans should be able to provide information on general issues such as where, when, and whether to do research. Many important websites provide useful information (see further information box).

Sundip D Udani *final year medical student, University of Manchester, Manchester*
 sundipudani@doctors.org.uk

K R Haylett *principal clinical scientist, medical engineering, Manchester Royal Infirmary, Manchester M13 9WL*

- 1 Blaxter L, Hughes C, Tight M. *How to research*. Philadelphia: Open University, 1999: 1-20.
- 2 BMA Health Policy and Economic Research Unit. *Medical academic career intentions*. London: BMA, 2004.

Further information

Medical Research Council—www.mrc.ac.uk
 Research Councils UK—www.rcuk.ac.uk
 The Health Foundation—www.health.org.uk
 Wellcome Trust—www.wellcome.ac.uk
 Department of Health—
www.dh.gov.uk/PolicyAndGuidance/ResearchAndDevelopment
 The BMA has produced *Medical specialties: the way forward*, which includes a chapter on academic medicine (contact the science and education department: email info.science@bma.org.uk; tel 020 7383 6164)

Tips on

Dealing with an unexpected loss

Dealing with the unexpected loss of a patient can be a difficult and emotional experience. You may feel sadness over the patient's death, helplessness over the inability to effect a positive outcome, or fear over mistakes that might have been made. It may help to take some active steps to deal with these feelings.

Here are some of the steps I took to deal with my feelings in a constructive way when a relatively young patient died unexpectedly in our care.

Support the members of your team

Your resident may feel much worse about the loss than you do. Talk to your resident and attending physician to see how they are feeling. Thank them for all they did for the patient, and ask if there is anything you can do to help.

Open up to a friend

Sometimes the best treatment is to talk to a trusted friend. It will help you process the events and release any emotions you may be suppressing.

Show compassion to the patient's family

It is most appropriate for the attending physician to deal with the patient's family. Be sure to follow any advice you are given regarding family contact. Within these guidelines, if you have the opportunity to talk to the family, you should identify your role on the team, express your deepest regrets, and see if there is anything you can do to help. Be careful not to speculate about anything you do not know for certain or promise anything that is outside your control.

Follow ethical guidelines

Any discussion about the case should be done with the intent to educate others, console those who were affected, or to seek legitimate advice. You should not tell a colleague about the case if your goal is to sensationalise the circumstances or place blame on those concerned. If you feel a medical mistake was made, of course it should be reported. But you should first talk to your resident, clerkship director, or an appropriate institutional representative to ask for guidance on how to proceed.

Learn from the experience

Do some extra reading based on the patient's history and the complications that developed. This will help you the next time you have a patient with a similar condition. You might also want to review the patient's chart to understand the case better, attend the patient's morbidity and mortality conference, or give a presentation to your team about any lessons learnt.

Michael A Grasso *resident, University of Maryland School of Medicine, Maryland, USA*
 mikegrasso@umbc.edu