Involving medical students in research

David Metcalfe

Warwick Medical School, University of Warwick, Gibbet Hill Road, Coventry CV4 7AL, UK.

E-mail: d.metcalfe@warwick.ac.uk

DECLARATIONS

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Undergraduate research is not a new phenomenon in medicine. Charles Best was a medical student at the time that he and his supervisor, Frederick Banting, discovered insulin. Insulin arises from the pancreatic islets of Langerhans, themselves discovered in 1869 by medical student Paul Langerhans. In biomedical research, Alan Hodgkin, formerly professor of biophysics at the University of Cambridge, won the Nobel Prize in 1927 for work on nerve transmission that he began as an undergraduate.

Medical student research can be mandatory, elective or extracurricular. In Germany, medical school graduates practice medicine but cannot assume the title 'Doctor' until they have submitted a thesis. As a result, around 90% of practicing German physicians have undertaken a period of research.¹ Although research is usually voluntary for UK medical students, there is increasing undergraduate interest in research and publication. The 2007 MTAS form, for example, awards credit to medical graduates for a first author paper in a peer-reviewed journal.

The GMC document *Tomorrow's Doctors* states that medical school graduates must be able to 'critically evaluate evidence' and 'use research skills to develop greater understanding and to influence their practice'.² It has been suggested that a period of research might help fulfill this requirement of new doctors.^{3,4} Despite this possibility, medical students have only limited opportunities to pursue original research. However, a number of institutions offer intercalated degree courses in which students suspend their medical training to undertake a second degree, often with a strong research component. These attract around a third of UK medical students each year.^{5,6}

Reasons for medical students choosing to intercalate are varied and include improving their long-term career prospects as well as establishing a broad knowledge base.⁶ The opportunity to conduct original research is, however, less frequently given as a reason for pursuing an intercalated

degree.^{5,6} In addition, two thirds of new doctors in the UK have not undertaken an intercalated degree^{5,6} and may graduate without experiencing research. A number of barriers explain the reluctance of medical students to intercalate. One survey found the most common reasons were financial constraints, lack of interest, and reluctance to prolong medical training.⁶

Nevertheless, there are many benefits of undergraduate participation in research. For example, student researchers can greatly increase the publication output of their medical school. Academic supervisors at one German institution have reported that students appear as co-authors on approximately 28% of papers published in Medline-indexed journals.⁸

Research experience may also boost the career profile of graduating medical students. When a cohort of students at the Stanford University School of Medicine was encouraged to participate in research, 75% gained authorship of a paper and 52% presented data to a national conference.³ In Germany, around 66% of medical students obtain a Medline-indexed publication before qualifying. This does not include data presented to meetings or published in peer-reviewed journals not indexed by Medline.⁸

In addition to boosting graduate employability, publication as an undergraduate can have long-term career implications for doctors. For example, one survey of academic physicians found that career success is independently associated with having conducted research as a student.⁹ In addition, physicians who undertook extracurricular research at medical school produced four times as many publications as their peers.¹⁰

Undergraduate research may also provide a solution for countries in which academic medicine is experiencing a crisis in recruiting postgraduate clinical researchers.¹¹ For example, a survey of medical student researchers found that 75% were motivated to pursue further research and 60% aspired to a full-time academic career.³

Those students not considering research careers may nevertheless develop skills transferable to clinical practice. In particular, medical student research may help instil a culture of evidence-based medicine (EBM) in clinical medicine. According to one author, 'the practice of EBM is not a "behaviour"... it is an internalized spirit of enquiry born of a deep understanding... of the value and the limitations of biomedical research'.⁵ Indeed, there is evidence to suggest that research experience as an undergraduate may foster this 'deeper understanding'.³⁻⁵ According to one survey, American medical students participating in research found that the experience 'taught them to ask questions, review the literature critically, and analyse data'.³ Students undertaking a mandatory literature review further developed 'critical appraisal, information literacy, and critical thinking skills' and the opportunity to make 'contacts for postgraduate training'.⁴

Despite these apparent benefits, there are objections to involving undergraduates in research. Intensive projects may, for example, disrupt the progress of students through the core medical curriculum. Similarly, supervision requirements may distract faculty members from their own clinical and research commitments. However, students do not have to run a clinical trial to learn about the research process. If there are not pre-existing clinical projects suitable for student participation, undergraduates might be involved in critically appraising literature for a review article, or preparing patient case reports for publication. Projects such as these require little supervision while still immersing students in the research culture of their profession.

In summary, research opportunities for medical students are often confined to intercalated degree courses; potentially increasing financial burden, prolonging the curriculum and delaying clinical

experience. As a result, around two thirds of medical students eschew the opportunity to intercalate^{5,6} and miss out on conducting original research. Nevertheless, the benefits of student participation in research are well-documented for graduates, institutions and the academic community as a whole.^{3-5,7-10} As a result, senior doctors should strongly consider involving motivated students in elective or extracurricular research projects. Furthermore, medical educators should recognize the value of student research and incorporate opportunities into the curriculum wherever practicable. Only in these ways can we secure a future for academic medicine and foster a genuine respect for EBM in tomorrow's doctors.

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