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## Evidence-based medicine - a new approach to teach medicine: a basic review for beginners

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### Abstract

No clinician would consider entering clinical practice without knowing the rudiments of history-taking and physical examination, nor would clinicians consider independent practice without a basic understanding of how the drugs they prescribe act on their patients. Yet, traditionally, clinicians have started practice without an ability to understand evidence about how they should interpret what they find on history and physical examination, or the magnitude of the effects they might expect when they offer patients medication. Evidence-based medicine (EBM) provides a remedy for this problem. Our Aim of this article is to introduce EBM to the beginners. Evidence-based medicine is the integration of best research evidence with clinical expertise and patient values. The EBM approach seeks to apply evidence from rigorous clinical research to the care of individual patients and has been defined as the "conscientious explicit and judicious use of current best evidence in making decisions about the care of individual patients". It consists of five related steps. Step 1: Asking focused clinical questions that arise in caring for patients. Step 2: Acquiring the best available evidence through electronic searching. Step 3: Appraising the quality of the evidence acquired against explicit methodological criteria. Step 4: Applying the evidence appropriately to the clinical management of individuals. Step 5: Assessing performance in relation to the previous four steps. 1) Universal to the practice of medicine 2) Shortage of coherent, consistent scientific evidence 3) Difficulties in applying evidence to the care of individual patients 4) Barriers to the practice of high-quality medicine 5) The need to develop new skills 6) Limited time and resources.

**Keywords:** Evidence-based medicine; electronic searching; appraisal; clinical management; patients; scientific evidence.

### Introduction

No clinician would consider entering clinical practice without knowing the rudiments of history-taking and physical examination, nor would clinicians consider independent practice without a basic understanding of how the drugs they prescribe act on their patients. Yet, traditionally, clinicians have started practice without an ability to understand evidence about how they should interpret what they find on history and physical examination, or the magnitude of the effects they might expect when they offer patients medication. Evidence-based medicine (EBM) provides a remedy for this problem. Evidence-based medicine has been defined as "the process of systematically finding, appraising and using contemporaneous research findings as the basis for clinical decisions (Straus and McAlister, 2000)." Interest in evidence-based medicine has grown exponentially since the coining of the term in the

early 1990s (Evidence-Based Medicine Working Group, 1992) and has led to calls to increase the teaching of evidence-based medicine at the undergraduate and postgraduate levels (Bordley et al, 1974). The different methods for designing clinical practice guidelines: preference-based; 'global subjective judgment'; consensus; outcomes based, and evidence-based, were discussed and the first published use of this term was in 1990 (Eddy, 1990).

### WHAT IS EBM?

Evidence-based medicine (EBM) is the integration of best research evidence with clinical expertise and patient values. It aims to apply the best available evidence gained from the scientific method to medical decision making (Timmermans and Mauck, 2005) and it seeks to assess the quality of evidence of the risks and benefits of treatments (Elstein, 2004). Evidence-based medicine is the conscientious, explicit,

and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research (Sackett et al, 1996).

**WHY THE INTEREST IN EBM?**

The EBM approach seeks to apply evidence from rigorous clinical research to the care of individual patients and has been defined as the “conscientious explicit and judicious use of current best evidence in making decisions about the care of individual patients”. Good doctors use both individual clinical expertise and the best available external evidence, and neither alone is enough. Without clinical expertise, practice risks becoming tyrannized by evidence, for even excellent external evidence may be inapplicable to or inappropriate for an individual patient. Without current best evidence, practice risks becoming rapidly out of date, to the detriment of patients (Sackett et al, 1996).

**STEPS IN EBM PRACTICE?** It consists of **FIVE** related steps (Sackett et al, 1997) and is shown in Figure 1 (taken from <http://www.le.ac.uk/li/clinical/digital/evidence/ebp/index.htm>).

