



1 What is evidence based medicine?

Summary of practical points in this section

This section will help you understand what the EBM 'debate' is about. There are a number of reasons put forward by GPs on why they do not want to learn about EBM – or why they think they are using evidence already! This section will define EBM for you so that you can counter some of the arguments.

In the end, you will accept that some GPs are still in the 'pre-contemplation' stage and will not want to listen to you or the division about the positive features of EBM. However, if you 'embed' EBM in clinically relevant programs and CME, then you will find that its relevance will be accepted by those who would reject it if it were presented as a subject standing in isolation from day to day practice.

This section describes how EBM can be tailored to meet the needs of busy GPs.

1.1 A definition of EBM

Evidence Based Medicine (EBM) is often defined by Sackett's* statement, namely that it is 'the explicit, conscientious and judicious use of current, best evidence in making decisions about the care of individual patients. It means integrating individual clinical expertise with the best available external clinical evidence from systematic research'.¹ Sackett's words are deliberately chosen. EBM is 'explicit' because it overtly translates the results of scientific research directly to patient care. It is 'conscientious' because it involves deliberate cognition about the use of evidence, rather than tacit assumptions which might accompany other clinical decisions. It is 'judicious' because it is understood that evidence cannot be applied blindly to all patients without taking into account the context of the patient, including social, cultural and environmental factors.

In practice, EBM is more than just the process of using evidence; it includes a different way of thinking about clinical decision-making and the way we process information. Its philosophy dates from 19th century Paris,¹ and its theoretical basis is in applied clinical epidemiology.

There is nothing new about using evidence in clinical decision-making. Indeed, many practitioners respond to the call for evidence based practice by insisting that they have always practiced in such a way. After all, modern medicine is based on science, and science is based on evidence. The new discipline of EBM has come about in a response to the information revolution which has resulted in both an explosion in the amount of published medical research and the advent of new tools which allow easier access to the results of research.

The principles of EBM are commonly applied to therapeutic interventions but also can be applied to diagnostic tests, prognosis, prevention and even clinical signs. EBM considers interventions as processes for reducing the risks of adverse events and in this way it encourages clinicians to be explicit about the aims of treatment.

1.2 EBM thinking

To a large extent the foundation of EBM is curiosity about the origins of knowledge. EBM encourages practitioners to be more rigorous in thinking about what they do in their day-to-day clinical activity. GPs ought to question the evidence which forms the basis of their practice.

Rather than saying that 'X' is the treatment for disease 'Y' as doctors might have learnt as students, EBM suggests that clinicians think about what they are trying to prevent with each intervention and then

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question its effectiveness. How do I know this intervention ‘works’? If it does, what adverse event or outcome am I preventing and by how much does the intervention reduce the risk? The answers to such questions lie in the evidence and give us an indication of the usefulness of each intervention. It is then up to the clinician to weigh up this and all the other factors which might influence the clinical decision (see 1.3). Not only does EBM quantify the effectiveness of each intervention but it also makes it easier for patients to understand the probabilistic nature of treatment. In this sense it is consumer oriented and indeed has garnered consumer support.²

This type of thinking can also be applied to other areas of clinical activity. How much does this positive test increase the chance that my patient has this disease? How much does this positive physical sign increase the probability of disease? Does this screening tool reduce the probability of a person dying from this disease? The answers to these questions are probabilities and can be found in the evidence.

1.3 The role of evidence in clinical decision-making

The individual clinical encounter between doctor and patient is a complex process and clinical decision-making is the result of interaction between many factors. Some of these relate to the patient, such as the perception of their disease, the social context of their problem and their other illnesses (co-morbidities). Other factors relate to the doctor, such as training and experience together with the doctor’s own social and cultural background.³ The cost of the intervention, both to the patient and society will also influence the result, as will society and the prevailing culture by determining what interventions are available, are legal or are ethically appropriate. The way all these factors might interact is illustrated in Figure 1.

