

## The limitations of evidence based practice for emergency medicine

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Evidence based practice (EBP), also known as evidence based medicine, has been suggested as a more suitable basis for decision-making in clinical practice than the traditional 'expert' based approach. Central to EBP is the application of evidence (as found in the published literature) to an individual clinical problem. EBP, however, has limitations that may raise questions regarding its applicability to particular types of clinical situations including many of the problems encountered in Emergency Medicine. This article discusses the background and limitations of EBM and suggests some ways that the principles can be incorporated into Emergency Medicine practice. (*Hong Kong j.emerg.med.* 2000;7: 116-120)

**Keywords:** Evidence-based medicine, emergency medicine

### What is evidence-based practice?

Evidence based practice (EBP) evolved in response to the perceived inadequacies of 'clinically based medicine' (CBM). CBM emphasised pathophysiological rationale, clinical experience and intuition as the cornerstones to good practice.<sup>1</sup> Expert opinions and review articles with expert comment were accepted as guides to best practice.

The validity of CBM has been challenged on a number of grounds including the influence of selective experiential memory with its tendency to remember favourable outcomes more readily than unfavourable ones; lack of scientific rigour in the testing of new therapies with preconceived ideas or hopes for a new intervention colouring the interpretation of the outcome and emphasis on scientific authority and hierarchy unrelated to proof through scientific method.

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(As presented at the Third Conjoint Scientific Meeting of Hong Kong College of Emergency Medicine and Hong Kong Society of Emergency Medicine and Surgery, Hong Kong, December 17, 1999.)

Using CBM there is wide inter-clinician variability in practice. The result is the potential for patients to miss out on beneficial therapies due to the lag between when treatments were proven to be beneficial by research and when they were widely applied in clinical practice and appear in textbooks. Thrombolysis for acute myocardial infarction is a good example, taking thirteen years to bridge this gap.<sup>2</sup> Furthermore, resources may have been consumed by unhelpful, or even harmful, interventions because of insufficient emphasis on scientific evidence.

The underlying premise of EBM is that clinical decisions should be based on evidence gathered through clinical research. The principles of EBP are that:

1. Clinical experience and the development of clinical instincts are vital, especially in diagnosis
2. Study of and understanding of basic mechanisms of disease are necessary but insufficient guides for clinical practice. Evidence of best practice should be sought from the literature.
3. There is a need for understanding rules of evidence to enable the appraisal of the usefulness and strength of research.

The process of EBM has five defined steps:

1. The formulation of a specific clinical question to be answered eg Should a 68 year old patient

with atrial fibrillation take warfarin to prevent stroke?

2. Identification of the best evidence available (e.g. *Medline* searches)
3. Critical appraisal of the evidence for validity and applicability ie. methodology rather than just the results
4. Application of the evidence to the clinical problem
5. Evaluation of the outcome of the intervention

These five steps form the core of EBP and aim to apply the results of research directly to solving clinical problems.

### **What are the limitations of EBP?**

In order to understand the development of EBP and its suitability as a tool for aiding decision making, it is important to understand its limitations. These can be divided into those relating to the application of the process of EBP to a clinical problem and specific problems relevant to Emergency Medicine.

#### ***Process limitations***

##### *1. Problems with the question*

The process of EBM assumes that the practitioner formulating the question knows the patient well, so that the question can be formulated taking into account all current illnesses and treatment, past medical history and the specific social and cultural context of the patient. This is often not the case, even in general practitioner relationships. It is rarely the case for emergency medicine (EM), where practitioners commonly have to work with incomplete information about patients. If the quality of the clinical question is compromised by incomplete information, the accuracy and applicability of the 'answer' will also be in doubt.

##### *2. Finding the evidence*

Conducting searches of the literature takes time. Assuming that practitioners have access to search mechanisms such as *Medline* in their place of practice, it has been estimated that it takes as much as thirty minutes to conduct a high-yield

search. This is much longer than many physicians have to spend on each clinical problem.<sup>3</sup> And this estimate does not take into account time to locate and evaluate the evidence identified by the search!