**Step 1: ASKING** focused clinical questions that arise in caring for patients.

**Step 2: ACQUIRING** the best available evidence through electronic searching.

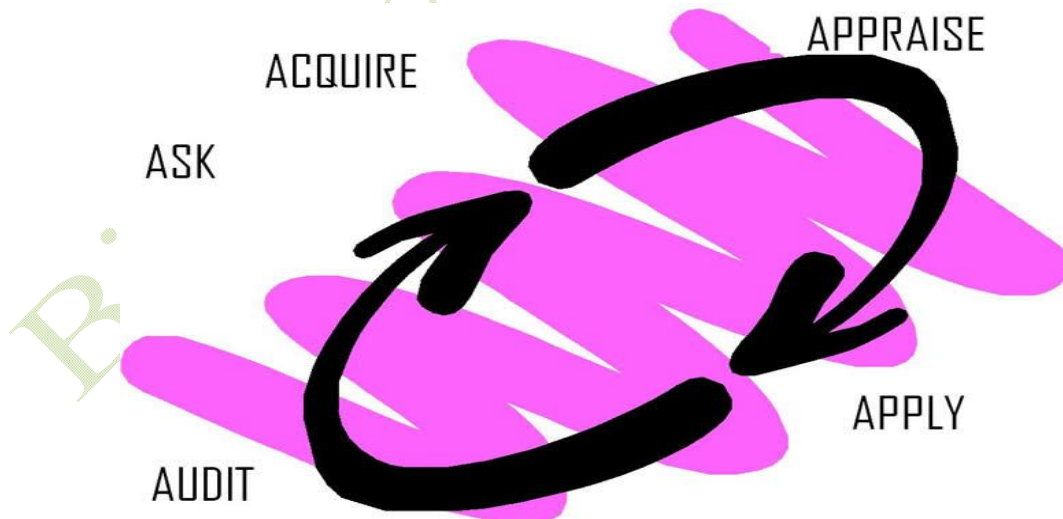
**Step 3: APPRAISING** the quality of the evidence acquired against explicit methodological criteria.

**Step 4: APPLYING** the evidence appropriately to the clinical management of individuals.

**Step 5: ASSESSING** performance in relation to the previous four steps.

The full blown practice of evidence-based medicine involves, converting the need for information (about prevention, diagnosis, prognosis, therapy, causation, etc) into an answerable question (step one), tracking down the best evidence with which to answer that question (step two), critically appraising that evidence for its validity (closeness to the truth), impact (size of the effect), and applicability (usefulness in our clinical practice) (step three), integrating the critical appraisal with our clinical expertise and with our patient's unique biology, values and circumstances (step four) and evaluating our effectiveness and efficiency in executing Steps 1-4 and seeking ways to improve them both for next time (step five) (Yeshwant et al, 2010).

Figure 1: Steps in Practice of Evidence-based Medicine (EBM).



**GOAL OF EVIDENCE-BASED MEDICINE:**

The practice of EBM means 'integrating individual clinical expertise with the best available external clinical evidence'. The goal was to improve the quality of patient care through the identification and promotion of practices that work, and the elimination of ineffective or harmful ones. This requires clinicians to be open-minded and to try new methods that are scientifically proven to be effective, and to discard old methods that are not (Crawford, 2007).

**BENEFITS OF EBM:**

The presumed benefits of EBM are: to help clinicians deal with 'information overload'; to reduce inequalities in the delivery of healthcare (and distribute healthcare resources more equitably); to help reduce healthcare costs; and to justify treatment choices to the public (Crawford, 2007; Pacy, 2006).

**CLASSIFICATION OF EBM:**

Two types of evidence-based medicine have been proposed (Eddy, 2005).

1. Evidence-based Health Care, also called as the evidence-based guidelines, is the practice of evidence-based medicine at the organizational or institutional level. This includes the production of guidelines, policy and regulations (Gray, 1997).
2. Evidence-based Individual Decision Making, is the practice of evidence-based medicine by the individual health care provider (Eddy, 2005).

