Practical tips and guidelines	Open Access

Practical tips for undertaking a medical education research project at undergraduate level: Recommendations for both students and supervisors.

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Abstract

Many undergraduate medical programmes now require students to develop research and medical students are increasingly choosing to undertake medical education projects at undergraduate level. As medical education research often requires different ways of thinking about knowledge and research compared with biomedical disciplines, undergraduate medical education research can be challenging for students and supervisors alike. This paper aims to address a gap in the literature, by providing recommendations for both students and supervisors involved in undergraduate medical education research. Our practical tips are based upon reflections and insights from an undergraduate student who undertook a medical education research project and an experienced undergraduate research supervisor. The importance of good organisational, time management and communication skills are highlighted. Students should recognise and make the most of the unique learning opportunities that are present when undertaking a medical education research project and supervisors should be attentive and supportive of their individual students' needs.

Keywords: Medical education research, Undergraduate education, Student, Research supervisor

Article

Introduction

Internationally there has been a drive to increase research content in undergraduate medical programmes, following demands for evidence-based medicine and an expectation that research skills are highly transferable and useful for many different medical careers (General Medical Council, 2015; Richardson, Oswald, Chan, Lang, & Harvey, 2015; World Federation for Medical Education, 2015). As a result, many undergraduate medical programmes now require their students to develop a research or evaluation project as part of their course. As involvement in medical education becomes an expectation for all doctors (General Medical Council, 2013), greater numbers of medical students are choosing to

undertake medical education projects as part of their undergraduate training.

While some research skills may be considered to be generic, such as time and project management skills, medical education research requires different ways of thinking about knowledge and research compared with other medical disciplines (Bunniss & Kelly, 2010). Undertaking a medical education research project involves engaging with and developing new understandings of research approaches, methods, and styles of writing drawn from social science traditions. These will challenge beliefs gained from any previous biomedical research training. Although there are several published guides for how to undertake research at undergraduate level (for example Smith, Todd, & Waldman, 2009; Walliman & Appleton, 2009; Wisker, 2009), we have noted a lack of published advice with regard to undertaking an undergraduate medical education project in particular. As this type of project presents a unique set of challenges, a paper providing practical tips on this topic is warranted. The aim of this paper is to provide recommendations to students and supervisors, who may each benefit from advice to ensure they produce medical education projects that are useful, meaningful, and rewarding.

Our practical tips are based on the reflections and insights of a student who completed an undergraduate project in medical education (James), and reflections from a supervisor of many undergraduate medical education research projects and the lead for an undergraduate research project module (Alison). James' reflections are based on his intercalated medical education project, which explored students and staff members' experiences of surgical teaching and was supervised by Alison.

Tip 1 - Pick a feasible topic

James: When first approaching a topic, with a whole realm of subject areas to choose from, it can be difficult to decide what to base a project on. Feasibility should be an important factor in developing undergraduate projects, as the length of the project from conception to final presentation can be as little as nine months.

My first plan for a project was to conduct a trial exploring different styles of anatomy teaching and attempt to objectively measure the subsequent student outcomes. However, after speaking with Alison, I quickly realised that the large scale of the project, the number of teaching staff required, and organisational barriers meant it was simply too ambitious for a first time project to be completed within a year.

Several factors influence whether a project is feasible, including the availability of participants. Early years medical students are often the most available to participate in research, as they have fewer clinical commitments. Students in later years tend to be busy on placement and doctors and patients can be even busier. Avoiding projects that deal with controversial or sensitive topics will also aid in recruitment and minimise concerns from gatekeepers and ethics committees (an issue which is discussed later).

