Strategies for

LEADERSHIP

Evidence-based Medicine for Effective Patient Care

Clinical Evidence is noteworthy

because of its focus and organization

around common conditions.

Crossing the Quality Chasm: A New Health System for the 21st Century,
Institute of Medicine, Washington, DC, 2001.

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What is Evidence-based Medicine…
a quick primer

Evidence-based medicine (EBM), as defined by the Institute of Medicine's report, *Crossing the Quality Chasm: A New Health System for the 21st Century:*

> is the integration of best research evidence with clinical expertise and patient values. **Best research evidence** refers to clinically relevant research, often from the basic health and medical sciences, but especially from patient-centered clinical research into the accuracy and precision of diagnostic tests (including the clinical examination); the power of prognostic markers; and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens. **Clinical expertise** means the ability to use clinical skills and past experience to rapidly identify each patient's unique health state and diagnosis, individual risks and benefits of potential interventions, and personal values and expectations. **Patient values** refers to the unique preferences, concerns, and expectations that each patient brings to a clinical encounter and that must be integrated into clinical decisions if they are to serve the patient.

The practice of EBM is not the evidence itself nor is it "cookbook" medicine. Instead, it is the judicious application of existing research evidence to answer the clinical questions raised by our encounters with patients. Those questions, based upon patient encounters, are framed by the judgment and experience of the clinician whose insight into the clinical process allows the right questions to be asked and the appropriate answers to be sought. These same questions are also shaped by the values and preferences of the individual patient.

To practice EBM requires learning how to frame the appropriate question(s) and to seek clinically valid and important answers. There are five basic steps in the process of EBM practice:

1. Convert a patient's need into a clear, clinically focused question.

2. Search for the relevant information from the best possible sources.

3. Evaluate the evidence for its validity and usefulness.

4. Integrate the evaluation with clinical expertise and patient's unique preferences and apply to individual clinical practice.

5. Evaluate the results achieved in practice from using the evidence.

In order to effectively practice EBM, these steps require constant and consistent use in the daily practice of medicine.

In the Institute of Medicine (IOM) report, *Crossing the Quality Chasm: A New Health System for the 21st Century*, six aims for a new health system were defined: safety, effective, patient-centered, timely, efficient, and equitable. In addition, 10 rules were promulgated that described the characteristics of such a health system. The use of evidence-based medicine was one of the most fundamental premises that related the aims to the rules for a new health care system. As noted in the report:

> In today's health system, it is widely believed that the best care for individuals is based on the training and experience of professionals. The new rule, on the other hand, could be stated: *The best care results from the conscientious, explicit, and judicious use of current best evidence and knowledge of patient values by well-trained, experienced clinicians.*

Through the use of evidence-based medicine, practitioners will be able to provide high quality care and can avoid the problems associated with the misuse, overuse, and underuse of specific care interventions. As the IOM report further noted:

> At their best, health care services match knowledge and need. When care does not match knowledge, it may fail to help — either by omission (failing to do what would help), or by waste (doing what cannot help)… As a result, care is too often unreliable, advice and answers are inconsistent, and clinical practice varies without well-founded rationale.

Today's fast paced environment offers little time for the individual clinician to leisurely research specific clinical questions and evaluate the quality of research evidence that may be available. Traditional sources of information, such as textbooks, are often quickly out-of-date and the volume of information published in the medical literature easily overwhelms the busy clinician. To address this problem, Web-based and print resources are now available that provide ongoing systematic reviews and concise summaries of the quality of evidence available regarding health care conditions.

One such valuable resource is the BMJ Publishing Group's *Clinical Evidence.* The IOM report calls *Clinical Evidence* "noteworthy because of its focus and organization around common conditions." *Clinical Evidence* provides a concise summary of the <u>current</u> state of knowledge, ignorance, and uncertainty about the prevention and treatment of a wide range of clinical conditions based on thorough searches of the international health care literature. For each topic, there is a summary page which presents the questions addressed, key messages, and a list of the interventions covered with a categorization as to whether they have found to be effective or not.

Clinical Evidence is formatted to answer relevant clinical questions as selected by its international board of advisors. Busy clinicians

will find this resource an efficient way to find the most current evidence-based answers to common clinical questions. These answers are validated and appraised by appropriate medical experts. How the answers are incorporated into their clinical practice is left to the clinician, but the publishers of *Clinical Evidence* ask for feedback based upon the clinician's experience. In addition, they encourage the submission of questions based on specific clinical situations that may not be currently addressed.

