Evidence-Based Medicine in Primary Care: An Overview

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Editor's Note: *This article is the first in a series of articles that during the next 2 years will sequentially address various evidence-based approaches to the diagnosis and management of common clinical problems in primary care. Future articles will deal with clinical efficacy and effectiveness, clinical practice guidelines, quality-of-life and outcomes analysis, patient preferences, meta-analysis, cost-effectiveness analysis, decision analysis, technology assessment, and related subjects. This Journal will also welcome papers that report studies of cost-and-outcome assessment relevant to primary care practice. We hope that this new feature, Evidence-Based Clinical Practice, will be useful to clinicians seeking to base their practice more on evidence-based approaches in their quest for improved patient care and a more fulfilling style of practice.*

Case 1-1

A 2-month old infant was brought into a rural island clinic at 11 PM with a temperature of 104°F (rectal). The child had been in good health from birth at full term until 2 days previously, when there was onset of intermittent fever to 104°F. There was no vomiting or lethargy. Heart rate, blood pressure, and respiratory rate were within normal limits. There was no rash and the neck was supple. The parents were observant and commented intelligently about the infant's condition. The family did not have health insurance. The last ferry to the mainland had left 1 hour earlier. The weather conditions were conducive for flying, but emergency transportation to a hospital would cost about $2000.

The physician doubted that the child had a life-threatening problem but could not be absolutely sure. He knew that the regional children's hospital 100 miles away had emergency hospital admission protocols for a sepsis work-up for infants younger than 3 months. He also knew that acute viral illness was the usual cause of illness and that most of these work-ups had negative findings for more serious problems. Though his reference books were current, he could not quantitate the risks and potential harms versus benefits of reexamination in the office 8 hours later versus emergency transportation to the hospital to work up for sepsis. The conscientious parents had the child flown to the mainland for care after talking to a pediatrician there who advised hospital admission (also without any estimates of harms versus benefits). The work-up was negative, the family acquired a sizable hospital bill, and the child was doing well without treatment 2 days later.

Introduction

The above case typifies a common problem faced almost daily by primary care physicians—how to quantify harms versus benefits and counsel patients and families about patient care options when needed evidence is either unavailable or unknown. Our prevailing system of medical education and usual process of continued learning in practice have not been based on rigorous periodic reassessment of evidence for or against particular management options. Our journals and textbooks, even if they can be accessed rapidly within the short time required for clinical decision making, are usually not helpful in quantifying harms versus benefits. The clinician usually relies on his or her clinical experience and judgment, perhaps buttressed by the advice of colleagues or consultants who practice the same way.

The recent rise of evidence-based medicine represents a major, but still untested, intellectual advance in the process of clinical decision making and patient care. The term has encountered varied reactions among physicians in both community and academic settings, ranging from skepticism or outright dismissal to enthusiastic acceptance.

Sackett and his colleagues[1] have defined evidence-based medicine as the "conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients." Evidence-based practice requires the integration, patient by patient, of the physician's clinical expertise and judgment with the best avail-

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able relevant external evidence. The process of evidence-based medicine is summarized in Table 1.

In Case 1-1 evidence-based approaches could have clarified harms versus benefits of hospital admission for a sepsis work-up and enabled better informed partnership decision making between the physician and the parents. The physician later undertook a brief literature search, which showed that the risk of bacterial meningitis and serious bacterial infection are about 0.5 percent (1 in 200) and 1.5 percent, respectively.[3,4] A practice guideline, based upon meta-analysis, has been formulated for the management of infants with fever without source. This guideline provides solid evidence supporting close ambulatory follow-up of low-risk infants (white cell count 5-15,000/μL, band cell count fewer than 1500/μL; normal urinalysis findings; fewer than 5 white cells per high-power field in stool when diarrhea is present).[4] Interestingly enough, a later study evaluated parent preferences for the care of febrile infants without apparent source. Parents were given a case scenario similar to Case 1-1 and advised of the risks, outcomes, and costs of close ambulatory follow-up versus hospitalization for lumbar puncture and sepsis work-up. About 80 percent of the parents chose the ambulatory option of less testing and treatment, often basing this choice on fewer painful tests and procedures, lesser chance of unnecessary antibiotics, and the assurance that reevaluation was available if their child failed to improve.[5]