Alison: In my experience, it is unusual for undergraduate students to enter the course with experience of undertaking full-scale research projects. Students are usually unaware of the amount of time and work needed for research tasks such as designing the study, gaining ethical approval, recruiting participants, arranging suitable times for data collection, carrying out data analysis, and writing a research paper or dissertation. It is therefore essential that research supervisors provide guidance to students about the appropriate scope of an undergraduate research project. In order to support supervisors with this task, I deliver a briefing session for supervisors prior to the start of each academic year. In this briefing, we discuss what makes a feasible undergraduate research project. I remind supervisors that the desired outcome of the research module is that students understand the research process, not that they produce research outputs of a publishable standard. I also encourage supervisors to steer students away from

projects that involve complex or mixed methods, multiple sites, or require multiple approvals (at both university and health system levels). The group of supervisors share examples of previous successful projects, which have involved analysis of existing data or have recruited only a few participants. Supervisors welcome these discussions, as this saves further problems down the line.

Tip 2 - Pick an interesting and worthwhile topic

James: An undergraduate project should not only be feasible, but also interesting, worthwhile and enjoyable for the student (Smith et al., 2009; Walliman & Appleton, 2009). That way it is then easier to remain focused and motivated for the life of the project. You may also be more motivated if you can see a relevance of the project for an intended future career.

As a student, it may be difficult to identify something that is "worthwhile" doing. This is where supervisors and a reading of the background literature can help you in identifying a research gap or uncovering something on the curriculum or in practice that needs research attention. With my anatomy project idea put on hold, I began to explore other more feasible options for a different project. Having an interest in surgery and speaking to some students from previous years about their research experience and ideas, I decided to base my project on exploring perceptions of the benefits and challenges of suturing teaching at my university. My conversations with peers indicated that this was an area students had strong feelings about and I wanted to know more about the staff perspectives on this teaching.

Alison: When first discussing research ideas with undergraduate students, often students wish to evaluate an area of the medical curriculum with which they are dissatisfied. Though they have a keen interest in the topic, this is not necessarily the best starting point. Undergraduate students may be unaware of the drivers behind curriculum decisions, the complexities of a particular issue, the way content develops in later years, or the importance of an experience for later training or practice. Furthermore, it can be difficult for students to gain the necessary approvals for their research when they have a clear agenda of revealing flaws in the course. For this reason, I encourage students to do further reading and talk to the course delivery team before settling on their research topics. This helps them to further understand complexities and perspectives different to their own. In James' case, this work led to a change from a simple evaluation project to a much more interesting exploration of the complexities of suturing teaching.

Tip 3 - Pick the right supervisor

James: In cases where you have a choice of supervisor, you should give this decision due consideration and not just choose on a whim. Although supervisors are often happy to support a wide range of topics, they will inevitably have their own special areas of interest which can be applied for your benefit. If possible, you should seek opportunities to meet with supervisors informally, to discuss project ideas, identify shared research interests, and begin to build up a rapport. This is what happens currently on the intercalated medical education course in Leeds, where students meet supervisors at an informal lunch and can discuss potential project ideas together. At this meeting, I discovered that Alison had previously supervised a similar style of project and was happy to support me in my new project choice.

Alison: At Leeds, our pool of supervisors have varied expertise. Some are experts in a particular research topic, such as interprofessional education or clinical placement learning, while others have expertise in particular methods, such as qualitative research methods or evaluation of technological innovations. Our students are encouraged to identify a supervisor with similar research interests or

experience in methods they wish to develop over the course of their studies. Students are provided with a list of supervisors and their expertise prior to starting the course and most supervisors make themselves available to meet with students on the first day of term.

Tip 4 - Develop methodological understanding

James: Studying medical education presents opportunities for developing research skills that may not exist in traditional medical courses, for example, qualitative data collection and analysis techniques. In order to develop meaningful qualitative research it is important to understand the philosophies underpinning various approaches. By developing your understanding of methodology and methods at the outset, you can better plan and justify your project. In my experience, the idea of methodology can be daunting to a student who has not previously been taught it. Although I had been taught about statistics and quantitative research in my medical degree, I wanted to use my intercalated degree as an opportunity to explore other avenues. For my project, I decided to undertake a qualitative piece of research exploring student and staff views and opinions. This would not only help me develop qualitative research skills, but also give me a greater understanding of qualitative research which would help when appraising qualitative studies. I quickly learned that qualitative research is just as valuable, robust and important as quantitative research. I was challenged to revise my expectations of what made a reliable study, from trying to recruit as many participants as possible to power a statistical test, to gathering insightful views and experiences from carefully selected students and staff members.