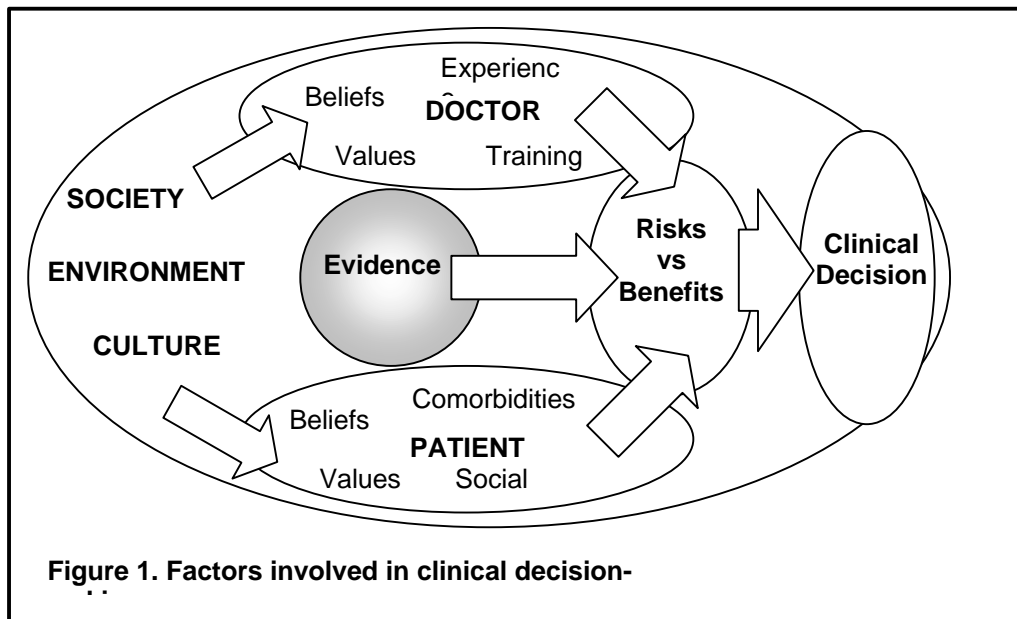


Figure 1. Factors involved in clinical decision-

EBM would say that the best results are achieved when this knowledge is based on the current, best evidence. By using scientifically derived evidence in the clinical situation the doctor is maximising the effectiveness of the intervention. It is nevertheless important to emphasise that the evidence can answer only the knowledge part of the clinical consultation and has little influence over the other determinants of clinical decision-making. Therefore EBM cannot give a yes/no answer to a question or dictate what therapy should be prescribed under all circumstances.

1.4 Classic EBM – five step answers to clinical questions

The process of finding and applying evidence in clinical practice is described in five steps.⁴ Each of these steps has a skill attached to it which GPs will learn as they move along the road to EBM. It is not necessary for every GP to become proficient or expert at each skill, rather EBM promotes the improvement and refining of these steps. In brief, these steps involve:

- **Questioning:** Looking critically at what we do in clinical practice and asking deliberately structured questions about specific clinical situations.
- **Searching:** Using evidence based resources to help find the answers to these questions.
- **Appraising:** Critically appraising the information retrieved.
- **Applying:** Working out how to apply this external evidence with individual patients.
- **Evaluating:** Seeing whether this evidence has helped in the quality of care of patients and their health outcomes.

Some GPs will be happy to search the internet for information; others will want to use summaries of evidence provided by reputable organisations, perhaps in the form of clinical practice guidelines. There is no one thing that constitutes the skills of EBM. Rather, there is a range of skills which GPs can acquire over time and which makes the explicit use of the best available evidence more likely. That is, the road to EBM is an approach to life-long learning and quality improvement in clinical practice (see 1.9).

These five steps constitute what might be referred to as 'classic EBM'. However, it is important to realise that evidence based practice is more than just following the five steps; it involves a different approach to clinical practice such as described above in 'EBM thinking' (1.2) and this will be explored in the next section (1.5).

Answering clinical questions

Day-to-day general practice generates so-called 'clinical questions'- questions which arise during clinical consultations. These may be asked by patients themselves. Do anti-oxidants prevent heart disease? Should I take aspirin if I have a family history of heart disease? Others come from the consultation. What is the best investigation to exclude carcinoma of the pancreas? Do antibiotics make a difference in sore throat? Research suggests⁵ that about one question arises every 3 or 4 patients, and whether the GP goes looking for the answer depends on several factors. These include obvious things such as the urgency of the problem and the consequences of not knowing the answer, but also include whether the doctor believes that the answer exists and is discoverable. In addition, doctors will search for the answer if they perceive that the patient expects them to know the answer.