The purpose of this article and others to follow in this series is to explore the dimensions and clinical relevance of evidence-based medicine in everyday primary care practice. More specifically, this series will do the following:

1. Introduce readers to the varied problems in the prevailing system of clinical decision making which have led to evidence-based medicine as a new paradigm.
2. Enable clinicians in primary care to read the literature more critically and develop new skills of self-learning.
3. Set forth some of the basic principles of evidence-based medicine, including introductory consideration of relative quality of evidence related to costs and outcomes.
4. Summarize the current status of evidence-based clinical practice in primary care.
5. Provide readers with concrete and practical approaches to integrate progressively the process of evidence-based medicine into their everyday clinical work.

Table 1. Process of Evidence-Based Medicine.

1. Select specific clinical questions from patient's problem(s)
2. Search the literature or databases for relevant clinical information
3. Appraise the evidence for validity and usefulness to the patient and practice
4. Implement useful findings in everyday practice

Adapted from Rosenberg et al.[2]

Case 1-2

A 50-year-old man came to a rural island clinic on a weekend with a finger injury sustained the previous evening while mooring a boat. He had been in good general health and was enrolled in a large health maintenance organization (HMO) in a metropolitan area 100 miles away. At examination he had a mallet-finger injury involving the long finger of his right (dominant) hand, with loss of extension of the tip. Radiographs did not show any associated fracture.

The physician was aware of the controversy regarding conservative treatment of this injury using a splint compared with surgical repair but had no accessible evidence to assess the merits of the two approaches critically. A telephone call to the orthopedic surgeon on call at the urban hospital associated with the HMO resulted in an unequivocal recommendation for conservative treatment ("They usually do fine, and a few may need later surgery."). The patient was not entirely happy with this advice and requested a second opinion. Another telephone call was made to the orthopedic surgeon on call at the nearest mainland hospital. His recommendation was equally unequivocal: "Almost all of my patients have failed splinting treatment and needed surgery." The patient opted for surgery at considerably more expense.

Some Dimensions of the Problem

Rapid Access to Relevant Information

Case 1-2 represents only two dimensions of a multifaceted problem facing primary care physicians during their everyday encounters with patients who have common medical problems. The biggest problem, of course, is to obtain relevant evidence to assist in clinical decision making at the time of the visit. Sometimes this information is available but not readily accessible. A rapid computer search could have been useful, but the physician lacked the time or expertise to accomplish such a search. The percentage of physicians in ac-

tive practice who use computers for clinical data retrieval, although increasing, is still comparatively limited; for example, the American Academy of Family Physicians has found that only 26 percent of US family physicians who have office computers use them for MEDLINE searches.[6]

Without convenient access to appropriate electronic databases, retrieval of relevant and useful information in a timely manner has become almost impossible. Most textbooks are becoming dated as they are published, and few are grounded in evidence-based practice in today's terms. There are now about 25,000 medical journals in print, and the doubling time of biomedical knowledge, which is currently 19 years, results in a fourfold increase within a clinician's career.[7] A physician often feels fortunate to find one or two useful articles in a single journal issue.

Rapid access to available electronic databases requires new skills and expertise. Given constant time constraints in a clinician's schedule, the physician is often frustrated in attempting to do a literature search. The database of the National Library of Medicine, MEDLINE, has some 6 million references from 4000 journals, with about 400,000 new entries each year.[8] When rigorous evidence-based criteria are used to screen for clinically credible and useful information in the six most important medical journals, fewer than one article per issue has been judged to be of immediate clinical value.[9] For example, one study of MEDLINE search patterns showed a low yield of useful information after an average search time of more than 20 minutes,[10] while another showed that less than 1 percent of retrieved citations led to a new or changed clinical decision.[11]

Global Judgment by Experts

A pervasive problem to primary care physicians attempting to appraise clinical information revolves around conflicting recommendations by experts, sometimes within the same specialty and often across specialty lines and representing various agencies. Many, if not most, of the clinical guidelines that have been promulgated in recent years are based on global subjective judgments by experts rather than rigorous criteria for analysis of evidence. Berg[12] has elucidated this lack of rigor well after considerable experience in evaluating clinical guidelines. Slawson and his colleagues[13] have observed the dilemma of "specialist ping-pong" in circumstances of conflicting data and recommendations by specialists; resolution of this problem requires an evidence-based search for data related to outcomes. Part of this problem is due to the different patient populations seen by specialists and primary care physicians. A classic example was reported in 1980 by Ellenberg and Nelson,[14] who found widely disparate results of studies of nonfebrile seizures among children who had had previous febrile seizures; rates ranged from 1.5-4.6 percent in population-based studies to 2.6-76.9 percent in seizure clinic studies.