##### *3. Problems with the evidence*

These can be broadly classified as:

- Publication bias - positive results are more likely to be published than null results.<sup>4</sup> This means that some of the relevant evidence is 'hidden'. Meta-analyses based on only published material will also reflect a bias toward significance. This has been suggested as contributing to the discrepancy between the meta-analysis and the meta-analytical results for the use of magnesium in myocardial infarction.<sup>5</sup>
- English language bias - there are often language restrictions in choosing trials for meta-analysis although research published in other languages may be equally relevant. This bias is overwhelmingly toward English language articles.<sup>6</sup> This biased selection of articles is likely to extend to simple searches performed as part of EBP.
- Indexing issues - many papers with worthwhile evidence are published in journals that are not indexed by the large indexing bodies such as *Medline*. Thus more relevant data is 'hidden'.
- Politicoeconomic Considerations - EBP applies population-based research to individual patients. Originally it was felt that the role of EBP was to find the 'best practice', regardless of cost, but there is a growing realisation that the marginal benefit to an individual patient may lead to less resources for other patients (for example, intensive care versus whole population immunisation). There is a need to combine efficacy data with the cost of various treatments as there are limits to the money available.
- Research Priorities - Funding for clinical research is scarce. This is particularly the case when trialing the use of already established therapies in innovative ways or investigating more cost effective treatment paths. Unless research has the potential to 'pay for itself', funding is unlikely

resulting in a bias towards research using new drugs or therapies (often funded by the private sector).

- Paradigm Limitations - EBP accepts a 'hierarchy of evidence' with the randomised controlled trial (RCT) as the most empirically satisfactory research tool for determining the answer to research questions about therapy.<sup>7</sup> This strongly favours research comparing one therapy to another in highly controlled circumstances. But health care is largely about systems of care and methodologies (and evidence) are poorly developed to evaluate these. Evaluation of trauma systems is a particular case in point. These questions will not be answerable by RCTs but are no less worthy of research.

#### 4. *Appraising the evidence*

There are a number of problems with the appraisal process. It is not easy to access full copies of all relevant papers. In some cases, further specific details of the data are needed and these are rarely easily available. The process of appraisal also takes time to do well. Additionally, skills in critical appraisal and statistics are needed.

#### 5. *Application and evaluation*

The main problem with this phase is ensuring adequate followup to assess the results. While this may be possible sometimes in general practice or clinic settings, it is almost impossible in EM.

### **Limitations specific to emergency medicine**

#### 1. *Multiple questions*

EBM assumes an identified clinical problem however patients in ED have undifferentiated and often multiple clinical problems. Although these problems can be organised into an order of priority, both the order and the array of clinical questions may change with time and the availability of further clinical evidence such as response to therapy or test results. Further, these questions may not be independent of each other, making the formulation of a simple clinical question for research unrealistic.

#### 2. *The dynamic of time*

The process of EBM takes time but emergency

physicians and Emergency Medical Services workers (EMS) must work in a climate of time-critical decision making. There are often situations with rapidly changing variables each of which requires time-critical decisions to be made. While emergency medicine is not the only field in which this is true (e.g. forward commanders in battle) there exists a need for integration of information more rapidly and with more complexity than in non-acute settings. For these situations, the application of the EBM process is clearly inappropriate.

Additionally, EM staff usually treat a number of patients contemporaneously thus expanding the number of clinical questions under consideration. In reality, the time to search for evidence-based answers to all these questions is severely limited.

#### 3. *Systems/process analysis*

EBM focuses on a single intervention whereas EM works more with systems or pathways or processes of care. While evaluation of a specific step or intervention is easier than assessment of the system or process, this does not mean it is more important. For both ED and EMS, EBP is too simplistic in its approach. What is needed is proven systems evaluation tools that better suit the ED / EMS model of care.

#### 4. *Teams*

EBM also assumes a single clinician-single patient model with one clinician interpreting the evidence. ED staff work in teams both internally and externally with other disciplines. EBM is not designed to cope with these multi-disciplinary teams, members of whom often have competing questions and competing interpretations of the evidence!

#### 5. *Operating in the "Grey Zone"*

The process limitations of EBP in EM lead to a 'grey zone' where evidence is incomplete or contradictory. The reason for the seemingly larger grey zone in Emergency Medicine is, as Naylor<sup>8</sup> stated 'the Malthusian growth of uncertainty when multiple technologies are combined into clinical strategies'. As already stated, EM decision-making is multifactorial and dynamic. While this is so in other specialties,

the time scale is unique. Naylor suggests that 'clinical reasoning, with its reliance on experience, analogy, and extrapolation, must be applied to traverse the many grey zones of practice.'