Some of these clinical questions will be easily answered from a reference source such as a text book or manual. For example, questions about the characteristics of a particular disease, the dose of a drug or specific travel advice could be answered by reference to Harrison's, the Australian Medicines Handbook or a travel manual. On the other hand, clinical questions which deal with treatment, diagnosis or screening, are often best answered using the results of population research and it is this type of question which appeals to the use of 'current best evidence'. While text books and GP journals might be able to provide answers to this type of question, they are often out of date, poorly indexed or 'opinion' based.

The 'evidence based' approach would be for GPs to search the evidence to find the answer, whether this evidence be original research papers, systematic reviews of the literature or evidence based clinical practice guidelines. This is the systematic five step process outlined above and the EBM skills are those associated with the five steps.

To some extent, GPs intuitively go through the five steps whenever they answer clinical questions; the EBM approach is to learn the skills associated with each step and by doing so become more effective in clinical practice. The fact that some of these skills are difficult to master shouldn't deter GPs from learning the basics and improving from there. Just as GPs can make an assessment of the quality of an article they read according to the quality of journal, the qualifications of the author etc., they can, by learning new skills, critically appraise the choice of study design, the statistical methods used and the conclusions reached.

Question framing

Questions are easier answered if they are framed in a structured way. If we are looking for evidence of effectiveness of a particular therapy, we want to know how much the intervention reduces the risk of an adverse outcome (or improves the risk of a good outcome) in our particular patient. Therefore, the question needs to address a patient, an intervention (sometimes with a comparison) and an outcome. This is called the PICO format (Patient, Intervention, Comparison, Outcome). Framing questions in this way allows for more efficient searching of the evidence and more enlightening results when the appropriate studies are found. Should you prescribe diazepam for back pain? Do beta-blockers prevent migraine? What is the best antibiotic for urinary tract infections? These are all questions which can be answered from the evidence but need to be phrased in the PICO format. Questions about diagnostic tests, screening tools and other areas of clinical practice are also more easily answered if framed in a systematic way.

Evidence searching

Most clinicians have experience searching catalogues for references, and many will have used a computer search engine to search the internet or a CD-ROM. The majority of these will also have experienced the frustration which searching can generate and also have an understanding of how difficult and complex a simple search can become.

The aim of searching for evidence is to find all the relevant material which will contribute to answering the question without being swamped with the irrelevant stuff. It is important to consider both of these aims because it is very easy to end up with either a short list missing the best material or a list too long to examine in detail.

Search strategies can be sensitive or specific. A sensitive search will pick up all the relevant material but also a lot which might be irrelevant while a specific search will exclude most of what isn't useful but at the cost of missing some of the relevant material. There is always some trade-off between the sensitivity and specificity of the search which is illustrated in Figure 2 below.

The most useful approach will depend on the expected outcomes. For a summary article on a topic or when time is short, a specific search is the one to start with, while a sensitive search is important for a comprehensive review of the literature. Searching is helped with the use of so-called 'Boolean operators', such as AND, OR and NOT, which help to broaden or narrow down the search. The best search can only be as good as the indexing allows and it is worthwhile keeping in mind that the indexing is done by humans and not computers. Also, it is worth remembering that you will never know how many things you haven't found.

