Clinical decision-making used to be based on physicians’ experience and authority. Now this is no longer enough. The dissemination of the practice of evidence-based medicine (EBM) has closely appended science to art. Clinicians worldwide have access to powerful, precise and up-to-date information sources on which to base both diagnosis and treatment. Medical textbooks, which until recently, referred to tests as being ‘positive’ or ‘negative’ and to treatments as being ‘useful’ or ‘ineffective’ for a given condition, are being transformed. They are less likely to contain these vague adjectives, whose meanings are uncertain, or the tables that cite extremely rare causes on the same footing as highly common ones. An analytical, quantitative and critical approach to medical data is on the rise. Factual, numeric information, often derived from the scientific examination of large numbers of patients, is now widely available, through modern textbooks, journal articles and electronic databases. Many of these databases can be accessed and searched in real time, and they are often continuously updated. As a result, EBM, which is the use of this type of information as the basis of decision-making, is becoming a paradigm of correct medical practice. More and more, it underlies clinical thinking, and it affects and improves many medical decisions.

The potential benefits of EBM are numerous and well described. Nevertheless, concerns have been published, and enthusiasm for this recently unearthed treasure trove should not be undiscerning. Although there is wide agreement as to the immense value of the practice of EBM in the science and art of clinical decision-making, its clinical usefulness could be enhanced if clinicians understood the gaps that exist between the research evidence and the care of the individual patient, and dealt with them effectively.

First, the characteristics of patients studied in randomized controlled trials (RCT) and the individual patient under care in the physician’s office or on hospital ward, are often different. As a result, even data collected from carefully conducted and controlled studies may not be directly applicable to an individual patient. Applying average results derived from groups of patients to a unique patient is bound to be problematic. As Mant says: ‘a clinical trial is the best way to assess whether an intervention works, but it is arguably the worst way to assess who will benefit from it’. In addition, differences related to the population (genetic, cultural, environmental, healthcare facilities) and individual differences (age, co-morbidity, past or current treatments, non-biological variables) may affect the translation of evidence from study sample to individual patient. Moreover, patients studied in large trials are selected according to strict criteria, meticulously investigated, and carefully followed, by physicians who are not only highly experienced, but also committed to their research project. Research studies are often conducted at outstanding teaching facilities with personnel, equipment and laboratory capabilities exceeding those available for most patient care. As a result, patients in controlled trials may get care and follow-up that is considerably better than ordinary. Their compliance is often above average, in part because willingness to follow medical advice is part of the trial’s selection criteria.

The potential gaps between research evidence and the individual patient can be illustrated throughout by looking at one well-studied example: warfarin treatment for stroke prevention in non-valvular atrial fibrillation. Most trials excluded many patients, and often less than 10% of eligible patients were actually randomized. In actual practice, patients are older, have more co-morbid conditions, have much longer intervals between coagulation checks, and are less often within the target ratios. Factors related to different physician’s expertise and time constraints in the community are also likely to contribute, and the reported rate of serious bleeding may be at least twice as high for patients in the community (3% vs. 1.3% per year). Perhaps treatment should not be offered to low-risk patients, identified through studies that examine risk stratification in atrial fibrillation. Treatment failures in ordinary practice (i.e. ischaemic strokes) may also be more frequent.
than reported in randomized trials based in referral centers. As one critic of EBM put it ‘the conditions of trials are often far removed from clinical practice, as are the patients. These differences should be carefully and critically taken into account when translating the evidence. Some differences may be avoided by finding studies that were done in ordinary practice settings, and more such studies are needed. Searching published studies for information on risk, benefit and harm in subgroups of patients that more closely approximate those in practice, is also useful when available. However, most trials are not large enough to allow precise estimates in subgroups, and pooled data from many randomized controlled trials may be necessary to obtain adequate information on patients in clinically important subgroups.

At the same time, carefully performed analyses of observational data (such as the Duke cardiovascular diseases database) can complement and extend RCT, often providing important information for individual patients and longer-term follow-up. Once information that is as relevant as possible to the patient in hand has been identified, a relatively simple approach can be adopted to tailor it to the patient. As suggested by the EBM Working Group, the clinician can estimate the patient’s risk of both a clinical event and intervention-related adverse events, relative to that of the patients in the study. Such estimation of relative differences based on clinical judgment, may be quite accurate, and used to generate patient-specific number-needed-to-treat or number-needed-to-harm data.

In extrapolating from large trials to an individual patient and in reconciling EBM with patients’ values, the criteria proposed by Glasziou et al. could be used. Their model requires four steps: deciding whether the patient is essentially similar to those in the study and stratifying findings according to individual patient characteristics; assessing whether the intervention can be approximated in a non-study setting; quantifying benefits and harm; and incorporating individual preferences. Alternatively, clinical decision analysis may be helpful. Familiarity with this method allows the clinician to derive a unique, patient-tailored decision that takes into account multiple health outcomes, even when the evidence is incomplete, complex and probabilistic, such as anticoagulation in a patient with atrial fibrillation. Recent studies clearly demonstrate the importance of the individual patient’s risk profile, and how it could be used in individualizing treatment choices. Nevertheless, review of decision analysis in patient care reveals that significant limitations still exist. Clearly, the effect of individual variables on patient outcomes must be skillfully assessed, and then incorporated into the controlled trial data, before it is adopted for the care of the individual patient.