The questions in *Clinical Evidence* concern the benefits and harms of preventive and therapeutic interventions, with emphasis on outcomes that matter to patients. Questions have been selected for their relevance to clinical practice by section advisors and contributors, in collaboration with primary care clinicians and patient groups. Each new issue of *Clinical Evidence* includes new questions as well as updates of existing questions.

Contents of *Clinical Evidence* are updated every six months for the print/CD-ROM versions and every month for the Web-based version. As part of this toolkit, *Strategies for Leadership Evidence-based Medicine for Effective Patient Care*, the AHA and United Healthcare Foundation provide hospitals with all three versions of *Clinical Evidence*:

• Print version (full text)

• CD-ROM

• Internet access to *Clinical Evidence Online* for a free six-month trial basis (see last page for details).

Using this evidence-based medicine resource or other evidence-based medicine resources will assist all clinicians in delivering high quality care and will serve as the foundation for achieving the IOM's vision of a new health system for the 21st Century.

ADDITIONAL RESOURCES:

Textbooks:

• *Evidence-Based Medicine: How to Practice and Teach EBM* (2nd Edition) Sackett DL, Straus S, Richardson S, Rosenberg W, Haynes RB., London, Churchill Livingstone, 2000.

• *Evidence-based Healthcare: How to Make Health Policy and Management Decisions* (2nd Edition), Gray, JAM., London, Churchill Livingstone, 2000.

• *Evidence-based Medicine: A Framework for Clinical Practice.* Friedland, DJ. Stamford, CT, Appleton & Lange, 1998.

• *Users' Guides to the Medical Literature: Essentials of Evidence-based Clinical Practice.* Guyatt, GH. Chicago, IL, AMA Press, 2002.

Journals:

• *ACP Journal Club,* American College of Physicians—American Society of Internal Medicine, 190 N. Independence Mall West, Philadelphia, PA, 19106

• *Effective Clinical Practice,* American College of Physicians—American Society of Internal Medicine, 190 N. Independence Mall West, Philadelphia, PA, 19106

• *Evidence-Based Healthcare,* Elsevier Science, 360 Park Avenue South, New York, NY 10010

• *Evidence-Based Medicine,* BMJ Publishing Group, BMA House, Tavistock Square, London, WC1H9JR, United Kingdom

• *Evidence-Based Nursing,* BMJ Publishing Group, BMA House, Tavistock Square, London, WC1H9JR, United Kingdom

• *Evidence-Based Mental Health,* BMJ Publishing Group, BMA House, Tavistock Square, London, WC1H9JR, United Kingdom

• *Evidence-Based Obstetrics & Gynecology,* Elsevier Science, 360 Park Avenue South, New York, NY, 10010

• *Evidence-Based Cardiovascular Medicine,* Elsevier Science, 360 Park Avenue South, New York, NY,10010

• *Evidence-Based Dentistry,* Nature Publishing Group, Houndmills, Basingstoke, Hampshire RG21 6XS, United Kingdom

• *Evidence-Based Oncology,* Elsevier Science, 360 Park Avenue South, New York, NY, 10010

Web sites:

• The BMJ Publishing Group *Clinical Evidence*
http://clinicalevidence.com

• Health Information Research Unit – McMaster University
http://hiru.mcmaster.ca/default.htm

• New York Academy of Medicine – EBM resource center
http://www.ebmny.org/

• Bandolier – monthly Web-based EBM journal
http://www.jr2.ox.ac.uk/bandolier

• University of Rochester Edward G. Miner Library
http://www.urmc.rochester.edu/Miner/Links/ebmlinks.html

• Cochrane Collaboration
http://cochrane.mcmaster.ca

• Centre for Evidence-based Medicine
http://cebm.jr2.ox.ac.uk

• Agency for Health Care Research and Policy
http://www.ahrq.gov

National Patient Safety Foundation®

Why Evidence-based Medicine is a Key Component of Patient Safety

Commentary by Karyn Baum, M.D.
Assistant Professor of Medicine, University of Minnesota

