

FEATURE REVIEW

The Why and the How of Evidence-Based Medicine

Eddy Lang*, MDCM, CCFP(EM), CSPQ

The term "Evidence-Based Medicine" (EBM) has become so ubiquitous in the health care literature that many have begun to wonder whether its original intent and meaning haven't become blurred or even distorted. A search of the term in the National Library of Medicine in Washington through the PubMed interface yields nearly 16 000 references, an astonishing amount if one considers that the term was only first coined by Dr. Gordon Guyatt of McMaster University fourteen years ago. In this overview of its rationale and fundamental building blocks I will attempt to clarify the pivotal role of the EBM approach in the professional development of health care providers.

SHEDDING LIGHT ON RESEARCH LITERATURE: THE WHY OF EBM

In thinking about this article I decided that it might be instructive to describe how I became a proponent (some would say zealot) of the EBM approach. During my undergraduate and postgraduate training at McGill University (Family and Emergency Medicine) I was vaguely aware of EBM and had associated it simply with the generally accepted perspective that the practice of medicine be guided by studies as opposed to anecdotal experience or simply by doing things the way that they have always been done. As my professional development continued through the first years as an attending staff at the Emergency Department of the Sir Mortimer B. Davis Jewish General Hospital my interests naturally veered towards staying up to date with the medical literature and examining the key articles that might influence my practice.

A regular, close examination of seminal research in your area of medical expertise is a crucial responsibility for a physician working in an academic

setting and Journal Club (JC) sessions serve to fulfill this essential function. Over the years I became increasingly aware of a disturbing problem with the nature and impact of the JC exercise. Unfortunately, these sessions were characterized by what seemed to be a haphazard attack on the study or studies being considered. In a pervasive culture of article-bashing it seemed that in general, this research was riddled with faults even though there was little consensus on what constituted the major (or minor) flaws. Discussions seemed unfocused; articles were criticized for not constituting best evidence on a given topic and given the wide range of criticisms, a consensus on how or even if to incorporate this research was rarely achieved. As a result I left these sessions with a deep sense of discouragement; not only was I beginning to think that research evidence cannot reliably inform our practice but I felt at a loss for how to approach the critical appraisal process myself. To make matters worse, as a result of my own research interests and activities, I had been asked to take on the responsibility of supervising the Family Medicine / Emergency Medicine residents for their JC experience.

Many physicians experience a turning point in their professional careers and mine occurred in the second week of June in 1999. In an attempt to better fulfill my role as the JC supervisor I participated in the "How to teach Evidence-Based Clinical Practice Workshop" held annually at McMaster University. The workshop involves small groups made up of ten participants from the same health care discipline and two seemingly aloof tutors. The scheduled tutorials amounted essentially to JC sessions led by the attendees themselves. After a few days of struggling with the content and format of the course; the experience led to an epiphany for me as it related to the critical appraisal and incorporation of research evidence into clinical practice. There was in fact a method to the madness! The McMaster experience had finally allowed me set

*To whom correspondence should be addressed: Eddy Lang, SMBD
Jewish General Hospital, 3755 Cote-St-Catherine, McGill
University, Montreal, Canada, H3T 1E2
email: eddy.lang@mcgill.ca

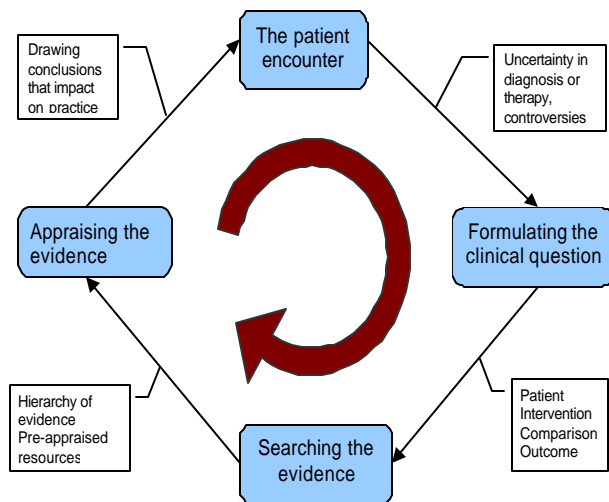


Figure 1. The EBM process

out a roadmap for finding, analyzing and if appropriate, incorporating research evidence into patient care and clinical teaching. While it began five years ago for me, the journey is a life-long one that is constantly being enriched with refined perspectives and novel opportunities to teach and practice EBM.

FOUR CORE SKILLS: THE HOW OF EBM

"The integration of best research evidence with clinical expertise and patient values" is the current definition of EBM. This well-known phrase attributed to Dr. David Sackett, one of the founders of movement does in many ways capture the essence of EBM. Unfortunately, this definition leaves me somewhat unsatisfied as it does not readily translate into something of practical relevance and utility. Furthermore, it echoes incontrovertible goods (like motherhood and apple pie) and seems to add little to what might otherwise be considered as common sense. When trying to convey the gist of EBM to learners I frequently describe EBM as a four step process that can be thought of as beginning and ending with the patient encounter (see figure 1). These are also the four core skills that allow you to get through the EBM cycle, the mastery of which constitutes expertise in Evidence-Based patient care.