Alison: As medical education can employ qualitative methods, quantitative methods, or both, it has always been important to me that students have sufficient methodological understanding to develop an appropriate research design. This relies on students understanding that, in qualitative research, they will not be uncovering objective truths nor coming up with conclusive findings. I therefore deliver teaching on the main research paradigms in medical education (Bunniss & Kelly, 2010), to clarify differences in the ways that knowledge and research can be understood. Undergraduate medical students are often challenged by the idea that knowledge can be viewed as a construction, dependent on particular interactions and contexts, and that their own background could be an advantage when interpreting data (rather than a bias to be eliminated from the research). Over the years, I have learned that it takes time for undergraduate students to develop their understanding of paradigmatic differences and understand how these differences influence research topics, questions, and methods. They can also find complex research terminology off-putting, which can be an obstacle to understanding research approaches. More recently, I have begun to appreciate the need to limit terminology at undergraduate level (instead explaining concepts in everyday language and using examples students can relate to) and to reinforce students' understanding throughout the whole research process. Encouraging students to begin writing early can also help in identifying any weaknesses in understanding.

Tip 5 - Develop literature search skills

James: A skill that is difficult to master but invaluable once developed is thorough literature searching (Smith et al., 2009; Walliman, 2011). Library staff and supervisors can often recommend good methods of performing literature searches but learning through experience is also important. This was an area I found particularly difficult during my project, as many of the early searches brought up studies conducted with postgraduate rather than undergraduate students, as well as being based on the American

training system, rather than the UK. Towards the end of the project, I identified many additional papers from the reference lists of articles I had found through database searches. I learned that performing a brief surface search first to gain a few articles can be helpful in developing a more detailed search strategy using some of the terms found in the initial papers.

Alison: Teaching on literature searching has always been a part of our intercalated degree. This teaching is delivered by library staff who are experienced in supporting undergraduate medical students and familiar with the resources our students are most likely to access. Early in the year, students submit an assignment in which they reflect on the effectiveness of their initial literature searching and identify areas for improvement. These activities are not only valuable for the research project module, but future modules that require support from literature.

Tip 6 - Develop a critical stance

James: As a student, it can feel like your primary aim is to absorb information given to you, whether that is from reading a journal article or taking notes in a lecture, and hope to remember and use this information to pass a future assignment. At first the idea of being critical about the information provided can be difficult and feel counterintuitive and it may even feel that to think critically is to doubt whether something is true. In my view, having a critical stance is the ability to look beyond face value at the information presented; exploring the assumptions inherent in the design of the research and taking into account the views and backgrounds of the authors themselves all adds depth to the critical stance.   This was particularly difficult at the beginning of my intercalated year but with practice and as the year progressed it gradually became easier and much more natural.

Alison: To help students in developing a critical stance, we have introduced teaching on critical reading and writing, as well as a formative assignment in which students undertake a first piece of critical writing. This allows students to receive early feedback to help them in developing the literature review sections of their later research dissertations. Some of the aspects that students seem to find most challenging are identifying weaknesses in published studies and questioning published authors' assumptions. Given that the challenges of these aspects are well-documented (Smith et al., 2009; Walliman & Appleton, 2009), supervisors should expect to provide their undergraduate students with additional critical writing support. I have found that students are often more able to convey criticality verbally, so it can be helpful to discuss their reading in supervision sessions.

Tip 7 - Prioritise application for ethical review

James: An important stage in any research project is gaining the required ethical approvals (Robson, 2007; Walliman, 2011). As an undergraduate student, an official ethics form can seem very daunting and time consuming at first glance. It is also important to realise that ethical approval may not be given on the first submission, and revisions to the ethical application may need to be done and sent back and forth for several weeks before you are able to carry out the research. It is therefore vital that the ethical approval is seen as a priority to be sent off as early as possible, to allow the student maximum time to collect the data and complete the project. Research supervisors will be more used to filling out the ethical application forms and can provide a wealth of experience and suggestions for improvement, possibly even providing past completed forms for the students to use as examples.