Every hospital has been affected by the recent public and professional interest in improving the safety of patients. This interest was highlighted by the 1999 Institute of Medicine's (IOM) influential report, *To Err is Human: Building a Safer Health System*[1], which underscored for all of the stakeholders in the health care system, including the public, the necessity of their involvement in improving safety in medical care delivery. In fact, hospitals, physicians, nurses, employers, health plans, accreditation agencies, and citizens have all taken actions to improve patient safety. These activities have included implementing computerized physician order entry systems; employing dedicated Intensive Care Unit physicians; concurrent drug utilization review and other safe pharmacy practices; and exciting new research initiatives. In addition, dedicated patient safety organizations, such as the National Patient Safety Foundation, have developed Web sites for relaying reliable information on safety-related initiatives for patients, health professionals and hospitals; supported the development of new safety-related knowledge; and collaborated with health institutions to facilitate the establishment of a "culture of safety" for care delivery.

One of the most important developments in patient safety has been the increasing recognition of the importance of evidence-based clinical practice. Evidence-based medicine (EBM) is the explicit integration of the best available scientific evidence into daily

medical decision-making. More than that, it implies a culture of reflective, active, objective, and systematic medical practice. EBM encourages health care professionals to question their knowledge, consciously consider all options in patient care, seek out the scientific basis and evidence for those options, and integrate this new knowledge into care decisions in a rigorous and consistent manner. EBM also promotes the integration of individual expertise and patient values into the process of medical decision-making.

A potent example of the ability of EBM to improve patient safety was demonstrated by the Agency for Healthcare Research and Quality (AHRQ) report, *Making Health Care Safer: A Critical Analysis of Patient Safety Practices*[2]. This report reviewed the evidence regarding 83 patient safety-related practices currently in use by various components of the health care system. Remarkably, many of these practices are not supported by good evidence. Furthermore, many practices with proven evidence for effectiveness were found not to be routinely used. Clearly more work is needed to identify and adopt initiatives with proven efficacy and weed out practices that are not supported by evidence.

In addition to translating the best evidence into safer health care <u>system</u> level interventions, it is equally important to support the translation of best science into <u>individual</u> clinical practice decisions. The field needs to take an interest in eliminating health care decisions that are unsupported by the best science and therefore increase the likelihood for errors. We should encourage health care professionals to regularly and consciously consider, discuss, and evaluate all options in patient care and evaluate those options based on the best science and the informed guidance of physicians and their professional societies. Training in and access to the tools of EBM will give health care teams the information and skills they need to make the best clinical decisions; evaluate specific patient safety interventions and more effectively design and test interventions such as those required by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO).

There are many ways hospital leaders can support and sustain the use of evidence-based medicine, which is an integral component of a "culture of safety":

1. Advocate for the use of evidence in making treatment and policy decisions.

2. Ensure that there is the technical infrastructure necessary to support the daily practice of EBM. In order to practice in an evidence-based manner, clinicians need ready access to the evidence at the point at which clinical decisions are being made. Sources, many of which are available online, such as MEDLINE; professional medical societies; the Cochrane Database; and the BMJ Publishing Group's *Clinical Evidence,* are some noteworthy examples of important information that can be made available through hospital intranet and/or Internet systems.

3. Incorporate evidence-based medicine concepts in assessing and evaluating your hospital's performance in providing safe, high quality care.

4. Encourage and help support practitioners and your staff in maintaining current knowledge relative to their area of practice. In addition, assist them in disseminating this knowledge to others within your organization.

In summary, to improve patient safety and the quality of care provided to our patients, we need to decrease clinical practice that varies from good scientific evidence, provide clinicians with ready access to the best possible clinical knowledge to aid in their medical decision-making, and arm them with the tools needed to assess and improve a hospital's quality and safety systems and interventions. Assisting your physicians in implementing reliable knowledge such as that found in the enclosed copy of *Clinical Evidence* is an important first step in building an evidence-based culture that ultimately leads to better and safer medical care for all the patients treated in your hospital.

1. Kohn KT, Corrigan JM, Donaldson MS, eds. *To Err Is Human: Building a Safer Health System.* Washington, DC: Committee on Quality of Health Care in America, Institute of Medicine, National Academy Press; 1999.

2. Shojania KG, Duncan BW, McDonald KM, Wachter RM, eds. *Making Health Care Safer: A Critical Analysis of Patient Safety Practices.* Rockville, MD: Agency for Healthcare Research and Quality; 2001. Evidence Report/Technology Assessment No. 43; AHRQ publication 01-E058.

