What evidence is there that teaching EBM achieves its aims? A five year old Cochrane review found sparse evidence[9]—one randomised controlled trial showing that about six hours of journal club time devoted to critical appraisal increased knowledge of this. Two subsequent randomised controlled trials with broader teaching showed a sustained educational benefit across several of the processes of EBM.[10 11] A systematic review in this issue shows that integrating the teaching of the steps of EBM with clinical practice is vital to improving attitudes, skills, and behaviour.[12] Integration means applying the steps to real and current clinical problems. Thinking is not enough and doing is necessary for success.

Additionally, role modelling may be necessary.[13] Unless students see their role models use EBM in practice, they are unlikely to value it as clinically important. Therefore, specific content in their daily clinical education must refer to relevant trials and cohort studies to show how research methods integrate with clinical practice. Teaching EBM may need to focus as much on teachers as on students and registrars.

In postgraduate environments one useful modelling step is modified and question driven journal clubs to enable registrars in hospital or general practice to engage in a communal EBM activity.[14] Another way to improve the teaching of EBM in the postgraduate environment is to create evidence teams consisting of registrars and medical students to find evidence in everyday clinical settings. Their evaluation of the evidence can then be evaluated by the consultant on the team, who would be in the best position to evaluate the use of that evidence for the patient.

EBM is here to stay. It has become an essential way of teaching and practising in the uncertain world of medicine. The challenge is to engage the whole healthcare team in learning about it and making it part of the routine of clinical practice.

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# Evidence based medicine has come a long way

*The second decade will be as exciting as the first*

Evidence based medicine seeks to empower clinicians so that they can develop independent views regarding medical claims and controversies. Although many helped to lay the foundations of evidence based medicine,[1] Archie Cochrane's insistence that clinical disciplines summarise evidence concerning their practices, Alvan Feinstein's role in defining the principles of quantitative clinical reasoning, and David Sackett's innovation in teaching critical appraisal all proved seminal. The term evidence based medicine,[2] and the first comprehensive description of its tenets, appeared little more than a decade ago. In its original formulation, this discipline reduced the emphasis on unsystematic clinical experience and pathophysiological rationale, and promoted the examination of evidence from clinical research. Evidence based medicine therefore required new skills including efficient literature searching and the application of formal rules of evidence in evaluating the clinical literature.

Important developments in evidence based medicine over the subsequent decade included the increasing popularity of structured abstracts[3] and secondary journals summarising studies of high relevance and methodological quality,[4] the creation of the Cochrane Collaboration and its systematic reviews, and the publication of innovative medical texts emphasising evidence based decision making. The principles of evidence based medicine have become core concepts of undergraduate, postgraduate, and continuing medical education, and courses, workshops, and online resources have proliferated.

The philosophy of evidence based medicine has evolved. Exponents increasingly emphasise the limitations of using evidence alone to make decisions, and the importance of the values and preference judgments that are implicit in every clinical management decision. They now see clinical expertise as the ability to integrate research evidence and patients' circumstances and preferences to help patients arrive at optimal decisions.

Evidence based medicine, still young, faces challenges in integration into clinical practice. The process of producing relevant evidence through high

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quality research will continue indefinitely, requiring considerable investment by funding agencies all over the world. The process of summarising that evidence is daunting. Estimates based on current rates of publication of randomised trials and completion of systematic reviews indicate that it would take reviewers until 2015 to produce the 10 000 Cochrane reviews required to summarise existing evidence.[5] Clinicians will also need new reviews and updates for the many thousands of trials completed each year and for observational studies concerning diagnosis, clinical prediction, and harm.

Evidence based medicine's biggest future challenge is one of knowledge translation, ensuring that clinicians base their day to day decision making on the right principles and on current best evidence. All too often clinicians are unaware of the available evidence or fail to apply it. Because clinicians' values often differ from those of patients,[6] even those who are aware of the evidence risk making the wrong recommendations if they do not involve patients in the decision making process.

One solution is to replace traditional sources of medical information that are unsystematic or quickly outdated. In the past five years many new resources have been developed to facilitate rapid access to the best evidence on a wide array of clinical problems. For most medical decisions, these preprocessed sources of high quality evidence surpass databases such as Medline. Other approaches to encouraging evidence based practice include computer systems for decision support that can incorporate reminders, directives, and incentives, as well as audit and feedback.

Ensuring decisions are consistent with patient values is even more challenging. With which patients should clinicians discuss personal values, and for which should they present the likely outcomes of different courses of action so that patients' values will be manifest in their decisions?[7] How can clinicians quickly and accurately ascertain patients' values? And how should they convey efficiently complex information that includes appreciable uncertainty? Clinicians often barely have time to do the necessary history and physical examination.

Investigators have begun to address these dilemmas. One strategy is to offer graded recommendations that identify decisions in which the trade offs between benefits and risks are clear and for which virtually all patients who understood the evidence would make the same choice.[8] A guidelines panel for the American College of Chest Physicians has used such an approach in developing recommendations for antithrombotic therapy including, for instance, recommendations concerning prophylaxis against deep venous thrombosis.[9]

Many important decisions will, however, remain sensitive to patients' values and preferences. Decision aids that provide structured presentations of options and outcomes for conditions such as breast cancer, for modifying cardiovascular risk, and for preventing stroke offer one approach. Decision aids increase knowledge, increase the proportion of patients with realistic perceptions of the chances of benefits, and improve agreement between patients' values and choices.[10]

While this research and innovation represents an encouraging start, appropriate incorporation of evidence and values in all clinical decision making remains a distant goal. Evidence based medicine has come a long way, but the remaining challenges suggest that its second decade will be as exciting as the first.

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# The essence of EBM

*Practising what we teach remains a big challenge*

Two roads diverged in a yellow wood,
And sorry I could not travel both . . . .

Robert Frost

When Frost pondered these two roads, he did not call for a randomised controlled trial. Life is about chance, and that goes for medicine too. Clinicians know that sometimes the best we can do is make our decision, hope it will have made all the difference, and not pine away about the road not taken. Today, as medicine lurches down the road to an evidence based world view, do we know where we are going? Should we turn back?

Even well intentioned supporters ask what's the "E" for evidence based medicine (EBM)?[1] Its most basic assumptions are unproved, indeed largely untested. For example, we do not know whether "convincing information leads to optimal decision making."[2] Nor do we know whether most healthcare professionals "base their decisions on the best evidence." As Frost wrote about another wood, EBM has miles to go, and promises to keep.

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