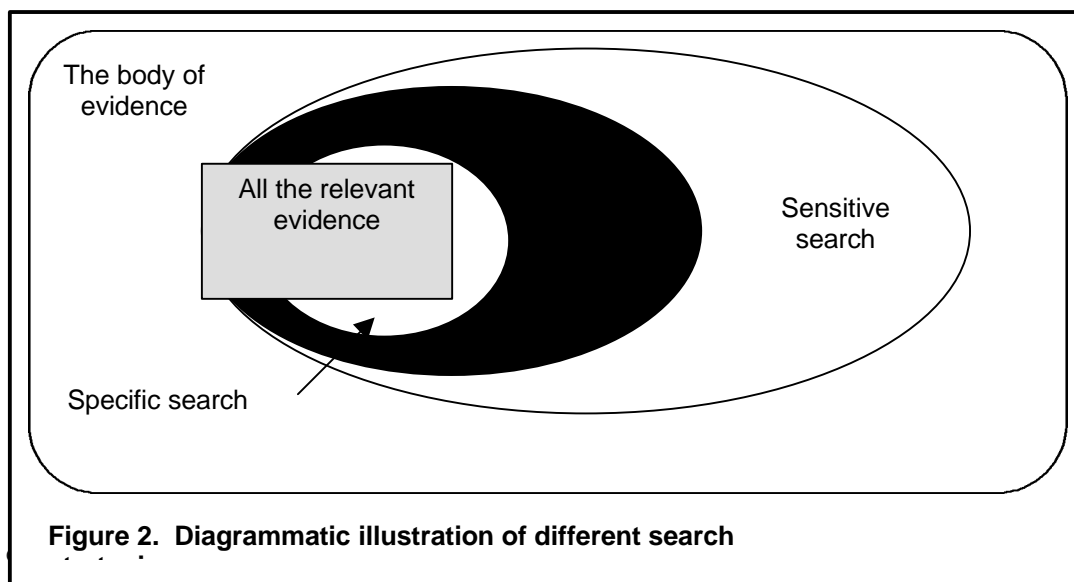


Figure 2. Diagrammatic illustration of different search

Critical appraisal

Critical appraisal is the assessment of the quality of the evidence presented in the literature. In a simple form it is a process which GPs go through unconsciously whenever they read the medical literature. They take note of the quality of the journal, the reputation and qualifications of the authors and the content of the article and how that fits in with their current knowledge. More thorough appraisal involves some understanding of basic statistics, trial designs and research methods including the origin and nature of bias. The important principle of critical appraisal is that it examines evidence in an objective and dispassionate way without preconceived notions about the validity of its outcomes.

Applying the evidence

The application of evidence requires both art and science. The science of applying evidence derived from population based research to individual patients is known as clinical epidemiology. It requires an understanding of the principles of risk and risk management together with concepts of clinical effectiveness and statistical analysis. Evidence will inform us about the degree to which an intervention reduces the risk of an adverse outcome and how much it might increase the risk of a side effect. However, it cannot tell us in black and white whether to prescribe a particular intervention or not. The 'art' in this is to integrate the evidence with all the other facets of the clinical encounter, such as the social context, patient preferences and beliefs, co-morbidities and issues of cost and resources. This relies on a thorough knowledge of the patient together with an understanding of the context of the patient's illness within his or her social and cultural environment.

Evaluation

The simplest form of evaluation is to assess whether the application of evidence in a particular case has achieved the desired result. However, this is not always easy to do, due to problems with follow up or the long delay required to achieve relevant outcomes. Sometimes other types of evaluation looking at the 'process' of evidence based practice might be more appropriate.

Perhaps the most important of these is self-evaluation. An evidence based GP might ask- Am I asking clinical questions? Am I integrating new evidence into my daily practice? Am I questioning the new information I receive? The results of this sort of evaluation might not just come from a few minutes of introspection but also from a structured discussion with colleagues or a detailed clinical audit. This audit could examine the notes of a random group of patients and decide what proportion are receiving optimal evidence based investigation and treatment.

Another way of looking at evaluation is to examine the mechanisms whereby the results of an evidence search or the introduction of new effective interventions can be applied to the rest of the eligible patients in the practice. This means evaluating patient record systems, recall methods, reporting and documentation standards etc. and eventually leads to a discussion about how GPs can improve the quality of their practice and the service they provide for the community. This is further developed in the section titled, '*How does EBM relate to quality improvement in general practice?*'

1.5 EBM for busy GPs

While traditional or 'classic' EBM has dwelt on improving clinicians' skills in using the 'five step' method of finding and applying evidence, there is good evidence to suggest that GPs lack both the time and the inclination to become experts at what they interpret to be a rather academic process.⁶⁻⁸ Moreover, an emphasis on the five steps as being the 'core' task in EBM has perhaps led to the misconception for some clinicians (both GPs and specialists) that this is all there is to evidence based practice. It is important therefore, to realise that evidence based practice involves developing and using a particular

'mind-set' together with a new set of skills and that this is perhaps more important than remembering and practicing the 'five steps'. Hence, GPs can adopt evidence based practice without having to become proficient at all the skills associated with the 'five step' process.

The important elements of evidence based practice in this sense include; an understanding of risk and risk management, questioning the information received from CME or pharmaceutical companies and being comfortable in using evidence based guidelines in clinical practice. It also means thinking about the *clinical* outcomes of practice (eg patient well-being) rather than physiological surrogate outcomes (eg lowered cholesterol). It means being prepared to change practice in the face of new evidence. Further down the 'road to EBM' GPs can champion the use of evidence in local CME activities and insist that the CME activities they are offered have an evidence based framework. They might subscribe to evidence based journals such as 'Clinical Evidence' or 'Evidence Based Medicine' and learn to be responsive to the evidence requirements of their patients.

