

Evidence-Based Medicine

Practicing Evidence-Based Medicine

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This article, the fifth in the *UTMJ* series on evidence-based medicine (EBM), examines the initial steps in the implementation of EBM into everyday clinical practice. The goals of EBM are to encourage physicians to ask clinical questions, seek answers from the best available evidence in the literature, and integrate this evidence with their clinical expertise and their patients' values.

Introduction

The practicing clinician is confronted with many questions about diagnosis, therapy, prognosis, and the etiology of diseases. One study found that general practitioners encounter two clinically important questions for every three patients seen.¹ Traditionally, attempts to answer these questions would involve the use of a textbook. Conventional textbooks, however, are often out of date even at the time of publication; therefore, physicians must look elsewhere for the most current and accurate information. Unfortunately, the leap from clinical query to substantiated answer can be a time-consuming process. Given the time constraints of physicians and students, EBM must be practiced efficiently. The intent of this article is to present a logical scheme for approaching clinical questions and to suggest ways to increase the value and efficiency of the literature search.

EBM is broadly comprised of three separate stages: finding the evidence, evaluating the evidence, and applying the evidence to the patient. This article will primarily address the first stage: the search. Identifying the evidence can be further divided into three steps: (1) defining the question; (2) choosing the literature resources; and (3) choosing the best evidence. The clinical scenario described below will be used to elucidate the three stages.

Clinical Scenario

It is the middle of winter. As a family physician, much of your day is spent seeing patients with upper respiratory tract infections. One

of your patients asks you whether taking zinc would help her recover from her current bout with the common cold. You have heard about this treatment, but you do not know how to authoritatively answer her question.

1. Defining the Question

Just as formulating the question is the most important step in conducting research, defining the clinical question is the most crucial step in practicing EBM. The success and the ease of the search will depend entirely on whether the clinician has asked an answerable question. Four elements of the question must be consciously considered: (1) the patient or problem being addressed; (2) the intervention; (3) a comparison intervention when applicable; and (4) the outcomes of interest. By outlining these before beginning the search, the clinician can more effectively sort through potential articles to find the ones most relevant to the specific patient and question. In our case, we may define the question as follows: "For a generally healthy patient suffering from an uncomplicated upper respiratory tract infection, will zinc supplements reduce the severity of the infection and speed recovery?" Here we have defined the patient, the problem, the intervention, and two outcomes.

The physician should also predetermine the type of evidence that will be most useful, considering specifically the study design and outcome measures that will best answer the clinical question. For example, if we are investigating the therapeutic benefit of zinc, we may only be interest-

ed in studies that compare zinc to placebo. We can, therefore, increase the specificity of our search by limiting our query to randomized controlled trials or reviews of such trials. Similarly, if we are investigating a diagnostic test, we may limit our search to studies reporting sensitivity, specificity, and positive predictive value.

2. Choosing Resources

The number and types of resources available for the practice of evidence-based medicine is expanding rapidly. So rapidly, in fact, that many of the best resources are not known to the majority of clinicians. Most physicians and medical students look to two conventional sources for clinical information: textbooks and MEDLINE. Both of these resources can be highly valuable, especially EBM-oriented textbooks that are frequently updated and that use judiciously applied searches. In addition, many novel resources, often available over the Internet, have recently been created. It is not feasible to comprehensively describe all available resources here. Instead, this article will highlight some of the most useful clinical resources for the day-to-day practice of EBM. For a broader list of resources, see the introductory article in this series.²

2.1 PubMed-MEDLINE

PubMed is an Internet interface for MEDLINE. MEDLINE is a bibliographic database of health care articles maintained by the National Library of Medicine in the United States. Physicians can access MEDLINE from multiple Internet portals, including PubMed, Ovid, and Grateful Med. The choice of portal can significantly affect the ease and success of the search. Here we will examine some of the most helpful features of the PubMed system, which is available free over the Internet (<http://www.ncbi.nlm.nih.gov>).

The PubMed system offers two services that can dramatically increase yield while decreasing search time. The first of these is the *Clinical Query* option, which aids the physician in appropriately limiting the search. Using this option, the search can be focused on diagnosis, therapy, prognosis, and etiology. In addition, the searcher can decide whether he or she wants to place the emphasis on the sensitivity or specificity of the search. By highlighting sensitivity, PubMed will cast a wide net to capture all potentially relevant articles. By choosing specificity, the program will limit the results to those articles which appear to be most pertinent.

Using our clinical scenario as an example, we can run a *Clinical Query* in PubMed with the terms, *zinc* and *common cold*. We can also specify that the search should focus on treatment, and stress specificity over sensitivity. Such a search generates 14 “hits,” a number that can be managed easily by a busy physician or medical student.

A second helpful feature for increasing the total number of studies is the list of *Related Articles* generated by PubMed. PubMed uses medical subject headings (MeSH) to group together studies of similar design and subject matter. Therefore, if you find one article that directly answers your clinical question, you can click on *Related Articles* to identify additional examples. This feature is particularly helpful if you do not initially enter the best search terms. If, by chance you find an article that answers your question, you can then locate other articles with the PubMed system.

