Evidence-Based Medicine, Part 1. An Introduction to Creating an Answerable Question and Searching the Evidence

Richard F. Virgilio, DO
Ana Luz Chiapa, MS
Elizabeth A. Palmarozzi, DO

This article, the first in a series of six articles, introduces the concept of evidence-based medicine and describes the first two steps of practicing it: formulating an answerable clinical question and searching the available evidence. The types of clinical questions practitioners can ask are examined and a hierarchy of how to search for the best and most authoritative evidence is provided. The skills learned from creating an answerable question and searching the evidence, as outlined in this article, provide a solid basis for life-long learning and improved patient care.

[Editor’s note: This article is part 1 of a six-article series intended to introduce the principles of evidence-based medicine (EBM) to busy clinicians, physician residents, and medical students. Because the application of EBM is a career-long process, further training is needed beyond the information provided within this article and series. A foundation of knowledge about research methods is critical in understanding EBM; however, such details, though introduced, are beyond the scope of this series.]

J Am Osteopath Assoc. 2007;107:295-297

In today’s Internet-addicted society, new, up-to-the-minute information is constantly replacing or improving upon “old news.” Similarly, an astonishing number of new medical studies are published and posted online each month. For example, a recent online search for articles published between July 1, 2007, and July 31, 2007, revealed 58,877 matches on the United States National Library of Medicine’s PubMed database. With such a large output of medical literature, it is difficult for physicians to know whether the advice and treatment they provide to their patients is the most accurate and up-to-date. However, by practicing evidence-based medicine (EBM) through the integration of physician clinical expertise, patient medical history and circumstances, and the best clinical research available, physicians can offer their patients the best care possible.

There has been a growing interest in EBM ever since the Evidence-Based Medicine Working Group2 first coined the term in 1992. Fifteen years later, a PubMed search of the terms “EBM” and “evidence-based medicine” reveals a list of almost 27,000 matches. This proliferation of EBM-related articles occurred for several reasons. First, physicians require a large amount of information regarding diagnosis, prognosis, therapy, and prevention on a daily basis.3,4 With the exception of using textbooks to answer basic anatomy, physiology, or pathology questions, traditional sources of information are usually inadequate because they are either incorrect, ineffective, outdated, or too voluminous to be practical.5-8 Also, as new medical graduates become experienced physicians, they rely less on their formal training in practicing medicine. As their clinical judgment and diagnostic skills improve, their knowledge of current diseases and treatments often declines.9,10 Finally, general practitioners, who have an average of less than 1 minute per patient to find and assimilate pertinent evidence and only 30 minutes per week to read and study,11,12 often do not have time to search for up-to-date information.

In this article, we introduce a strategy for busy physicians, physician residents, and medical students to formulate clinical questions and search the evidence. In-depth details of research methods are beyond the scope of this introductory series on EBM. Readers are encouraged to seek further training on these topics with supplemental learning opportunities and continuing medical education.

Evidence-Based Medicine in Practice

There are five steps to practice EBM effectively:

1. ask an answerable question
2. search the evidence
3. critically appraise the evidence for its validity, impact, and applicability
4. integrate critical appraisal with the physician’s clinical expertise and the patient’s unique biology, values, and circumstances
5. evaluate and improve personal effectiveness and efficiency in performing the four steps above

From the Department of Family Medicine at the University of North Texas Health Science Center—Texas College of Osteopathic Medicine at Fort Worth.

Address correspondence to Richard F. Virgilio, DO, Department of Family Medicine, Texas College of Osteopathic Medicine, University of North Texas Health Science Center, 855 Montgomery St, Patient Care Center, 2nd Fl, Fort Worth, TX 76107-2553.

E-mail: rvirgilio@hsct.unt.edu

Submitted January 31, 2007; revision received June 14, 2007; accepted June 18, 2007.
The present article discusses how to perform the first two steps in practicing EBM. Steps 3 through 5 will be discussed in the remainder of this series:


**Step 1: Ask an Answerable Question**

The practice of EBM begins when physicians convert their needs for information about causation, diagnosis, prognosis, therapy, and prevention into answerable clinical questions. Background and foreground questions lead to clinical solutions. **Background questions** ask for general knowledge about a certain condition, illness, or some aspect of health status and have two components: (1) a question root (ie, who, what, when, where, why, how) and (2) a disorder, test, or treatment (eg, hypertension, angiography, or exercise).1 An example of a background question is, “How does hypercholesterolemia increase a patient’s risk of having a myocardial infarction?” This type of question is most commonly asked by medical students and other apprentices of EBM in the healthcare professions.