In the long run, EBM is about being effective in clinical practice and this evokes the issue of quality improvement. Evidence based practice entails following clinical practice guidelines, and implementation of these often requires 'system' changes in the way GPs organise and maintain their practices. Hence, reminder systems, practice protocols, audits and quality assurance processes are the logical consequence of evidence based practice (see Chapter 5).

Having stressed that busy GPs needn't have to struggle with the time-consuming process of the five steps to embrace EBM, it is also important to stress that they can't do nothing. A GP who says 'I agree that evidence is the basis of modern medicine, but just tell me what to do and I'll do it' hasn't embraced the principles of EBM. Even though the recent evidence suggests that GPs are both overworked and underpaid, shortage of time doesn't explain why some GPs have embraced the concept of EBM as part of professional development and quality improvement while others have been reluctant to seize the opportunity.

1.6 Problems with EBM

EBM has generated its fair share of controversy and criticisms. This is, to some extent, the result of the dogmatic style of its early protagonists and perhaps a response by clinicians to the perception that academics were appropriating the clinical coal-face.

A common criticism of EBM is that it takes the 'art' out of clinical practice. This assertion is difficult to refute because the 'art' is difficult to precisely define. Nevertheless, one might argue that the evidence and the 'art' are not mutually exclusive, and nor are the many other factors which impact on clinical decision-making (see 2.3). EBM leaves plenty of room for the imperceptible nuances of the doctor-patient interaction, and the intuitive aspects of diagnosis to affect the outcome of a consultation. Proponents of EBM simply argue that evidence ought to be considered and ought to be both recent and the best available.

Some doctors argue that EBM is too statistical and impersonal because it reduces patients to numbers and treats everyone the same. They perceive EBM as simply the results of randomised, controlled trials (RCTs) applied to individuals and would assert that an RCT is so artificial it doesn't help them decide what is best for their unique and multi-faceted patient. This feeling is understandable but it is important for us to remember that modern medicine is grounded in science which relies on statistics to create the knowledge on which we, as clinicians, base our practice. Moreover, EBM is not just about the results of RCTs, rather it promotes the use of the best available evidence, whether that be from an RCT or the opinion of a local expert.

EBM is also accused of being 'cookbook' medicine. The suggestion here is that evidence based practitioners slavishly follow predetermined texts of disease management based on the results of clinical studies. Again, proponents of EBM would stress that evidence does not replace clinical expertise, which itself must decide the role evidence has to play in each particular case. Moreover, it is just not possible to subscribe all the variations of social, cultural, environmental and co-morbidity influences on disease processes into a 'cook-book'. It is true that EBM does promote the use of guidelines, whose aims are to

standardise (and thereby improve) treatment, but a quick perusal of any guideline will reveal how little 'cooking' is done.

Another criticism of promoting evidence in clinical practice is that it displaces 'experience' as the basis for clinical decisions and thereby devalues the wisdom which is accrued by years of practice. In that way, it can inadvertently threaten those who see their experience as their power base. This is both understandable and to a large extent unavoidable. Indeed, part of the EBM argument is that our perceptions can mislead us, and that the best evidence comes from trials of many patients rather than the memories of a relative few. Nevertheless, experience has a major role in evidence based practice, not only in the 'art' of medicine and when to apply the evidence as described above, but also in that majority of situations where there is no evidence, or where the situation doesn't lend itself to empirical thought.

From a philosophical viewpoint, EBM has its theoretical base within the scientific and empirical thought of the 19th and 20th centuries. In this sense it relies on what might be called an 'old-fashioned' understanding of 'the truth', which has changed in the last 20 years with the rise of post-modernism. Whereas scientific thought assumes that 'the truth' is an objective and verifiable reality which is external to our human-ness, post-modernists hold that knowledge itself arises from the social, political and linguistic context in which our actions, thoughts and language are embedded. 'The truth' is constructed by our cultural and socio-political environment, so we cannot 'know' anything, they would say, without first examining the socio-political context of where that knowledge sits. Not surprisingly, post-modernists have critiqued EBM in this respect and ask questions such as:- whose evidence is this, in what context was it made and who benefits from it? ⁹

1.7 The limits of EBM

There are limits to what EBM can do. EBM emphasises the probabilistic nature of clinical practice, stressing that the evidence can only give us a probability that our intervention (or diagnostic test or screening tool) will be effective. Evidence based therapeutics cannot guarantee a positive outcome nor can it give us a yes/no answer to a treatment decision. It only informs the 'knowledge' bit of the consultation (see 1.3).