**REQUIREMENTS FOR THE EBM PRACTICE:**

The requirements for the practice of evidence-based medicine includes a process called "Critical Appraisal Exercise" (Evidence-Based Medicine Working Group, 1992) which consists of the following steps. 1) defining a patient problem and the information that is required to resolve the patient's problem, 2) conducting an efficient literature search, 3) selection of the best of the relevant studies, and application of the rules of evidence to determine their validity, 4) should be able to present to colleagues regarding the strengths and weaknesses of the article in an effective manner, 5) extracting the

message and applying it to the patient problem (Sackett et al, 1991). Another requirement for the practice of evidence-based medicine is the physician's sensitivity towards the patient's emotional needs (Evidence-Based Medicine Working Group, 1992) i.e understanding the understanding the patient's suffering (Cassell, 1982) and how that suffering can be ameliorated by the caring and compassionate physician are the fundamental requirements for medical practice. These required skills can be acquired through careful observation of patients and of physicians of role models (Evidence-Based Medicine Working Group, 1992; Carter et al, 1982). In this regard, the randomized clinical trials using different strategies for interacting with patients will be helpful (Greenfield et al, 1985).

**PROCESS OF EVIDENCE-BASED MEDICINE:**

There exist three distinct, interdependent areas in the process of evidence-based medicine. The first area is to treat the individual patients with chronic or acute pathologies by treatments supported in the most scientifically valid medical literature, so that medical practitioners would select treatment options for specific cases based on the best research for each patient they treat. The second area is the systematic review of medical literature to evaluate the best studies on specific topics. This process can be very human-centered, as in a journal club, or highly technical, using computer programs and information techniques such as data mining. Increased use of information technology turns large volumes of information into practical guides (Akobeng, 2005; Begley, 2006).

Using techniques from science, engineering, and statistics, such as meta-analysis of medical literature, risk-benefit analysis, and randomized controlled trials (RCTs), EBM aims for the ideal that healthcare professionals should make "conscientious, explicit, and judicious use of current best evidence" in their everyday practice (Mendelson and Carino, 2005).

Evidence-based medicine categorizes different types of clinical evidence and ranks them according to the strength of their freedom from the various biases that beset medical research. For example, the strongest evidence for therapeutic interventions is provided by systematic review of randomized, double-blind,

placebo-controlled trials involving a homogeneous patient population and medical condition. In contrast, patient testimonials, case reports, and even expert opinion have little value as proof because of the placebo effect, the biases inherent in observation and reporting of cases, difficulties in ascertaining who is an expert, and more (Pacy, 2006).

The systematic review of published research studies is a major method used for evaluating particular treatments. The Cochrane Collaboration is one of the best-known, respected examples of systematic reviews. A 2007 analysis of 1016 systematic reviews from all 50 Cochrane Collaboration Review Groups found that 44% of the reviews concluded that the intervention was "likely to be beneficial", 7% concluded that the intervention was "likely to be harmful", and 49% concluded that evidence "did not support either benefit or harm". 96% recommended further research (El Dib et al, 2007; Sanchaya et al, 2010).

A 2001 review of 160 Cochrane systematic reviews (excluding complementary treatments) in the 1998 database revealed that, according to two readers, 41.3% concluded positive or possibly positive effect, 20% concluded evidence of no effect, 8.1% concluded net harmful effects, and 21.3% of the reviews concluded insufficient evidence (Ezzo et al, 2001). A review of 145 alternative medicine Cochrane reviews using the more up-to-date 2004 database revealed that 38.4% concluded positive effect or possibly positive (12.4%) effect, 4.8% concluded no effect, 0.69% concluded harmful effect, and 56.6% concluded insufficient evidence (Ezzo et al, 2001).

#### **WHAT IS ESSENTIAL FOR THE PRACTICE OF EBM:**

In order to practice the evidence-based medicine effectively, there is a need to acquire and develop the new skills particularly in literature search and critical appraisal (Straus and McAlister, 2000) and evidence-based medicine skills can be acquired at any stage in clinical training. Incorporating their acquisition into the routine of grand rounds, postgraduate and undergraduate seminars integrates them with the other skills being developed in these settings (Reilly and Lemon, 1997). Members of clinical teams at various stages of training can

collaborate by sharing the searching and appraising tasks. The different skills required for practicing in the "using" and "doing" modes can be learned in sequence, thus avoiding learner overload (Jacobson et al, 1997).

#### **LIMITATIONS OF EBM** (Straus and McAlister, 2000):

1) Universal to the practice of medicine 2) Shortage of coherent, consistent scientific evidence 3) Difficulties in applying evidence to the care of individual patients 4) Barriers to the practice of high-quality medicine 5) The need to develop new skills 6) Limited time and resources.

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