2.2 SUMSearch

Another easily accessible source of information is Medical SUMSearch run by the Society for General Internal Medicine at the University of Texas Health Sciences Center San Antonio (<http://sumsearch.uthscsa.edu/searchform45.htm>). This program searches five sources of information: the Merck Manual, traditional reviews or editorials, systematic reviews, guidelines, and original research. Most of these “hits” are linked to full-text articles via PubMed, the National Guideline Clearinghouse, or the Database of Abstracts of Reviews of Effectiveness. Additionally, like PubMed, the search can be focused on treatment, diagnosis, prognosis, or etiology.

By entering *common cold* and *zinc*, with a focus on treatment, SmartSearch gives a range of citations including: five chapters from the Merck Manual, one traditional review, one practice guideline, six systematic reviews, and 45 original research documents. This is a larger array of material than was generated with the PubMed clinical query, but it has the advantage of specifying the source and type of information. The task of choosing between the different information sources will be discussed in the next section.

2.3 ACP Journal Club

The American College of Physicians Journal Club offers a quick and easy route to finding answers (<http://www.acponline.org/journals/acpjlc>). The ACP Journal Club is a publication that reviews the major clinical journals and abstracts information from key articles. Abstracted articles are selected on the basis of the quality of the study and the clinical relevance of its outcomes. Thus, the ACP Journal Club provides clinicians with an efficient means to stay abreast of the literature. The contents of the ACP Journal Club and its sibling journal, Evidence Based Medicine, are available on a CD-ROM called *Best Evidence* and through Ovid EBM Reviews.

The ACP Journal Club has a somewhat limited role in answering specific clinical questions, because it will only provide information if an applicable study has been reviewed. Therefore, it is quite likely that a search will not

generate any “hits.” However, if applicable articles have been reviewed, then the ACP Journal Club can be useful in a number of ways. The abstracted data is short, easy to read, emphasizes the consequential aspects of the study design and results, and is followed by commentary from an expert in the field. Therefore, the reader can be confident that the study is of high quality and is also provided with insight into the significance of the article. These advantages must be weighed against the disadvantages of not providing a comprehensive survey of the available literature.

In the search through *Best Evidence* for the common cold, there was one abstract of a systematic review. The abstract clearly delineated the question, data sources, study selection, data extraction, main results, and conclusion. There was also commentary, which helps the reader understand how to interpret the results of the meta-analysis and, ultimately, whether physicians should recommend zinc therapy.

3. Choosing the Evidence

The final step in the search is to choose the sources of evidence to further evaluate and transfer into clinical practice. The types of evidence vary from highly synthesized data sources to original studies that need more interpretation on the part of the physician. Each class of evidence along this spectrum offers particular advantages and disadvantages to the clinician wishing to practice EBM.

Guidelines are often taken as the gold standard in practice. They represent multiple forms of information and are generally applicable to the average patient. The process of writing guidelines is complicated and lengthy, and the results represent not only a broad summary of the medical literature, but also the consensus opinion of many experts in the field. Because they offer specific directives, physicians often rely on guidelines to determine practice. There are, however, inherent problems with guidelines, which are frequently overlooked by physicians. First, because preparing guidelines is an enormous and time-consuming project, guidelines do not always represent the most current research. Second, in areas where evidence is insufficient, guidelines sometimes offer directives based on small studies or solely on the committee's opinion. The best guidelines clearly identify the quality of evidence underlying the particular recommendation.

Systematic reviews and meta-analyses are an additional source of synthesized evidence. Like guidelines, they offer the advantage of providing easy access to multiple important articles. A good systematic review or meta-analysis will clearly define the criteria used to select studies, the

main sources of heterogeneity between articles, and how this heterogeneity was managed if results were combined to generate a summary effect size. These forms of evidence are convenient for the busy physician, and reduce the bias associated with considering a small number of studies. However, it should be noted that because research in the same area may utilize highly disparate study designs, it may be difficult to combine results. Therefore, even in a field with satisfactory studies, a meta-analysis may not be able to generate definitive results.

Finally, the physician may find that the best evidence is found in reports of individual studies. The advantage of this type of evidence is that it obviates the problems associated with inadequately prepared guidelines or systematic reviews. However, the onus is on the physician to evaluate the quality of the research and the significance of the findings. This obviously requires far more effort from the physician than simply reading a more synthesized form of evidence. The time demands of reading multiple articles and appraising the data may be more than what is feasible for the average physician. However, in many cases, this may be the only available form of evidence because guidelines and systematic reviews only cover a small proportion of clinical questions.

Conclusion

There are a multitude of resources available to the physician wishing to incorporate evidence-based medicine into his or her practice. However, it is important to consider that one's approach to these resources determines whether EBM will be a successful and sustainable part of continuing education and patient care. First and foremost, answerable questions need to be asked. Secondly, the best sources of information must be utilized. Newer forms of print publications and Internet databases can dramatically simplify the process of finding evidence and make EBM a feasible aspect of everyday medical decision-making. Finally, the expansion of synthesized forms of data - guidelines, systematic reviews, and meta-analyses can be invaluable in securing a foundation of evidence for clinical practice - when used appropriately.

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