Gap Between Evidence and Clinical Practice

Another complex dimension is translating solid scientific evidence into actual clinical practice. Clinicians need to become aware of new evidence and then to appraise the quality of that evidence, which might result in acceptance, skepticism, or rejection of the evidence. If accepted, many sequential barriers in the process of patient care can block its implementation. Even in the case of clinical guidelines that are solidly based on scientific evidence, frequently a mismatch exists between the circumstances of clinical trials upon which the guidelines are based and actual clinical situations in which clinicians encounter patients with a given clinical problem.

Geographic Variations

During the last 15 years, many studies have reflected the extreme practice variations from one part of the country to another, and even within a given state. Wennberg[15] found, for example, 20-fold differences in utilization rates for carotid endarterectomy in 16 large communities in 4 states. Within single states, he found the odds of tonsillectomy during childhood ranging from 8 percent in one Vermont community to 70 percent in another, while in Maine the range for hysterectomy varied from 20 percent to over 70 percent.[15,16] A study of procedure rates for Medicare patients in 13 large metropolitan areas of the country showed variations of more than 300 percent for more than one half of the procedures.[17] Recently another study found a fourfold variation in adjusted odds ratios for the likelihood of warfarin use for patients with atrial fibrillation in the South compared with the Midwest.[18] All of these examples stretch the bounds of clinical credibility way beyond any reasonable variations that might be de-

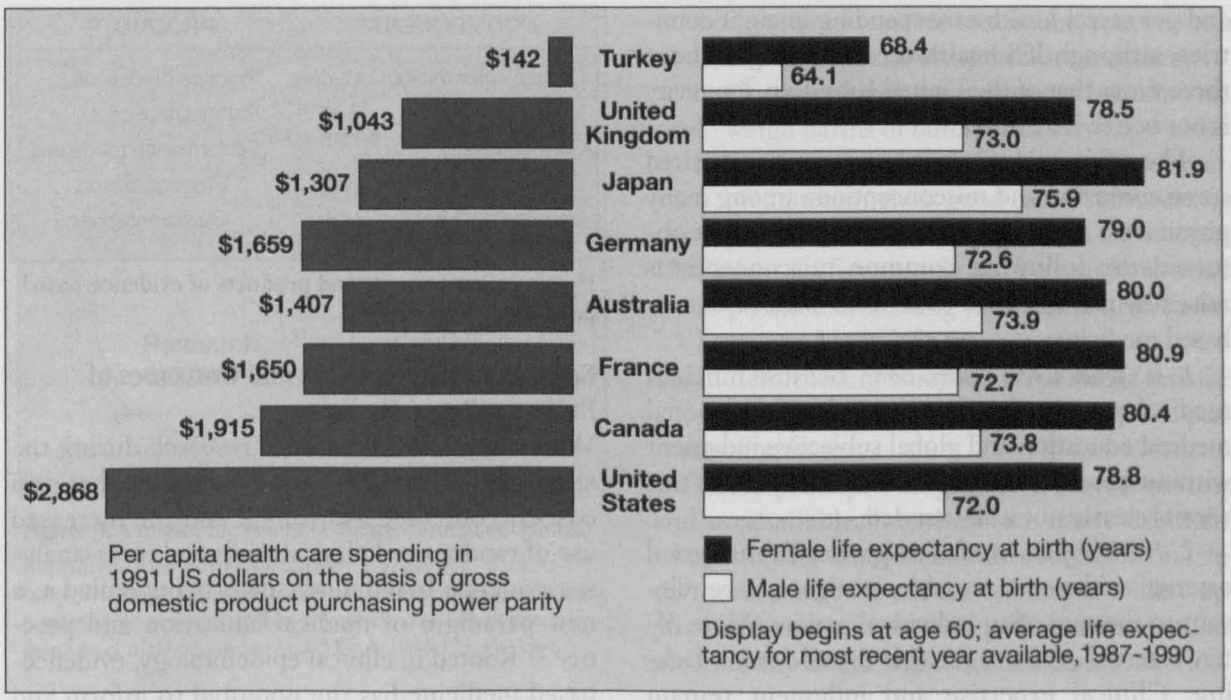

Figure 1. Per capita expenditure for health care versus life expectancy by country.