### **Alternatives for incorporating evidence into practice**

Regardless of the flaws in EBP, the problems of delays in implementing the findings of research still remain and the principle of applying the best evidence available is uncontested. There is a lot of interest currently into methods of implementing research and bringing about changes in clinical behaviour.<sup>9,10</sup> Methods that have already been looked at include Continuing Medical Education (CME), evidence-based topic reviews, evidence-based protocols / pathways, evidence 'warehouses' and the use of computer assisted decision-making. All these involve an analysis of the research remote from, and in anticipation of, the clinical problem.

#### **Traditional didactic CME**

Traditional didactic CME is very poor at changing clinical behaviour.<sup>11</sup> It was previously presumed that dissemination of research findings was all that was needed to change practices, but there is now a realisation that change occurs within a local medical culture. Traditional CME is often not systematic in its approach (being driven by particular opinions or lobby groups) and lacks mechanisms for incorporating new evidence into practice. Despite these limitations, the role of practice norms and opinion leaders in highlighting areas of research that impact on practice is without doubt.

#### **Evidence-based topic reviews**

Another approach to the incorporation of best evidence into EM practice is by way of structured critical appraisal journal club<sup>12</sup> and best evidence topic reviews (BETs).<sup>13</sup> BETs are designed to be a one-page summary of the evidence related to a particular question. To a large extent, BETs follow the process of EBM (and therefore share many of its limitations) but use more general questions and take place in anticipation of clinical problems. Their value is to provide evidence to inform reviews of current clinical practices. When used

with training groups, BETs also provide the opportunity to learn and practice the skills of critical appraisal.

#### **Evidence-based protocols / pathways**

Evidence based protocols aim to use evidence to formulate 'best practice' for a common clinical problem. They are usually formulated by multi-disciplinary teams and aim to marry best evidence and local conditions. If they are to be accepted by those 'at the coal face', paper based protocols need to be simple, clear and easy to follow. Preferably they should be reduced to a diagrammatic decision tree. However, this requirement for simplicity and clarity imposes a limitation on protocols. Even if the most commonly occurring clinical questions were incorporated into the protocol, following it would become unworkable unless there is marked flexibility within the protocol.

#### **Evidence 'warehouses'**

A number of groups are attempting to address many of the problems with the available evidence by producing evidence-based systematic reviews of the literature on important topics. These include the Cochrane Collaboration<sup>14</sup> or the Centre for Reviews and Dissemination (York).<sup>15</sup> These reviews seek to locate all information available including unpublished and non-English trials, to appraise the research and address how the research affects clinical practice.<sup>16</sup> Other approaches include journals devoted to EBP such as *ACP Journal Club* and *Evidence Based Medicine*. In addition, there are evidence-based guidelines and working groups that appraise the available literature and publish relevant articles.

#### **Computer-based decision-making**

Computer-based systems aim to use evidence from research to aid decision-making. Some simple versions are already in use. In theory, related questions and patient and environmental factors could be incorporated into these programs and this would more accurately reflect the complexity of the clinical questions. Unfortunately, the time requirement and the cost for development of such systems will be very high so it is likely that only a limited number of critical problems will be addressed this way.

Until supporting technologies or processes that are suitable to the ED setting are available, the most

practical alternative is likely to be a combination of protocols, group-based critical appraisal and evidence-based reviews.

## Conclusions

The search for quality evidence and its application to decision-making for clinical problems is meritorious and undisputed. However, the **process** of EBP is unsuitable to many of the clinical problems posed by patient in ED because it is too simplistic and time consuming and because the available evidence is weak.

Emergency Medicine should strive to improve the quality of evidence upon which to base discussions and to find other processes, for example, computer-aided decision making, that can incorporate good evidence but be flexible enough to allow the incorporation of other influences. We should also strive to establish evaluation methodologies that are suitable for evaluating systems of care, rather than single interventions.

As the original article on Evidence-Based Medicine stated: 'when defects in an existing paradigm accumulate to an extent that the paradigm is no longer tenable, the paradigm is challenged and replaced by a new way of looking at things'. Emergency Medicine needs to continue the search.

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