As mentioned above, EBM ranks evidence in levels, with the so-called best evidence coming from randomised controlled trials. While this is understandable from a scientific viewpoint, it inadvertently devalues other forms of evidence and thereby imposes limitations on the types of interventions which have 'good' evidence to support them. Interventions and outcomes which are physically, economically and politically easier to measure, tend to gain priority and popularity at the expense of the more nebulous or difficult. For example, we can easily get 'level 1' evidence to prove that antibiotics prevent recurrent otitis media but it would be more difficult to examine the role of improved housing in preventing the same disease. This bias which gives prominence to experimental studies and quantitative research means that the biomedical model of health tends to get precedence over the social model. At the moment qualitative studies get no mention in the 'levels of evidence' hierarchy.

EBM can't help us in those everyday situations where there simply is no evidence on the best thing to do. In those situations, we need to rely on our basic sciences, clinical acumen, rapport with our patient, their particular preferences and the 'art' of what we do, to decide the best approach. Neither can EBM help us on issues we haven't yet discovered or about things we know exist but can't measure.

Finally, even though evidence can inform us that an intervention is effective from a clinical point of view, it cannot reassure us that it is cost effective. While some may argue against the ethics of raising the issue of cost in this context, it is nevertheless reasonable to assume that we ought not to waste money. Interventions that have proven effectiveness might not necessarily warrant implementation if the money would be better spent elsewhere. EBM has a crucial role in informing economic evaluations of interventions but in itself cannot demonstrate that an effective intervention is worth the expense.

1.8 Barriers to evidence based practice

There are many barriers preventing GPs from using current best evidence in their day-to-day practice. Most GPs mention time as the major barrier, meaning that they are just too busy with clinical work, paper work and CME to afford the extra time necessary to follow the five steps to answering a clinical question,

or for that matter learn the appropriate skills to do it. Some GPs consider that it is not their role to search for evidence and that other clinicians such as academics and specialists should review the evidence and simply inform them what to do through CME activities. Other GPs might perceive that EBM is being imposed upon them by academics or governments with a hidden agenda such as cost savings or research. Some also might disagree with EBM on principle, believing that experience and intuition are more effective tools in modern general practice.

Even if GPs are enthusiastic about evidence based practice, the next step requires the acquisition of certain skills, such as searching and critical appraisal, and the lack of these skills might also be a barrier to practice. And even if the skills are acquired access to the evidence can be difficult, either due to a 'system' problem (for example having a system to index clinical practice guidelines) or due to the lack of IT hardware, slow software or problems coping with the 'jungle' which exists on the internet.

1.9 The GP and the road to EBM

GPs already practice evidence based medicine to varying degrees. Some will already be accustomed to searching for evidence on the internet, questioning drug reps or specialists about therapeutic interventions and following evidence based guidelines. On the other hand, others might base their therapy solely on the information they receive from drug reps, or what they learnt 20 years ago and might regard EBM as a government conspiracy to control general practice. Therefore, it is useful to visualise EBM as a road along which GPs will travel as they pick up the skills and learn the 'mind-set' of EBM. This road doesn't really have a beginning and no-one can see the end; rather it is a learning continuum which GPs move along as they improve their practice. We say 'improve' deliberately because we believe that evidence based medicine goes hand in hand with quality in general practice.

Moving down the 'road' to EBM will involve tackling the barriers mentioned above (1.8). This may involve improved time scheduling or setting aside particular times for evidence searching or updating. It may involve simply adjusting the resources GPs seek when doing self-directed learning, such as replacing books and narrative reviews with systematic reviews and guidelines. It may mean just making evidence based resources more easily available, undergoing IT skills training or computerising the practice. It will depend upon where each GP (or group of GPs) is on the 'road'.

The evidence based general practitioner will have an understanding of the probabilistic nature of daily clinical practice. He or she will continue to question the effectiveness of the interventions they use and be demanding of evidence in response to new interventions and screening tools. They will use evidence based clinical practice guidelines daily in the management of common disorders and be responsive to the questions that arise in the clinical context. Evidence based practitioners will be familiar with the Cochrane Library and will be confident, but might not be expert, at searching other databases on the internet and critically appraising the results of their search.

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