My passage through university ethical review was smoother than some of my peers. This may have been because I recognised that late December/early January is when many ethical review applications

for other student projects are handed in. With the ethical review committee not running over the Christmas period, this means that the review process can take slightly longer than the advertised six-week turn around. With this is mind, from the outset of the project I had planned to ensure the ethical application was handed in before December to allow enough time for the remainder of the project. I recommend that other undergraduate students talk to supervisors about the best time to be submitting ethical review applications within their particular institution and setting realistic deadlines for application completion.

Alison: As a supervisor, there is a balance to be struck between early application submission (providing the student with opportunities to learn about the ethical review process), and ensuring the application is of sufficient standard so as not to require substantial revisions. I tend to spend considerable time with students in the ethical approval stage, to encourage them to consider ethical issues carefully and to maximise their chance of a smooth passage through the review process. By looking at several drafts of the ethical review application, I hope to minimise the need for ethics committee members' time and enable the student to start their data collection as soon as possible. It also helps that I am a member of the ethics committee myself and have valuable insider knowledge of committee expectations. I strongly recommend that other supervisors join their institution's ethics committee, as it is valuable learning to be on the other side of the ethics review process and to understand the pressures reviewers are under.

Tip 8 - Hold regular supervision meetings

James: It is important to work with your supervisor and to build up a good relationship and rapport (Remenyi & Money, 2004; Wisker, 2009). Up to this point, undergraduate medical students may not have had experience with this type of educational relationship and so it is important to set up ground rules early. Mutual agreement of deadlines, combined with regular meetings, helps to spot any areas in the project which are proving difficult and where the student needs further support. These strategies contributed to the development of a supportive supervisory relationship in my own research project.

Alison: Although James alluded to our positive working relationship, a satisfactory relationship does not always develop between supervisor and student. Some undergraduate students appear reluctant to take ownership of their research and wait to be told what to do. This reluctance can be problematic when the student is paired with a supervisor who is more experienced in providing postgraduate supervision and expects students to take responsibility for arranging research meetings. We have therefore introduced a workshop on 'Working with Supervisors' for new students to address this mismatch in expectations. This workshop has not solved all problems, but has helped to clarify responsibilities with regard to research meetings. We have also made it the student's responsibility to ensure at least six supervision meetings are held and documented. Though this could be viewed by students as an additional burden, preliminary feedback suggests that students find this requirement helpful in requesting meetings and documenting research decisions.

Tip 9 - Ask for and offer help when needed

James: As an undergraduate medical student, it can be all too easy to plough on through work without mentioning any form of struggle. While this may indicate a breakdown in communication in the supervisor-student relationship, it is key that the student feels able to ask for help without fear of rebuke. I was reassured when Alison made it clear in the beginning that I could bring any questions or concerns in person or by email and that she would always be happy to help and give advice.

Alison: I agree that undergraduate students can be hesitant to ask for the support they need, particularly when we have encouraged them to show independence and responsibility for their own projects. As module lead and someone the students know well, I often receive complaints from students that they are not receiving the research support they need. It usually emerges that the student concerned has not asked his or her supervisor for help, nor alerted the supervisor that there is an issue. Again, the workshop on 'Working with Supervisors' has helped to address this problem, and students are always reminded to ask their supervisors for support in the first instance. I also aim to promote approachability among the team and alert supervisors to the possibility that their undergraduate students may not be very forthcoming.

Tip 10 - Balance the work out over time

James: The ability to balance work and leisure time is a skill that must be developed quickly as a medical student (Cottrell, 2007). In my intercalated degree, there was limited time to undertake and present a full research project alongside completing other assignments and assessments. I observed how students could be lulled into a false sense of security with fewer contact hours than they were used to in a medical degree.   During the first term of my intercalated degree, we were scheduled for two morning sessions a week and our weekly teaching with the 1st year medical students; compared to the usual Monday to Friday, nine until five on the medical course. After getting a lower mark than expected in the first round of assignments, I realised that non-contact time did not mean free time. Stepping up my game for the 2nd term assignments, with a research project to complete at the same time, required careful use of all the time available, both contact and non-contact hours. I recognised the importance of doing course work regularly outside of contact hours to complete all the work in good time. A research project will not happen overnight and the work must be spread out over the course of the year. Setting regular objectives and writing as you go along are just two ways of balancing this time commitment across the year (Wisker, 2009).