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Adapted by Mengel and Holleman from: Schieber GJ, Poullier JP, Greenwald LM. Health spending, delivery, and outcomes in OECD countries. Health Aff Millwood 1993;12(2):122. Reprinted with permission. Copyright © 1993, the People-to-People Health Foundation, Inc. All Rights Reserved. Sources: OECH health systems: Facts and trends. Paris: Organization for Economic Cooperation and Development, 1993; and Letsch S, et al: National health expenditures 1991. Health Care Financing Rev, Winter 1992.

fended based upon clinical, demographic, or other geographic differences. These large practice variations call into question scientific truth in each instance; shifting to a more evidence-based style of practice would have to narrow these variations.

Cost Containment in an Era of Limits

National spending for health care services in the United States continues to rise at a rate well beyond the index of inflation. Despite many concerted efforts to rein in health care costs, the proportion of the gross domestic product expended for health care has grown from 5 percent in 1960 to 12 percent in 1990 to 15 percent today.[19] This amount of spending represents one seventh of the national economy.[20] For a family of 4 with a median family income of $30,000, health care spending has grown to about one third of that income, or $2500 per person.[16(p327)]

Cost containment has become a driving force in health care reform and has ignited a vigorous national debate about alternative ways of structuring and financing health care services, managed care, value received (ie, outcomes), and comparative benefits to the individual patient versus population served. It makes logical and political sense to take an evidence-based approach to evaluating the need for various health care services and procedures based on analysis of costs and outcomes.

Genesis of Evidence-Based Medicine

Many forces appear to be driving the wide application of evidence-based medicine: the need for cost containment felt by the payers of health care services (principally the government and insurance industry); advances in medical informatics providing increased access to electronic databases, as well as the capacity to monitor practice patterns and outcomes; and continued pressure by patients and industry to apply the latest therapies. In addition to cost, access and quality add further momentum to efforts to reform the health care system. As costs have escalated, so has the number of uninsured, now totaling about 40 million people.[21] Although the US health care system is touted by many to offer the highest quality of care in the world, outcome statistics for many reasons have often not demonstrated the best outcomes. Figure 1, for example, compares life expectancy

and per capita health care spending in eight countries; although US health care spending is about three times that of the United Kingdom, longevity is not better.[22,23]

The term *evidence-based medicine* has elicited some confusion and misconceptions among many physicians. Sackett and his colleagues[24] have observed the following common misconceptions raised by physicians in their work with evidence-based medicine:

1. *It's what we've always done.* Because much of medical practice has been based on traditional medical education and global subjective judgment without broad access to electronic databases, this view is clearly not well founded.

2. *It will replace clinical judgment.* Even if good external evidence is available, it might not be relevant to the care of an individual patient. More often, external evidence is either insufficient or lacking. Clinical expertise and judgment remain essential in everyday clinical decision making.

3. *I don't have time for it.* Lack of time remains a major barrier, but continued advances in medical informatics may well decrease this problem in the future. Additionally, the physician can now readily access predigested evidence-based analyses of common clinical problems through more efficient reading patterns.

4. *It will lead to cookbook medicine.* The process of evidence-based medicine requires that physicians assess the quality and relevance of whatever current evidence can be found. In an individual clinical situation, the physician always needs to apply the evidence only as it is appropriate to the patient's needs and preferences.

In their excellent, recently published book *Evidence-Based Medicine: How to Practice & Teach EBM*, Sackett and his coauthors[24] propose the following rationale for applying evidence-based medicine in medical education and clinical practice:

1. Increasingly available new evidence can and should lead to major changes in patient care.
2. Practicing physicians often fail to obtain available relevant evidence.
3. Medical knowledge and clinical performance deteriorate with time.
4. Traditional continuing medical education (CME) is inefficient and generally does not improve clinical performance.
5. Evidence-based medicine can keep the physician up-to-date.