1. Formulating a Focused Clinical Question

A parable often used to describe the importance of formulating a detailed clinical question to deal with the uncertainty that arises out of the clinical assessment, diagnostic work-up and ultimately the management of patients involves two medical students away at a conference. The first student comes down from his hotel room after a fascinating day of education and asks

the concierge for a restaurant recommendation. The second emerges a few moments later and asks for low-budget, but pungent Asian cuisine within walking distance of the hotel. Needless to say, the second student, having had a more precise idea of what he wanted to know, achieved a superior culinary experience.

The same principle applies to translating questions that demand the type of research evidence that is not readily available in most medical textbooks. In fact, medical reference texts are often inconsistent and are more likely to provide background information on the nature and evaluation of disease while providing more general and potentially dated treatment recommendations. Focused clinical questions, also known as foreground questions are carefully thought out and generally answerable queries which serve as the anchor for the remaining steps of the EBM process.

A guide to good question formulation can be found in the mnemonic known as PICO or Patient, Intervention, Comparison (if appropriate) and Outcome of interest. For example, if faced with a newly diagnosed hypertensive patient who has failed non-medical management the question of what antihypertensive to initiate might transform into this PICO: Among elderly (>75 year old) hypertensive patients without additional cardiovascular risk factors does the initiation of a thiazide diuretic-based treatment as compared to an ace-inhibitor or calcium channel blocker reduce the incidence of adverse cardiovascular events (myocardial infarction and stroke) and death? As this example demonstrates, the hallmark of a good PICO is the inability to say it in a single breath.

2. Searching for Evidence

The advent of the "medical internet" which includes immense online databases of biomedical research constitutes the most important development in the evolution of Evidence-Based Clinical Practice. As a result of this technological revolution, nearly all health care providers in developed countries can access current best research. The challenge of searching for evidence within the EBM cycle is to recognize what type of question a PICO is asking i.e. therapy, prognosis, diagnosis, harm and to map that question to the study design (systematic review, randomized controlled trial, cohort study or case control study) most likely to yield an answer. The next component of the search is to decide on which database (Cochrane Library of Systematic Reviews, Medline through OVID or PubMed etc.) is best suited for retrieval of relevant evidence. A consideration of time constraints and the degree of detail sought can and should

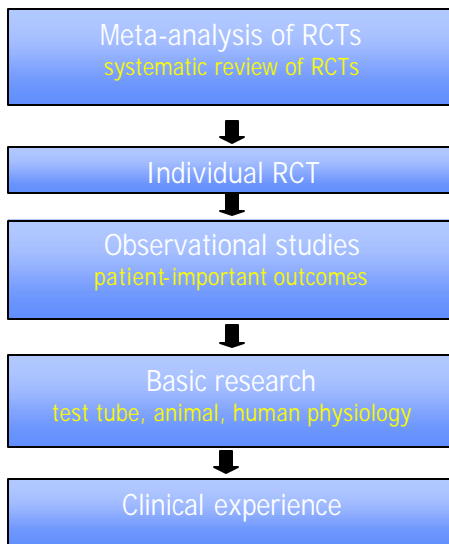


Figure 2. Hierarchy of Evidence

influence the type of database one decides to check. Furthermore, it is the components of the PICO that will serve as the search terms that will enable the most focused and productive navigation of that database.

At this point it is worth the first of two central tenets to the philosophy and practice of EBM and that refers to the primacy of the hierarchy of evidence (figure 2); the second central tenet will be covered below. A consideration of levels of evidence is essential groundwork to considering the degree to which we can rely upon research evidence to inform and influence what we do as clinician and thus bears directly on the selection of one or more studies that the search has yielded.

3. Appraising the Evidence

As viewed from the EBM perspective, critical appraisal is more complex than the simple thumbs up, thumbs down that one might associate with movie or restaurant reviews. Critical appraisal is actually founded upon three distinct pillars which house a specific set of questions and criteria that one would use to evaluate a particular research article. The first set of questions amount to the systematic search for bias within the research methods or unfolding of the study that might have resulted in systematic error and thus a distortion of the study findings. The second set of questions are about understanding the results of the study in quantitative terms so as to appreciate the strength and precision of the effects (benefit and harm) reported in the trial. The third and most important set of questions to ask pertain to the applicability of the