**Foreground questions** ask for specific information to make clinical decisions or take immediate action.1 The four components of foreground questions are (1) patient, problem, or both; (2) intervention or exposure; (3) comparison (if relevant); and (4) clinical outcome (including time, if relevant).1 An example of a foreground question is, “In adults with hypercholesterolemia, would the use of hydroxymethylglutaryl-CoA reductase inhibitor (statins) lower patient risk of myocardial infarction when compared with lifestyle changes (eg, low fat, low cholesterol diet)?” This type of question is most commonly asked by practitioners who are advanced learners in the practice of EBM.

Clinical questions are formulated from a multitude of perspectives, including prevention, clinical findings, etiology of disease, clinical manifestations of disease, differential diagnoses, diagnostic tests, prognoses, and therapy. Often, the number of questions one generates exceeds the time available to answer them. To address this issue, Straus and colleagues1 triaged clinical questions into three different categories: selecting, scheduling, and saving.1 The most important and time-sensitive questions are given top priority. Questions that need to be answered but do not require immediate solutions are set aside to be addressed at a later date (eg, in time for a predetermined follow-up visit). The remaining questions are saved to be answered at one’s convenience.

Clearly written questions allow physicians to focus on patients’ most pressing needs and improve communication with students, residents, and colleagues. In turn, answerable questions develop practitioners’ skill sets for life-long learning.

**Step 2: Search the Evidence**

Having created an answerable question, it is now necessary to review the available evidence. An effective method to search for evidence is to use the “4S” hierarchical structure (Figure), which consists of systems, synopses, syntheses, and studies.1 In order to find the best information, begin the search with the most authoritative sources available, working toward the less authoritative sources only as necessary.1 For example, begin by searching a system, which is an online reference source that provides reviews and other EBM support materials, for information related to any given clinical question. The ideal system would concisely summarize the available evidence that can be accessed through an electronic medical record tailored to a patient’s need during a clinical visit.1 Resources that meet these criteria include BMJ Clinical Evidence (http://www.clinicalevidence.com), UpToDate (http://www.uptodate.com), and PIER: The Physician’s Information and Education Resource (http://pier.acponline.org/index.html).

In the absence of systems with the necessary information, synopses, which are short evidence-based summaries of original research, should be sought. Examples of these are available in ACP [American College of Physicians] Journal Club (http://www.acpjc.org) and EBM (http://ebm.bmj.com). A good synopsis will provide only the necessary information to support a clinical decision.1

Syntheses, or systematic reviews, are the next best resources available for physician consultation and can be found on The Cochrane Library Web site (http://www3.interscience.wiley.com/cgi-bin/mrwhome/106566753/HOME), which is the most authoritative of its kind. Although systematic review databases are available, there is a “lag time” from the time of publication of original articles to the time when systematic reviews are published and available.

The findings of an original research article might not be appropriate to extrapolate to a physician’s patient. In addition, the study design used in the original research might not be suitable to apply to the clinical question formulated, which
could result in findings that contradict the currently available evidence. Therefore, individual studies should be sought only after all other resources (ie, systems, synopses, and syntheses) have proved inadequate.

Conclusion
Although most clinicians are already incorporating EBM principles in their practices, often instinctively, some physicians may require a more organized approach to integrating this relatively new model of self-education. Improved comfort levels and true expertise in the practice of EBM are the result of additional education, repetition, and self-assessment. The principles of EBM allow physicians to stay informed while also improving the quality of the information communicated to patients during patient encounters. The systematic approach that is used to create an answerable question and search the evidence is but one step in practicing EBM. Remember, the goal is always to provide the best care possible to patients—using one’s clinical expertise to address patient values and expectations for treatment.

References