COMPONENTS	PRODUCTS
Clinical epidemiologic studies	Practice guidelines
Meta-analysis	Pathways of care
Clinical trials	Performance measures
Cost-effectiveness analysis	Process-based
Decision analysis	Outcomes-based

Figure 2. Components and products of evidence-based medicine.

Conceptual Components and Outcomes of Evidence-Based Medicine

With the growth of clinical research during the last 30 years, together with the new emphasis on cost and outcome assessment and the increased use of randomized clinical trials and meta-analysis, evidence-based medicine is being hailed as a new paradigm of medical education and practice.[25] Rooted in clinical epidemiology, evidence-based medicine has the potential to inform and guide clinical decision-making not only for the care of individual patients but also for cost-effectiveness analysis and health policy for populations being served. The application of evidence-based medicine can thereby help to formulate clinical practice guidelines as summaries of rigorously appraised evidence, pathways of care, and both process-based and outcomes-based performance measures of clinical practice. Figure 2 illustrates the conceptual framework that will underpin this and later presentations in this series. Within the context of everyday patient care, Figure 3 represents the essential components for making evidence-based clinical decisions in partnership with the patient or family.[26]

Meta-analysis is a powerful tool with both strengths and limitations.[27] Properly applied, it can sort out what we know, what we do not know, and what we need to know.

Practice guidelines have proliferated in recent years, as promulgated by specialty organizations, governmental agencies, and other groups. They have been of variable quality and value, depending largely upon the scientific rigor of the process by which they were developed. Many, especially earlier, practice guidelines were produced without an explicit review process through global subjective judgment of an appointed panel of so-called experts. These guidelines are often flawed and not widely accepted. To an increasing extent, more guidelines are becoming available that are evi-

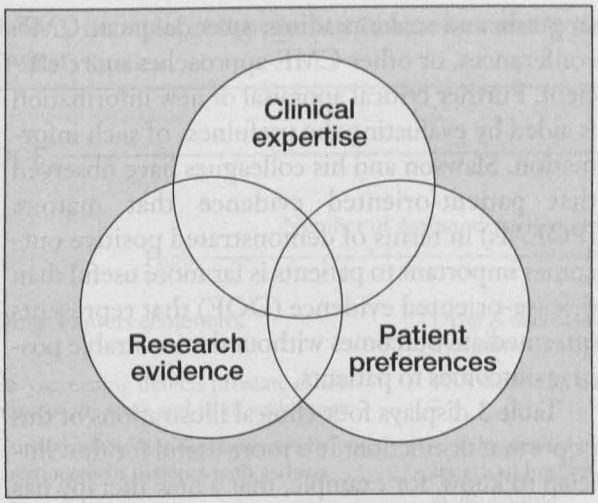

Figure 3. A model for evidence-based clinical decisions.

Reprinted, with permission, from Haynes RB, Sackett DL, Gray JM, Cook DJ, Guyatt GH. Transferring evidence from research into practice: 1. The role of clinical care research evidence in clinical decisions. ACP J Club 1996;125(3):A14-6.

dence-based. The most desirable evidence, if and when available, will include evidence of outcomes and patient preferences, as summarized in Table 2.[16(pp30-3)]

For the purpose of resource allocation decisions within health care in an era of limits, Eddy[16(pp252-65)] has proposed the following 11 principles based on an underlying premise that resources for population-based health care are truly limited financially:

1. Financial resources to provide health care to a population are limited.
2. It is valid and important to consider financial costs of interventions.
3. Because of financial constraints, priorities must be set.
4. It is not possible to cover from shared resources every treatment that might have some benefit.
5. Objective of health care is to maximize health of population served within available resources.
6. Priority of a treatment should not depend on whether the particular individuals are our personal patients.
7. Priority setting requires estimates of benefits, harms, and costs.
8. Empirical evidence should take priority in assessing benefits, harms, and costs.
9. A treatment must meet 3 criteria before being promoted for use:
   a. Compared with no treatment, treatment is effective in improving health outcomes.
   b. Compared with no treatment, benefits outweigh harms of outcomes.
   c. Compared with next best alternative treatment, treatment is good use of resources for population served (principle 5).
10. Patient preferences should be sought as much as possible in making judgments of benefits, harms, and costs of a treatment.
11. In determining whether a treatment satisfies principle 9, a burden of proof is on those promoting its use.

