

Evidence Based Medicine (EBM) -a short overview

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Abstract

Evidence based medicine (EBM) is the conscientious, explicit, judicious and reasonable use of up to date, best evidence in making decisions about the individual patient health care. EBM integrates clinical experience and patient values with the best available research information. It is an ideas which aims to increase the use of high quality clinical research in clinical decision making. EBM requires new skills of the health practitioner, including efficient literature-searching, and the application of formal rules of evidence in evaluating the clinical literature. When somebody wants to practice EBM he has to identify gaps in knowledge and formulate questions to fill those gaps, to conduct an efficient search in medical literature, to critically evaluate the research information and to apply this information to patient's care. EBM can minimize the errors in patient care, reduces the cost of treatment of the patient and optimizes the quality of patient care. The skills which has being learned when conducting EBM like those which were needed for being a lifelong, self- directed learner.

Key word: Evidence Based Medicine

Introduction:

Evidence-based medicine (EBM) is a systematic approach to clinical problem solving which allows the integration of the best available research evidence with clinical expertise and patient values.¹ This means relating individual clinical signs, individual clinical experience with the best scientific evidences obtained by the clinical research.² EBM deemphasizes (but not eliminate)intuition, unsystematic clinical experience and physiologic reasoning as sufficient grounds for clinical decision-making and emphasizes the systematic evaluation of evidence from clinical research.³ EBM recognizes that the research literature is constantly changing .⁴ What the evidence points to as the best method of practice today may change next month or next year. The primary aims of EBM were minimization of the using of non-documentary knowledge and reasoning in clinical practice and integration of clinical expertise, pathophysiologic knowledge and patient preferences in making decisions regarding the care of individual patients.³

History Of EBM:

While some find traces of evidence-based medicine's origin in ancient Greece,^{2,4} others trace its roots to ancient Chinese medicine.^{5,6} Testing medical interventions for efficacy has occurred since the time of Avicenna's The Canon of Medicine in the 11th century^{7,8} The concepts behind evidence -based practice has been increasingly accepted after the book of the Professor Archie Cochrane(a Scottish epidemiologist) Effectiveness and Efficiency: Random Reflections on health Services (1972). The EBM movement started in 1981 when a group of clinical epidemiologists at Mc Master University (Hamilton, Ontario, Canada), led by David Sackett, published the first of a series of articles in the Canadian Medical Association Journal advising physicians how to appraise the medical literature.^{9,10} the term "evidence-based medicine" first appeared in the medical literature in 1992 in a paper by Guyatt et al¹¹, however, the founder of EBM is considered to be English epidemiologist

Archie Cochrane, who lived in the 19th century and which has already pointed out the impossibility of monitoring all the new discoveries in medical science¹.

Now EBM has been applied in management for every patient by doctors in western countries with the support of their governments, the ministries of health and pharmaceutical industry. This achieved by using practical guidelines for different diseases, a database with the best scientific evidence from each category, which is edited by special experts and which is continuously updated with new data, medical journals and literature available with the latest objective information.¹⁰ when you have the EBM resources available in the hospitals, wards and clinic for immediate use, this is called point of care

Why we need EBM^{3,11}?

There are many reasons leading to increase our interest in EBM. The most important ones were:

- Improves quality of patient care
- Standardize the delivery of healthcare
- Reduces the cost of health care
- Incorporates patients values into health care

For whom the EBM?

Not only for doctors, but for anyone involved in the health care system, including managers and health planners.

How we can practice EBM?

A doctor or any health professional who wants to conduct EBM must be able to understand the patient's circumstances or predicament (including issues such as social supports and financial Resources) he /she has to identify gaps in knowledge and formulate questions to fill those gaps, to conduct an efficient search in medical literature, to critically evaluate the research information and to apply this information to patient's care. This whole process has been divided into five simple steps, which if followed systematically can bring out a very successful outcome and a desired benefit to the patient care.¹²

The Five Steps EBM Model

5 As; Ask, Acquire, Appraise, Apply and Assess

Step1: Ask: Formulating answerable clinical questions

One of the difficult steps in practicing EBM to clinician is to translate the clinical problem into an answerable question.¹³

This means that clinician should develop the skills that enable them to convert the information which has been needed to answerable questions.

Good clinical questions should be clear, directly focused on the problem at hand, and answerable by searching the medical literature.¹⁴ A good clinical question should have four essential components structured in the **PICO** format (**P**atient or problem, **I**ntervention, **C**omparison, **O**utcome).¹

PICO format¹:

- **Patient or problem**— who are the relevant patients, what kind of problem we try to solve?
- **Intervention**—what is the management strategy, diagnostic test or exposure (drugs, diagnostic test, foods or surgical procedure)?
- **Comparison of interventions** – what is the control or alternative management strategy, test or expo-sure that we will compare?
- **Outcome** – what are the patient-relevant consequences of the exposure in which we are interested?

In addition the clinician should add two other considerations when formulating their question.

Type of Question:

How would I categorize this question? Is it related to etiology, diagnosis, therapy or prognosis?

Type of Study:

The other consideration is the type of study that will answer a formulate question. Various study designs provide specific answers (**table 1**).³

Example of PICO format:

In obese elderly patients with Type 2 Diabetes Mellitus (Problem),

is **Chlorpropamide** (Intervention) more efficient than **Metformin** (Comparison) in Controlling the blood glucose level (Outcome)?