National Patient Safety Foundation®

How to Use *Clinical Evidence* in Your Organization

Evidence-based medicine is a concept and a philosophy that has a broad application throughout the hospital. It not only has application to the care of the individual patient, but also has application to a hospital's overall philosophy of care. As noted earlier, evidence-based medicine is defined as:

> …the integration of best research evidence with clinical expertise and patient values. ***Best research evidence*** refers to clinically relevant research, often from the basic health and medical sciences, but especially from patient-centered clinical research into the accuracy and precision of diagnostic tests (including the clinical examination); the power of prognostic markers; and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens. ***Clinical expertise*** means the ability to use clinical skills and past experience to rapidly identify each patient's unique health state and diagnosis, individual risks and benefits of potential interventions, and personal values and expectations. ***Patient values*** refers to the unique preferences, concerns, and expectations that each patient brings to a clinical encounter and that must be integrated into clinical decision if they are to serve the patient.

As can be seen from this definition, not only is the quality of care provided to the patient of importance, but also issues of safety, patient-centeredness, and effectiveness are critical components of the use of evidence-based medicine. Given this inclusiveness and breadth of application of evidence-based medicine, who should be familiar with its contents and how can it be used within hospitals and health systems?

➤ **Hospital Senior Management** — should have a familiarity with the basics of evidence-based medicine, how it is applied and utilized within the organization, and its effects on patient care. Measures of performance should be based upon interventions that have a sound evidence base. Use of the concepts embedded in evidence-based medicine will also provide assistance in evaluating specific technologies and tools needed for improving patient care and safety.

➤ **Board of Trustees** — should have a familiarity with the basics of evidence-based medicine, how it is applied and utilized within the organization, and its effects on patient care.

➤ **Clinicians/Medical Staff/Medical Director** — will have the most direct use of this resource for the provision of care to their patients. Evidence-based medicine can also be used by the medical staff in the development of care protocols, benchmarking performance of clinical departments against evidence of best practices, and as a resource for the peer review process.

➤ **Nursing Executives** — can use evidence-based medicine in training, assessing, and evaluating the nursing care provided to patients and as part of their collaborative efforts in working with the medical staff.

➤ **Quality Improvement/Management Staff** — can use evidence-based medicine as a resource in the development of clinical pathways, care protocols, and practice guidelines in accordance with the health care priorities of the hospital, its clinical staff, and the needs of patients. It can also serve as a resource in developing performance measures and identifying opportunities for quality improvement.

➤ **JCAHO/Compliance Managers** — should consider how use of this resource would help the organization meet JCAHO standards concerning leadership and management of information.

➤ **Risk Managers** — will find this a useful resource in identifying areas for risk prevention activities.

➤ **Information Technology** — will need to consider the concepts embodied in evidence-based medicine (see the following section concerning information technology) in the design of clinical information systems. Also, consideration needs to be given to having evidence-based medicine resources available at the point of care.

➤ **Directors of Medical Education/Residency Programs** — should use evidence-based medicine in constructing continuing education programs as well as in the development of training programs. How to practice evidence-based medicine should be an integral part of the training of medical residents. Evidence-based medicine concepts and evaluations will be useful to all clinicians to incorporate as part of a lifelong education process.

➤ **Pharmacists** — should use evidence-based medicine in understanding preferred methods of treatment for various medical conditions. It will also serve as a framework for evaluating new drugs.

Information Systems and *Clinical Evidence*

Through the use of evidence-based medicine, practitioners can more effectively apply care and can avoid the problems associated with the misuse, overuse, and underuse of care interventions. As noted in the IOM report, *Crossing the Quality Chasm: A New Health System for the 21st Century*, "The ultimate test of the quality of a health care system is whether it helps the people it intends to help."

Traditionally, evidence-based medicine tools and techniques have been applied to the medical literature as a means for developing guidance related to important clinical questions. Such guidance might then be disseminated in the form of published articles and practice guidelines. Increasingly, such tools and techniques have been advocated as a means for the individual practitioner to refine their clinical judgment in the care of individual patients.

However, the medical literature continues to explode with new research findings. It is estimated that there are more than 20,000 journals, and 17,000 new medical books published annually. Of those, MEDLINE categorizes over 6 million references and adds approximately 400,000 new entries annually. The very real problem confronting clinicians has been not only the inability to keep up with the virtual explosion of medical information, but the ability to access, evaluate and apply the current best evidence that directly relates to symptoms being experienced by a patient for whose care they are responsible. In fact, it has been estimated that the lag time between applicable research findings making their way into routine care delivery is approximately 17 years!