These principles might seem all too obvious and unassailable, but there are many examples where they have not been followed. Electronic fetal monitoring, for example, became widely applied with major impacts on perinatal care without meeting any of the criteria of principle 9.

Present Status of Evidence-Based Practice

Sources for Evidence-Based Medicine

A steadily advancing wave of interest in evidence-based medicine is starting to influence medical education and clinical practice. Some books and journals are taking an evidence-based approach, as are some CME programs. An increasing number of clinical practice guidelines are being developed through rigorous analysis and appraisal methods. The Agency for Health Care Policy and Research (AHCPR), having already created 19 practice guidelines, is establishing a group of evidence-based practice centers around the country to develop guidelines on a contractual basis.[28] It is also creating a national guideline clearinghouse on the Internet to become available in the fall of 1998.[29] A recent study of the use of practice guidelines by HMOs showed that 80 percent used guidelines developed by the HMO, whereas an equal number adapted them from external sources[30]; in many instances these guidelines are increasingly evidence based.

There are two major types of electronic data-

Table 2. Hierarchy of Practice Guideline Development.

1. Global subjective judgment
2. Evidence-based
3. Outcomes-based
4. Patient preference-based

Source: Eddy[16(pp30-3)]

$$\text{Usefulness} = \frac{\text{relevance} \times \text{validity}}{\text{work}}$$

Figure 4. Usefulness equation.

Reprinted, with permission, from Slawson DC, Shaughnessy AF, Bennett JH. Becoming a medical information master: feeling good about not knowing everything. J Fam Pract 1994;38:505-13.

bases. One is bibliographic, such as MEDLINE, which retrieves relevant citations. The other provides direct access to publications of relevant clinical evidence. Examples of the second type include the *ACP Journal Club* (a bimonthly supplement of the *Annals of Internal Medicine*), POEMs, formerly the *Journal of Family Practice* Journal Club, and the Cochrane Database of Systematic Reviews.[2] All are available on the Internet.

In only a few studies has the potential availability of evidence relevant to the wide spectrum of clinical problems in primary care been examined. Two such early reports, however, suggest a surprisingly high degree of relevance. In a retrospective study in a suburban training general practice in Leeds, United Kingdom (UK), 81 percent of interventions were found to be based on randomized controlled trial (RCT) evidence or convincing nonexperimental evidence.[31] Another recent study examined the treatments provided to 109 consecutive inpatients on a general medical ward in Oxford, UK. It was found that 82 percent of treatments were evidence based (53 percent with RCT support and 29 percent with convincing nonexperimental evidence).[32]

Application of Evidence-Based Medicine in Clinical Practice

Slawson and his colleagues have suggested an extremely useful approach that can be used by physicians to gather evidence and appraise its clinical importance. Given the clinician's shortage of time and information overload from myriad sources, they observe that clinically useful information must be accessible within the constraints of limited time and be both relevant and valid for the clinician's practice. They combine these variables in a "usefulness equation" (Figure 4).

Whatever effort a clinician is making to increase his or her medical knowledge about clinical questions, an initial relevance test concerning prevalence of clinical problems in practice can help to guide and make reading, attendance at CME conferences, or other CME approaches more efficient. Further critical appraisal of new information is aided by evaluating the usefulness of such information. Slawson and his colleagues have observed that patient-oriented evidence that matters (POEMs) in terms of demonstrated positive outcomes important to patients is far more useful than disease-oriented evidence (DOE) that represents intermediate outcomes without demonstrable positive outcomes to patients.

Table 3 displays four clinical illustrations of this important distinction. It is more useful for the clinician to know, for example, that a new therapy has been shown to decrease mortality, morbidity, or major complications of diabetes mellitus than whether that new therapy merely leads to better control as measured by hemoglobin A_{1c} tests, an intermediate outcome.

