

EVIDENCE-BASED MEDICINE FOR THE NEW MILLENNIUM: CRITICAL APPRAISAL AND PRAGMATIC APPROACH

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It is not news that medicine and other health care areas are changing. In recent years, physicians have been confronted with the challenge of the exponential increase in medical knowledge, as approximately two million articles are published annually in close to 23,000 biomedical journals. It is estimated that a general physician has to read 19 articles a day for 365 days each year to keep abreast with his field.¹ The challenge is compounded further by the fact that much of the published knowledge is of controversial value. That paradox set the way for the foundation of the recent concepts of evidence-based medicine (EBM). This has been defined by David L. Sackett, a founder of the EBM movement, as “the judicious use of current best evidence in making decisions about the care of individual patients.”² In a recently published article in the *Annals of Saudi Medicine*, Stewart elegantly introduced the readers to the new approach.³ This editorial is intended to provide practical guidance for practicing physicians, physicians primarily involved in academic medicine, and also for health care policymakers in how to apply EBM.

Searching for evidence traditionally takes the following steps: 1) precisely formulating the question; 2) designing a search strategy; 3) identifying search resources; 4) critically appraising search results; 5) refining the search if dictated; and 6) applying the findings and making a decision about an individual patient or a medical controversy.

Computerized databases are the main search resources. MEDLINE, perhaps the most frequently used medical database, contains approximately seven million citations and abstracts from only 4000 journals.⁴ This multipurpose database is produced by the US National Library of Medicine. There are also several databases that are MEDLINE-dependent, e.g., Cancerlit, PDQ (oncology-related databases), and EMBASE, which host, in addition to MEDLINE database, many of the pharmaceutical trials. Recently, MEDLINE access became available free of charge for anyone who has access to the Internet through Internet Grateful MED (<http://igm.nlm.nih.gov>) and PubMed (<http://www.ncbi.nlm.nih.gov/PubMed>). The PubMed, though a MEDLINE-dependent database, has unique and indispensable features. PubMed allows searchers to find articles by specifying publication type and also determining the sensitivity and specificity of the search. PubMed also has an advanced search option

operated by a powerful search engine developed by McMaster University to permit filtering the literature to optimize retrieval of clinically applicable studies.

Other databases are particularly designed to serve EBM. Through a joint effort between the American College of Physicians (ACP) and the British Medical Journal, two bimonthly publications were produced. The first is *ACP Journal Club* (acp.com) and the second is *Evidence-Based Medicine*. The latter can be accessed at the UK Center for Evidence-Based Medicine website (<http://cebm.jr2.ox.ac.uk>). The two publications contain peer-reviewed abstracts from prestigious biomedical journals, selected based on quality and the level of evidence they provide. The abstracts are modified to include a meaningful translation of benefit—or lack of—by reporting relative and absolute risk reduction, number needed to treat, number needed to harm, confidence interval, etc. The abstracts are also accompanied by commentaries made by experts in the field. The UK Center for Evidence-Based Medicine website also contains several CATs (critically appraised topics) that critically assess several therapeutic controversies. Readers may refer to the recent article by Ball to better understand the concept of CATs.⁵

The Cochrane Collaboration Library (<http://www.medlib.com> and <http://www.hcn.net.au/healthbase/cochrane/intro.htm>) is an outstanding recent effort to provide best evidence. Its creation was influenced by a statement made by the British epidemiologist Archie Cochrane that “it is surely a great criticism of our profession that we have not organized a critical summary, by specialty or subspecialty, adapted periodically, of all randomized clinical trials.”⁶ The library is updated quarterly, and contains four sets of databases: 1) systemic reviews; 2) reviews of effectiveness; 3) controlled trial registry (approximately 160,000); and 4) review methodology. The Cochrane Collaboration Library uses a rigorous methodology in formulating evidence.⁷ Currently, there are 15 Cochrane Centers in 13 countries that have evolved rapidly since their inception.

Textbooks cannot be considered as solid bases for the best evidence, as they are already several years behind by the time they are published. Moreover, editors and contributors too infrequently provide reference to the evidence of their recommendations. A notable exception to

that rule is *Scientific American Medicine*, which is a database that is regularly updated by the National Institute of Health and also contains information for patients (<http://www.samed.com>).

There are several helpful hints that searchers can use to refine their search results. Most of the above-mentioned databases have search engines that allow exploding searches and use of boolean terms (or, and, and not). Moreover, using Medical Subject Headings (MeSh terms), and the term "practice guideline" certainly enhances the outcome of a search.

It is crucial that one appraise the strengths and weaknesses of the sources of evidence. Randomized controlled trials (RCT) are considered to be the highest level of evidence. Nevertheless, it is not uncommon to find that many of the published RCT suffer from serious methodologic flaws.⁸ An attempt to standardize reporting of RCT, using the criteria laid by the Consolidated Standard of Reporting Trials (CONSORT), has been adopted by only 70 journals.⁹

Combining results from a number of studies to examine the same question, using rigorous statistical procedures, is a sound concept that is called systemic review or meta-analysis. Through critical exploration, evaluation and synthesis, systemic reviews separate the insignificant, unsound, or redundant information from the salient, relevant and critical studies that are worthy of reflection. While they can serve as powerful tools that aid decision-making, systemic reviews have their own limitations.¹⁰ Though more costly and time-demanding, systemic reviews that utilize individual patient data are superior to those that only include published trials.¹¹ Narrative reviews, however, can be unreliable sources of evidence, as they are frequently influenced by bias and the effect of the experience of the reviewers.¹²

Adversaries of EBM argue about the validity of this novel approach by focusing on its limitations. EBM can only provide numbers, that may or may not be applicable for an individual patient. Moreover, most of the EBM data

place more emphasis on therapeutic decisions and less on diagnosis or prognosis. Nevertheless, despite some limitations, EBM properly applied is a viable and sound tool for our daily clinical practice. The approach can also economize resources, aid health care policymakers, and advance clinical research.

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