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Time for evidence based medical education

Tomorrow's doctors need informed educators not amateur tutors

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No doctor will deny the need for evidence based clinical practice, and all responsible professionals try to keep up with research in their discipline.[1] For many, however, the education of the next generation of doctors is also a major responsibility, yet the same professional standards are not so commonly applied. All doctors have been successful medical students, and it seems easy to assume that this alone qualifies them to educate others. Few surgeons would claim that surviving a surgical procedure qualifies a patient to perform it on another, yet how often do we hear, "There was none of this gobbledegook in my day, yet I learnt medicine well. I know about medical education. I'm not going to change." Why do these attitudes persist? What are the barriers to effective, evidence based medical education, and how may they be overcome?

It is hard for clinical teachers to learn about medical education research, partly because there is not that much of it. Grants for research in medical education are difficult to obtain. In the United Kingdom a new doctor costs twice as much as a Rolls Royce car, and at least £1bn ($1600bn) a year is spent on medical education,[2] yet the funds available for research and development of medical education are tiny, amounting in total to little more than a couple of decent grants in molecular biology. For example, funding to UK medical schools specifically to support curriculum change following publication of *Tomorrow's Doctors* by the education committee of the General Medical Council[3] was less than £50 000 per school over each of four years. Welcome though this support was, it offered little scope for research at a time when opportunities for good work were outstanding.

Despite these privations, some very good work is done, but many clinical teachers still don't seem to know about it. Major journals publish little on the subject. The *BMJ* is better than most, but there is still only a handful of papers each year. An electronic search using the keywords "education" or "medical education" over most high profile, general journals yields little other than book reviews. There are, of course, specialist medical education journals,[4] but these seem to be regarded by most doctors as somebody else's business. There are good reviews and guides to be found once clinical teachers begin to look—all we need to do is persuade them.

Many clinical teachers think they will not understand educational research anyway. Educational theory has not figured in medical training until very recently, and educational research has its own jargon. Some debates in medical education can appear to the outsider to have an almost religious fervour to them, which may be off putting. It is as important to have precise definitions in medical education as in any other discipline, but long debates about just what is meant by problem based learning[5,6] or the difference between community oriented and community based can easily alienate the uninitiated. Educationalists do not always help their cause by the ways in which ideas are communicated.

Even if clinical teachers think they understand what the research is about, they can be suspicious of it. Educational research does not often use randomised controlled trials.[7] Much research is qualitative, and outcomes of educational processes are often difficult to evaluate and not detectable until years after the event. Studies can be perceived to be poorly designed, conducted, and analysed and the results dismissed as not generalisable. This is despite, for example, an extensive, scientifically valid literature on methods of assessment.[8] Although this perception is perhaps no more true of educational research than some other types, the ignorance of most practitioners allows the scepticism to survive. The task of convincing the average doctor in the consulting room is not, therefore, an easy one. If medical education research is to inform more teachers it must become accessible, comprehensible, convincing, and demonstrably related to the real issues faced by medical teachers at the bedside or clinic.

An important starting point is for a major journal to pick up the torch and publish for a general readership educational research that meets strict guidelines for quality. In the longer term we need to produce new doctors who understand the educational process and who can interpret the research they read. Many new medical curriculums strive to help students understand the learning process itself,[9] and in time these students and new graduates will spread the word. In the meantime it is up to medical educationalists to present ideas in clear, jargon free format; to show that research methods are designed for the task and competently carried out; and to convince their colleagues that the evidence base is as important in educating new doctors as it is in assessing a new chemotherapy.

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The case for structuring the discussion of scientific papers

Much the same as that for structuring abstracts

Structure is the most difficult part of writing, no matter whether you are writing a novel, a play, a poem, a government report, or a scientific paper. If the structure is right then the rest can follow fairly easily, but no amount of clever language can compensate for a weak structure. Structure is important so that readers don't become lost. They should know where they've come from, where they are, and where they are headed. A strong structure also allows readers to know where to look for particular information and makes it more likely that all important information will be included.

Readers of scientific papers in medical journals are used to the IMRaD structure (Introduction, Methods, Results, and Discussion)[1] and either consciously or unconsciously know the function of each section. Readers have also become used to structured abstracts, which have been shown to include more important information than unstructured summaries.[2 3] Journals are now introducing specific structures for particular types of papers—such as the CONSORT structure for reporting randomised trials.[4] Now we are proposing that the discussion of scientific reports should be structured—because it is often the weakest part of the paper where careful explanation gives way to polemic.[5]

Old fashioned papers often comprised small amounts of new data—perhaps a case report—with extensive discussion. The function of the discussion seemed to be to convince readers of the rightness of the authors' interpretation of data and speculation. It was not a dispassionate examination of the evidence. Times have changed, and greater emphasis has been placed on methods and results, particularly as methods have become more complicated and scientifically valid. But still we see many papers where the job of the discussion seems to be to "sell" the paper.

Richard Horton, editor of the *Lancet*, and others have described how authors use rhetoric in the discussion of papers.[6 7] Authors may use extensive text without subheadings; expand reports with comment relating more to the generalities than to the specifics of the study; and introduce bias by emphasising the strengths of the study more than its weaknesses, reiterating selected results, and inflating the importance and generalisability of the findings. Commonly authors go beyond the evidence they have gathered and draw unjustified conclusions.

Suggested structure for discussion of scientific papers

- Statement of principal findings
- Strengths and weaknesses of the study
- Strengths and weaknesses in relation to other studies, discussing particularly any differences in results
- Meaning of the study: possible mechanisms and implications for clinicians or policymakers
- Unanswered questions and future research

Our proposal for a structured discussion is shown in the box. The discussion should begin with a restatement of the principal finding. Ideally, this should be no more than one sentence. Next should come a comprehensive examination of the strengths and weaknesses of the study, with equal emphasis given to both. Indeed, editors and readers are likely to be most interested in the weaknesses of the study: all medical studies have them. If editors and readers identify weaknesses that are not discussed then their trust in the paper may be shaken: what other weaknesses might there be that neither they nor the authors have identified?

The next job is to relate the study to what has gone before. The task here is not to show how your study is better than previous studies but rather to compare strengths and weaknesses. Do not hide the weaknesses of your study relative to other studies. Importantly, you should discuss why you might have reached different conclusions from others. But go easy on the speculation. If you don't know why your results are different from those of others then don't pretend you do, and you should certainly not assume that your results are right and the others wrong.

Now you should begin the difficult study of discussing what your study might "mean." What might be the explanation of your findings and what might they mean for clinicians or policymakers? Here you are on dangerous ground, and most editors and readers will appreciate you being cautious, not moving beyond what is often limited evidence. Leave readers to make up their own minds on meaning: they will anyway. You might even emphasise what your evidence does not mean, holding readers back from reaching overdramatic, unjustified conclusions. Finally, you should discuss what questions remain unanswered and what

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