Table 1: Type of study design to be selected for answering the question

Type of Question	Type of Study Design	Some words may be found in the title of the study
Therapy	Double-Blind Randomized Controlled Trial	Clinical Trials
Diagnosis	Controlled Trial	Sensitivity and Specificity or Diagnosis
Prognosis	Cohort Studies, Case Control, Case Series	Prognosis or Survival Analysis
Etiology	Cohort Studies	Risk factors
Prevention	Randomized Controlled Trial Cohort Studies	Prevention and Control


Step 2: Acquire: Finding the evidence

Once the clinician formulated his clinical question, the next step is to seek relevant evidence that will help him to answer his question. The aim effective searches are to maximize the potential of retrieving relevant articles within the shortest possible time¹. The ideal information source is valid (contains high quality data), relevant

(clinically applicable), comprehensive (has data on all benefits and harms of all possible interventions), and is user-friendly (is quick and easy to access and use).¹

The basic search principles were Convert the clinical problem into an answerable question, Generate appropriate keywords, choose a bibliographic database and Conduct the search.¹⁵

Table (2): Type of research and its strength

Type of research methodology	Strength of the evidence
Double-Blind Randomized Controlled studies	
Randomized Controlled studies	
Cohort studies	
Case control studies	
Case series	
Case reports	
Ideas , personal opinions	
Animal research	
In vitro (test tube) research	

When looking for articles on effectiveness of interventions or treatments, the first point of call should probably be the Cochrane database of systematic reviews or the other secondary sources such as Archimedes, Clinical Evidence, and Best Bets. The Cochrane controlled trials register provides an index of published randomized controlled trials.¹⁵ MEDLINE is probably the most widely used database for searching the biomedical literature.¹⁶ It is maintained by the National Library of Medicine, USA. A version of MEDLINE

(PUBMED) is freely available on the internet, is updated regularly, and is relatively user friendly.¹⁵

Step 3: Appraise: Critical evaluation of the information

- Critical appraisal has been defined as the “application of rules of evidence to a study to assess the validity of the data, completeness of reporting, methods and procedures, conclusions, compliance with ethical standards, etc. The rules of evidence vary with circumstances.¹⁷ Critical appraisal evolving looking for

research evidence in three main areas: Validity, importance, and applicability to the patient or patients of interest. Critical appraisal provides a structured but simple method for assessing research evidence in all three areas.¹⁸ A structured approach to critical appraisal could potentially improve the quality of this process, and simple checklists can be useful to screen out research that is of low quality or of little relevance.¹⁹

- Did the study methods address the most important potential sources of bias?
- Was the study performed according to the original protocol?
- Does the study test a stated hypothesis?
- Were the statistical analyses performed correctly?
- Do the data justify the conclusions?

Are There were ten key questions can be used to assess the validity and relevance of a research article. These questions can assist clinicians to identify the most

- There any conflicts of interest?

Clinician can develop critical appraisal skills which involve learning how to ask a few key questions about the validity of the evidence and its relevance to a particular patient or group of patients through small tutorials, workshops, interactive lectures, and at the bedside teaching.¹⁸ Several tools for appraising research articles are available; one of it is the Critical Appraisal Skills Programme (CASP), Oxford, UK, which include tools for appraising randomised controlled trials, systematic reviews, case-control studies, and cohort studies. The CASP tools are simple, easy to use, and freely available on the internet.²¹

Step4. Apply: Application of information of the patient:

Application of gained information on the special circumstances pertaining to each patient is the crucial and the most complex step in Evidence Based Medicine. There were questions that we should ask before we decide to apply the results of the study¹:

Step 5. Assess: Evaluating the Process:

relevant, high-quality studies that are available to guide their clinical practice.²⁰

Ten questions to ask when critically appraising a research article.

- Is the study question relevant?
- Does the study add anything new?
- What type of research question is being asked?
- Was the study design appropriate for the research question?
- Do the potential side effects of the drug or procedure outweigh the benefits?
- Are the outcomes appropriate to the patient?
- Does the treatment conflict with the patient's values and expectations?
- If something does not exist, it is necessary to weigh the potential harm from the benefit and do all that in partnership with the patient.
- Is the treatment available and is health care system prepared to fund it?
- What alternatives are available? Are the participants in the study similar enough to my patient?

As the clinicians use the EBM into their routine clinical practice, they need to evaluate their approach time to time to decide whether they need to improve on any of the four steps discussed above. The clinicians need to ask whether they formulating answerable questions, finding good evidence quickly, effectively appraising the evidence, and integrating clinical expertise and patient's values with the evidence in a way that leads to a rational, acceptable management strategy.²² The clinicians should document the outcomes of the application of the evidence and present it to their colleagues in formal audit and they should be able to develop management consensus. After that they must collaborate with medical scientific societies and professional bodies in developing practice guidelines. The last step leads to completion of the feedback loop of the EBM.

Limitations of Evidence Based Medicine:

There are many challenges or limitations in adopting EBM like³:

- The availability of the technology and online information to the clinician.
- Lacking of clinician's skills which required for accessing the medical literature and finding the best evidence.
- Lacking of moral, ethical, and professional obligation of providing the current best health care to the patients.
- Publication bias and major deficiencies in the design, analysis and reporting of the research findings.
- Over-reliance on statistical significance of the evidence as opposed to clinical significance.

Conclusion:

EBM can improve the quality of care when there is integration of best research evidence with clinical experience and patient's preferences, so EBM can minimize the errors in patient care, reduces the cost of treatment of the patient and optimizes the quality of patient care. EBM requires from clinician new knowledge, access to medical database, the ability to search medical literature and basic skills in interpretation of epidemiological and statistical results. The skills which have been learned when conducting EBM like those which were needed for being a lifelong, self-directed learner.

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