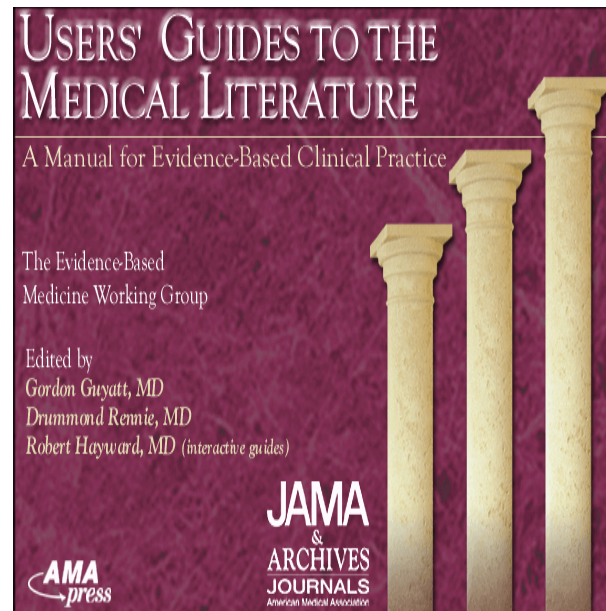


Figure 3. Users Guides to the Medical Literature

study in light of the patient or type of patient that you are considering this study for. Within applicability, one asks if the patient they are considering for this intervention would have been eligible for enrollment into the study being appraised. Furthermore, are there additional considerations, taking into account the costs, side effects and resource requirements needed to offer the intervention which should be weighed and discussed with the patient and their family in light of the study validity and strength of the result.

Complicating matters is the fact that the question sets needed for the critical appraisal of a therapy study or a study of a diagnostic test or a meta-analysis study of multiple randomized controlled trials are not the same. Furthermore, the exact meaning or intent of the critical appraisal questions may not always be evident to readers of medical research. To address this knowledge and skill deficit, a number of authors and experts in critical appraisal have developed step by step approaches to critical appraisal. The most widely known of these resources has appeared as regular installments of over 25 articles published regularly in the Journal of the American Medical Association (JAMA) since 1993. The series, known as the Users' Guides to the Medical Literature (figure 3) was amalgamated and enhanced into a textbook (currently in its fourth printing), CD-ROM and interactive website (www.usersguides.org). Fortunately, as a reflection of its foresight and an institutional subscription to JAMA, the McGill Health Sciences Library offers Users' Guides access to all trainees and staff on the University network.

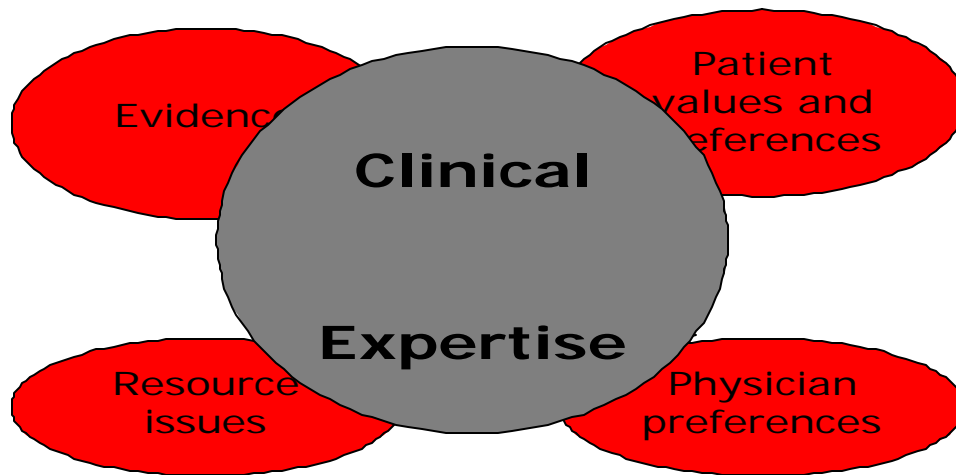


Figure 4. Model for Evidence-Based Decision-making

4. Drawing conclusions that impact on practice

The second central tenet of EBM is that the evidence alone can never tell the clinician what to do. Instead, the validity, strength of results and applicability of the research evidence must be integrated with many other facets, including the patient perspective and the clinical context before a truly informed and evidence-based decision can be made (figure 4). Although it might seem paradoxical, it is entirely evidence-based to make a medical decision that is discrepant with best research evidence if either a patient's circumstances or the clinical context demand it.

One of the criticisms often directed at EBM is its de-emphasis and relegation of clinical experience and thus

clinical expertise i.e. hierarchy of evidence. In reality however, what EBM is trying to outline is a new definition for what clinical expertise should be. As viewed from the EBM (and hopefully the McGill) perspective, an expert clinician is one who can locate and interpret research evidence and then integrate its importance with the patient's values and the clinical context. We should all strive for this.

REFERENCES

1. Guyatt GH, Rennie D, Editors, The Evidence-Based Medicine Working Group. Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice. AMA Press, Chicago, 2002

Eddy S. Lang is an Assistant Professor in the Department of Family Medicine at McGill University. He is an Attending Staff in the Emergency Department of the Sir Mortimer B. Davis, Jewish General Hospital. Dr. Lang is the director of the Evidence Medicine Course offered within the Professional Skills section of the second year medical student curriculum. He was awarded "Teacher of the Year" by the Canadian Association of Emergency Physicians in 2004. As a clinician researcher, Dr. Lang pursues research interests in EBM education, Emergency Department overcrowding and Venous Thromboembolism.