Alison: Undergraduate students tend to enter our programme with a traditional understanding of research – you collect the data, then you 'write up' the research. Instead, we strive to promote the value of starting writing early, particularly when students are grappling with new ways of writing and different research approaches. Writing early has several benefits for the students: 1) it allows students to receive early feedback on their understanding of methodology and methods, 2) it encourages students to spend sufficient time developing their analysis of findings, and 3) it makes the task of writing a dissertation less daunting. Students seem to view writing smaller sections of a dissertation as more possible than writing a whole dissertation of 7,500 words.

Tip 11 - View the research as a learning experience

James: As medical students and future doctors we want to achieve and help people and in research this is no different. Something important, but often difficult to recognise as a novice researcher, is that it is unlikely that your first research project will have major implications for practice, policy, or research. The degree and the research project should instead be viewed as a learning experience which will aid you in future projects and allow you to learn from mistakes in a supported environment. The skills I learnt from conducting interviews and analysing transcripts I am already using again, this time in a research module as part of my medical degree.

Alison – Often our students choose to intercalate in order to gain a competitive advantage when applying

for posts after graduation from their medical degree. They typically have strong ambitions to succeed and mention a desire to develop work suitable for publication. However, publication standard is not an expected outcome of our research project module. I therefore encourage supervisors to emphasise that an undergraduate project is for learning about the research process, not for producing world-breaking research. While this can be a difficult conversation to have at the start of a supervisory relationship, students come to appreciate this aspect later on when they realise the practical difficulties of undertaking a research project in a short space of time.

Tip 12 - Take your research forward

James: Despite not achieving world class research status, you should still gain a sense of accomplishment through completing your first research project. Based on my experience, I encourage others to do something with the project they have completed. While the obvious thing may be to aim for a presentation or publication, even things such as writing an internal report or presenting the findings to fellow students are important skills for your future career. The project may also form the basis for future research projects which you can go on to undertake, or uncover areas of research for others to take forward. At Leeds we present our research at a mini conference to our peers on the course and medical education staff. I also wrote a report for the medical course team to help inform future curriculum changes.

Alison: Often our undergraduate students develop very valuable projects, which have implications for medical education locally. However, they are not always capable of producing work that is at the standard of a peer-reviewed publication, especially when the publication process is becoming increasingly competitive. We therefore encourage students to develop presentations and reports for local stakeholders and to carry on their research in later years of their medical studies (our students typically return to year 4 of the medical degree, at which time they are required to develop another research project). We also raise awareness of the possibility to undertake medical education research at postgraduate level.

Conclusion

It is hoped that the reflections provided in this article will help students in undertaking an undergraduate medical education research project and also provide advice and tips for their supervisors. It is vital that students and supervisors communicate and work together through the difficulties that arise from conducting research within a limited time-frame and when the incoming student has limited research experience. Most importantly, students should recognise and make the most of the unique learning opportunities that arise in the process of designing and running a medical education research project and fully engage with all parts of the project to maximise their learning. Supervisors should be attentive to undergraduate students' particular needs, support students to develop their interests in medical education, and help students to gain the necessary experience to make ongoing contributions to the medical education field.

Take Home Messages

Notes On Contributors

James Barnard is a 4th year medical student at the University of Leeds. He completed the BSc in Applied Health (Medical Education) at the University of Leeds and has an interest in medical education research particularly in the field of surgical education.

Dr Alison Ledger is programme lead for the BSc in Applied Health (Medical Education) degree, Leeds Institute of Medical Education, University of Leeds. She is an experienced qualitative researcher, who supervises medical education projects at undergraduate and postgraduate levels.

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Appendices

Declaration of Interest

The author has declared that there are no conflicts of interest.