Validity assessment can be approached individually or by using validity appraisals established by others. In either event, a clinical study being evaluated must be appraised for internal validity (are the results valid for patients in the study, eg, randomized?) and external validity (can the findings of the study be generalized to one's patient and practice?). Haynes and his colleagues[33] have developed a "bare bones user's guide" for appraisal of the validity of clinical studies (Table 4).

The process used by the US Preventive Services Task Force[34] serves as an excellent example of an explicitly rigorous application of an evidence-based appraisal of evidence for or against the use of screening and preventive procedures (Table 5).

It is becoming increasingly apparent that the major problem in practicing evidence-based medicine is finding relevant evidence in a timely way so that it can be integrated into clinical decision making in everyday practice. As more electronic databases become more complete and more user friendly, this problem should be alleviated. The Cochrane Library, for example, now has 159 completed systematic reviews on file, with 199 protocols for reviews in progress, and 5000 to 10,000 reviews projected by the year 2002. In addition, this library also has a Database of Abstracts of Reviews of Effectiveness (DARE).[35]

Getting Started Toward Evidence-Based Practice

There are a number of practical, concrete steps

Table 3. Examples of Hypothetical Disease-Oriented Evidence (DOE) and Patient-Oriented Evidence That Matters (POEM) Studies.

DOE → POEM

Number of Assumptions Required to Assume Patients Will Benefit

High → Low

Drug A lowers cholesterol	Drug A decreases cardiovascular mortality/morbidity	Decreases overall mortality
PSA screening detects prostate cancer most of the time and at an early stage	PSA screening decreases mortality	PSA screening improves quality of life
Corticosteroid use decreases neutrophil chemotaxis in patients with asthma	Corticosteroid use decreases admissions, length of hospital stay, and symptoms of acute asthma	Corticosteroid use decreases asthma-related mortality
Tight control of type 1 diabetes mellitus can keep fasting blood glucose <140 mg/dL	Tight control of type 1 diabetes can decrease microvascular complications	Tight control of type 1 diabetes can decrease mortality and improve quality of life

Note: not all these POEM trials have been performed.
PSA - prostate-specific antigen.
Adapted from Slawson et al.[13]

that a clinician can readily take to get started toward an evidence-based approach to practice. The following steps are recommended in this initial effort:

1. Subscribe to *Evidence-Based Medicine*, bimonthly structured abstracts with evidence-based commentaries published by the American College of Physicians, Philadelphia (800-523-1546).
2. Increase reading of predigested information relevant to your practice from sources listed in Table 6.
3. Refocus reading habits along the lines suggested in Table 7.
4. Join or establish an evidence-based journal club in your area, with hospital staff, or in a group practice.
5. Meet with a librarian at your nearest health sciences library to arrange a tutorial or workshop in current search tools, such as MEDLINE.
6. Establish access through an office or home computer to the Internet and the Web sites listed in Table 6.
7. Reorient your CME to evidence-based courses as they become more available.

Time is the major limitation faced by the busy primary care physician in the trenches of everyday

Table 4. Bare-Bones Users' Guides for Appraisal of the Validity of Medical Studies.

Purpose of Study	Guides		
Therapy	Concealed random allocation of patients to comparison groups	Outcome measure of known or probable clinical importance	Few lost to follow-up compared with number of bad outcomes
Diagnosis	Patients to whom you would want to apply the test in practice	Objective or reproducible diagnostic standard applied to all participants	Blinded assessment of test and diagnostic standards
Prognosis	Inception cohort early in the course of the disorder and initially free of the outcome of interest	Objective or reproducible assessment of clinically important outcomes	Few lost to follow-up compared with number of bad outcomes
Cause	Clearly defined comparison group or those at risk for, or having, the outcome of interest	Blinding of observers of outcome to exposure; blinding of observers of exposure to outcome	
Reviews	Explicit criteria for selecting articles and rating validity	Comprehensive search for all relevant articles	

Reprinted, with permission, from Haynes RB, Sackett DL, Gray JA, Cook DL, Guyatt GH. Transferring evidence from research into practice: 2. Getting the evidence straight. ACP J Club 1997;126:A14-6.