Second, practicing physicians, pressured by work overload and shortened time for seeing each patient, may be tempted to prematurely narrow the clinical question and look for the best evidence related to it. Unlike physicians in trials, whose carefully planned protocol demands meticulous evaluation, their examination might overlook one of many important secondary causes of atrial fibrillation which require different management, such as an occult murmur of mitral stenosis; or their history taking may fail to discover that the patient is taking quinine for night cramps, which interacts with warfarin, increasing haemorrhagic risk. Thus, careful history and physical examination remains the cornerstone of medical decision-making, and should precede the application of EBM, to avoid serious gaps in knowledge and adverse patient consequences. The physical examination should itself be guided by evidence-based medicine.

A third gap between research evidence and practice is of particular importance in the era of escalating medical costs and managing care. The physician’s recommendation may be well founded in research evidence, but even wealthy countries encounter local barriers to implementation because of scarce resources. The contention that interventions driven by research evidence not only increase effectiveness but ultimately decrease costs, remains so far unproven. Fourth, the patient’s own wishes and preferences should determine how evidence is applied to them. The patient’s autonomy, rights and point of view should be respected and taken into consideration. This can be done best only after the evidence has been consulted. In that way, the pros and cons of the situation can be accurately transmitted to the patient and family, enabling them to judge, give an informed consent and be compliant. Providing an accurate basis for the patient’s own decisions is another important advantage of EBM.

In the atrial fibrillation example, the patient might find it too difficult to submit to frequent blood tests, or decide that the risk of serious bleeding is too much to accept. A recent meta-analysis of six RCTs showed a relative risk reduction of 62% with warfarin compared with placebo, and 36% compared with aspirin. Unfortunately, despite its well-proven efficacy in preventing stroke, warfarin therapy of these patients is still markedly underused: up to two-thirds of eligible patients do not
receive warfarin. Part of this may be due to patient reluctance, but recent studies consistently found that patients placed a high value on avoiding stroke and a much lower value on avoiding a bleed. Physicians' thresholds were significantly different, emphasizing that clinicians cannot confidently substitute their own values for those of their patients. They must take care to avoid inadvertently skewed presentation of information, and strive at a truly balanced shared decision making between them and the patient. This point is well illustrated by the abovementioned study, which shows just how substantially different individual responses are. Responses of the 61 patients interviewed, regarding the minimum number of strokes that need to be prevented before warfarin is acceptable, ranged from 1 to 11(!) strokes in 100 patients over two years, and the patient’s view could not be predicted by other associated factors.

Finally, in every patient's illness and reaction to illness there is a strong emotional component. The so-called ‘psychosocial’ element is often hidden behind the organic presentation, but affects it in a complex interplay, and has an important bearing on the patient’s prognosis. Elements such as the patient’s social support, economic status, level of satisfaction, stress and perhaps most important, feelings of hope and optimism, all affect the patient’s course and prognosis. Physicians relying on the evidence alone, tend to disregard this information, which is relevant to the individual's patient’s outcome but does not show on randomized controlled trials. Yet it is there, and may even be managed to improve outcomes.

With the current dominance of the biomedical approach, the patient’s preferences and emotions are likely to be given only fleeting attention unless a patient-centered paradigm is intimately incorporated into the physician’s thinking and consideration.

This is especially important, because patients differ widely in their values and needs; even individual patients’ circumstances and preferences may change with time and should be re-evaluated frequently. An effective and sensitive communication between the physician, the patient and the family is an essential tool for incorporating and adopting individual circumstances to the evidence gathered from the analysis of populations. Furthermore, active patient participation in consultations may actually be associated with a better control of their diseases. Thus EBM may not fulfil its full promise if the patient’s unique personal concerns and attitudes are not fully appreciated and allowed to affect evidence-derived clinical decisions. This is as true in secondary and tertiary care settings as it is in primary care.

Medical decisions should certainly be based on the best available research evidence. However, the importance of the physician’s traditional skills is not diminished in the process. Clinical expertise is nowadays more crucial than ever. It enables the physician to carefully collect all relevant information from the patient, assess it to form a central question, then collect the best available research information and carefully apply it to the individual patient. In doing so, the physician should bear in mind the differences between the setting of the randomized controlled trial and the current situation, and the patient’s own wishes and feelings. Incorporating clinical skills and above all clinical judgment with a thorough appraisal of research evidence and matching the results to the unique individual patient should be today’s standard of good care. In this way, the inherent gap between clinical research and practice will become as narrow as possible, and the myriad benefits of evidence-based medicine will become even more impressive.

**Table 1** Recommended tools for narrowing the gap between population-based research ('the evidence'), and the unique individual ('the patient')

| The old arts: Using skillful collection and interpretation of basic data (primarily gleaned by the history, physical examination and basic ancillary tests) before formulating the main question to be pursued. |
| Searching and matching: A careful search and selection of data from the literature to identify studies (or subgroups of patients within studies) that match the current patient and setting as much as possible. |
| Estimating: Clinical judgment, or more formal methods such as decision analysis, can be used to estimate the individual patients’ outcomes relative to randomized controlled trial patients. |
| Verifying actual resources: Taking into consideration local factors such as healthcare professional expertise, rationing, availability, etc. |
| Identifying patient’s priorities and circumstances: Emphasizing the centrality of sensitive listening and communication with the patient and the family as an essential indispensable means of evaluating ‘intangible’ important emotional, spiritual and other non-biological aspects of the illness, sharing information and assuring patient participation in decision making that suit the patient and the patient’s values, best. |
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References


41. Ross JM. Commentary on applying the results of trials and systematic reviews to individual patients. ACP Journal Club 1998; 129:A17–18.


