

Doing an intercalated BSc can make you a better doctor

Two British medical students embarked on BSc degrees in anatomy and psychology with the aim of pursuing a side interest and gaining a taste of research. They achieved these intended aims as well as a significant unanticipated spin-off: they now 'fully understand' evidence-based medicine – and furthermore, they are keen and confident to apply its principles in their clinical training and beyond.¹

The students are a small and self-selected sample; their story is anecdotal; and they may have undeclared subliminal biases (what better way to ingratiate oneself to a future employer than to publish a letter praising his or her course?). But for all that, these young individuals have raised an important and original hypothesis, which the educational community should now take steps to test.

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The hypothesis is this: The way to ensure that lifelong clinical performance incorporates the principles of evidence-based medicine (EBM) is to introduce students to the practical realities of research during their formative years.

For anyone who missed it, the principles of EBM are: (a) clinicians should regularly raise structured questions about diagnosis, prognosis, therapy and so on in their encounters with patients; (b) they should search sys-

tematically for research-based evidence; (c) they should evaluate critically the evidence they find, asking about validity ('can I trust it?') and relevance ('does it apply to this patient?'); and (d) they should base their clinical decisions, and the information they share with patients, on 'bottom line' mathematical estimates of benefit and harm.

Twenty-five cohorts of undergraduates have passed through the doors of our medical schools since the principles listed in the previous paragraph were first set out by David Sackett. But medicine as practised by most health professionals is still not evidence-based, and the accumulated pile of papers and commentaries addressing the question 'why not?' grows higher year on year.

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The advocates of EBM (who as we know have a penchant for generating quantitative data from controlled trials) have undertaken at least 40 of them on the teaching of EBM – and helpfully summarized them in three systematic or quasi-systematic reviews.²⁻⁴ The 'population' in such trials is usually a sample of medical students or junior hospital doctors; the 'intervention' is (with a few shining exceptions) a short and thinly described course in critical appraisal; the 'control' is the pedagogical equivalent of 'usual care', and the 'outcome' (again with one or two notable exceptions) is a self-rating scale of satisfaction with the course and/or 'EBM knowledge', which at least one study has shown bears little relation to participants' actual knowledge.⁵

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Bearing in mind that negative studies are less likely to reach publication, and that the methodological quality of many trials was low, four messages can be distilled from this literature: (i) that EBM teaching as conventionally delivered in undergraduate curricula improves students' EBM knowledge and attitudes, but a wider impact on performance has not been consistently demonstrated;^{3,4} (ii) that most classroom-based EBM training has little or no impact on doctors' knowledge or critical appraisal skills³ (perhaps because both the training and the tests are non-compulsory; perhaps because the training itself is too little, too superficial, too formulaic, too passive and too removed from practice^{2,6}); (iii) that more pedagogically sound approaches such as 'integrated' EBM teaching (e.g. during ward rounds or in the emergency room)⁷ or intensive short courses using highly interactive learning methods⁸ can produce significant changes in knowledge, skills and behaviour; and (iv) that no direct impact has yet been demonstrated from such courses on any patient-relevant outcomes.^{3,6,9}

Michael Green, who has conducted one of the most rigorous primary studies as well as a national survey of programmes and a critical overview^{2,7,10} holds the view that EBM teaching should occur 'where the rubber meets the road' – that is, in the clinic and at the bedside.⁷ Green cites adult learning theory to support the argument that EBM teaching must surely be more

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effective if the learner can relate it to practical problems in the here-and-now and use it for real (as opposed to hypothetical) decision making. The way forward, he claims, is for more senior clinicians to follow Sackett's example and take an 'evidence cart' or equivalent on their rounds¹¹ enabling clinical questions to be raised and answered in a context that optimizes active learning.⁷

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Education should of course be both meaningful and 'real'. But perhaps the interest in EBM teaching up to now has focussed too much on 'downstream' meaning (that is, the meaning assigned to the application of the evidence at the bedside) and not enough on the meaning of the evidence itself (where did it come from, by what steps was it produced, and why might we choose to challenge its validity?). As the student correspondents point out:

Any student who carries out a research project during the course of an intercalated degree knows how things are never black and white or clear cut and *thus* evidence has to be evaluated carefully' [our emphasis]

As these students rightly imply, the practice of EBM is not a 'behaviour'; it is an internalized spirit of enquiry born of a deep understanding of the both the value and the limitations of biomedical research. It is time that research into the teaching of EBM ceased to be predicated on a linear and behaviourist model in which the teaching package is an 'intervention' and the goal is an 'outcome' (e.g. doctors assigned to receive it are more likely to read the journals, correctly complete a critical appraisal checklist, correctly extract and interpret the number needed to treat and so on),

and moved to a more humanist focus that addresses fundamental changes to learners as people.

McManus and colleagues compared UK undergraduates who took an intercalated BSc degree (around one-third of the total cohort of 2695) with those who did not. Whereas there was no significant difference between their deep and strategic learning scores on entry to medical school, there was a significant difference in favour of the BSc group by the final year.¹² This study should be interpreted cautiously as the study was non-randomized and groups differed in key baseline variables. It raises, but does not prove, the hypothesis that intercalated BSc courses produce graduates who are significantly better able to 'get their heads round' research and what it means for clinical practice.

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Despite decades of research on EBM, we still do not know it all and we congratulate Agha and Singh for providing EBM educationists with a much-needed new hypothesis about how it is learnt. Perhaps the intercalated BSc provides a new opportunity to make a difference. Furthermore, their experience throws up more challenging questions about the meaning of EBM and, ironically, we may have to turn to words rather than numbers to address these questions.

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