Table 5. An Evidence-Based Approach to Guideline Development by the US Preventive Services Task Force: Rating the Quality of Evidence and Strength of Recommendations

Quality of evidence	I	Evidence obtained from at least one properly designed randomized controlled trial
	II.1	Evidence obtained from well-designed controlled trials without randomization
	II.2	Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group
	II.3	Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence
	III	Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees
Strength of recommendations	A.	There is good evidence to support the recommendation that the condition be specifically considered in a periodic health examination
	B.	There is fair evidence to support the recommendation that the condition be specifically considered in a periodic health examination
	C.	There is poor evidence regarding the inclusion of the condition in the periodic health examination, but recommendations may be made on other grounds
	D.	There is fair evidence to support the recommendation that the condition be excluded from consideration in a periodic health examination
	E.	There is good evidence to support the recommendation that the condition be excluded from consideration in a periodic health examination

Adapted from Report of the US Preventive Services Task Force.[34]

practice. Targeted reading of predigested evidence-based references, however, can make already-allocated reading time more efficient and productive. In addition, as electronic aids to practice become more widely available in more primary care settings, the barriers to evidence-based practice should diminish. As Becker[36] recently observed, the availability of a palm-top computer with comprehensive, current clinical information is already on the immediate horizon.

Table 6. Some Sources of High-Quality Evidence.

Source	Description or Address
Primary (undigested) sources	
MEDLINE	National Library of Medicine database with citations from about 4000 journals dating back to 1966
EMBASE	Derived from *Excerpta Medica*, with some citations in pharmaceutical literature not available in MEDLINE; since 1974
Secondary (predigested sources)	
American College of Physicians *ACP Journal Club*	*ACP Journal Club* on CD-ROM www.acponline.org
POEMs, formerly *Journal of Family Practice* Journal Club	jfp.msu.edu
Best Evidence	CD-ROM started in 1997 with all first years of *ACP Journal Club* and all of *Evidence-Based Medicine*
Centre for Evidence-Based Medicine (CEBM)	cebm.jr2.ox.ac.uK
Cochrane Collaboration	hiru.mcmaster.ca/COCHRANE
Bandolier (full text)	www.jr2.ox.ac.uK:80/Bandolier
Agency for Health Care Policy and Research (AHCPR) Clinical Practice Guidelines	text.nlm.nih.gov/ftrs/dbaccess/ahcpr
Physicians' Online (POL)	Free MEDLINE access, inexpensive Internet access if sign up www.po.com

Table 7. Suggested Reading.

Articles

Evidence-Based Medicine

Bennett JW, Glazious P. Evidence-based practice: What does it really mean? Dis Manage Health Outcomes 1997;1:277-85.

Evidence-based medicine. A new approach to teaching the practice of medicine. Evidence-Based Medicine Working Group. JAMA 1992;268:2420-25.

Rosenberg W, Donald A. Evidence-based medicine: an approach to clinical problem-solving. BMJ 1995;310: 1122-6.

Information Mastery

Shaughnessy AF, Slawson DC, Bennett JH. Becoming an information master: a guidebook to the medical information jungle. J Fam Pract 1994;39:489-99.

Slawson DC, Shaughnessy AF, Bennett JH. Becoming a medical information master: feeling good about not knowing everything. J Fam Pract 1994;38:505-13.

Critical Appraisal of Literature

Fletcher RH, Fletcher SW. Evidence-based approach to the medical literature. J Gen Intern Med 1997;12(Suppl 2)S5-S14.

Greenhalgh J. How to read a paper. The MEDLINE database. BMJ 1997;315:180-3.

Haynes RB, Wilczynski N, McKibbon KA, Walker CJ, Sinclair JC. Developing optimal search strategies for detecting clinically sound studies in MEDLINE. J Am Med Inform Assoc 1994;1:447-58.

Shaughnessy AF, Slawson DC. Getting the most from review articles: a guide for readers and writers. Am Fam Physician 1997;55:2155-60.

Oxman AD, Sackett DL, Guyatt GH. Users' guides to the medical literature. I. How to get started. The Evidence-Based Medicine Working Group. JAMA 1993;270: 2093-5.

Guyatt GH, Sackett DL, Cook DJ. Users' guides to the medical literature. II. How to use an article about therapy or prevention. A. Are the results of the study valid? Evidence-Based Medicine Working Group. JAMA 1993;270:2598-601.

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