The best remedy to this problem appears to lie with clinical information systems and broader utilization of the Internet. Recently, most attention has been focused upon the use of computerized physician order entry (CPOE) as a method to improve patient safety and reduce medical errors. While addressing issues such as illegible handwriting, CPOE systems can be significantly more effective if they are coupled with decision-support logic, based upon evidence-based medicine, that provides, among other things, standardized order sets, clinical reminders, and alerts for drug allergies and drug-drug interactions. Although much of the current decision support in CPOE is focused on "doing things right" (e.g. correct dosing of a medication for the correct patient), more attention needs to be focused upon "doing the right things" (e.g. right drug for the right medical condition) that the most current medical evidence supports.

It is this latter application where the incorporation of evidence-based medicine into a clinical information system holds the most promise. Known as "evidence-adaptive clinical decision support systems" (EA-CDSS), these clinical information systems are based upon software that integrates information regarding the characteristics of individual patients with a computerized knowledge base that continually reflects the most up-to-date evidence from the research literature for the purpose of generating patient-specific assessments or recommendations designed to aid clinicians and/or patients in making clinical decisions.

It is this combination of evidence-based medicine with clinical information systems in the diagnosis and management of patients where the greatest promise for improvement in the care of patients rests. However, as noted in a recent article by Sim et al.[1], information system "monitoring of the literature for relevant studies, identifying those of high quality, and incorporating those into patient-specific assessments, remains an 'open area of research'."

In the interim, what can health care organizations do to assist their health care practitioners in the application of evidence-based medicine? First and foremost is readily available access at the point of care to the Internet and specific evidence-based resources that have assessed and evaluated the current literature. As noted by Sim, et al, "the best electronic resources for evidence-based medicine include the *Cochrane Library, Best Evidence*, and *Clinical Evidence*, resources that cull the best of the literature to provide an up-to-date solid foundation for evidence-based practice."

Other interim steps to consider as an organization develops a clinical decision support system that is based upon evidence-based medicine are:

• Information systems that are interrelated and allow for the ready communication and availability of laboratory and radiology results for clinician use.

• Information systems that incorporate current patient demographics and interrelate with clinical information systems.

• Internet and intranet applications for ensuring the capability of clinicians and patients to communicate with each other.

• Internet and intranet applications for patients/consumers to access relevant evidence-based information and health education programs.

• Evidence-based performance measures to provide feedback regarding individual and organizational performance.

Additional examples of clinical applications where evidence-based medicine could be of use are:

• Systems with patient access to online general health information, especially when this is coupled with population management decision support features and health /wellness recommendations.

- Electronic medical record systems, in the ambulatory care environment, with incorporation of population-specific health maintenance reminders and practice guidelines.

- Pre-visit intake information systems, especially those that incorporate rules for presenting additional interview questions for selected subsets of patients and identifying patients who might be candidates for disease management programs.

- Information systems for physicians to identify and manage selected subsets of their patient populations (e.g. those with chronic disease, regardless of past or future encounters).

- E-mail messaging systems, where evidence-based medicine tools could aid the physician in responding to queries from patients.

- Computer-assisted telephone triage and assistance (call center technology) systems where evidence-based medicine might help in the design of protocols for use by nurses and customer service representatives.

While the melding of evidence-based medicine with clinical information systems is in its relative infancy, the application of evidence-based medicine is more advanced. By making evidence-based medicine resources more available to practitioners, particularly at the point of care, the likelihood of its increased use is significantly greater. The technology now exists for these resources to be made available so that the time gap between the discovery of efficacious forms of treatment and their routine application in routine care can be significantly narrowed.

1. Sim I, Gorman P, Greenes R, et al. "Clinical Decision Support Systems for the Practice of Evidence-based Medicine." J. Am Med Inform Assoc. 2001; 8 (6) 527-534.

Clinical Evidence
CD-ROM Instructions

The *Clinical Evidence* mini CD-ROM allows you to refer to the full *Clinical Evidence* content contained within the print version.

To Install *Clinical Evidence*

1. Exit from any Windows programs you have running.

2. Insert the *Clinical Evidence* installation CD-ROM into the CD-ROM drive. The installation starts automatically (if it does not, select Run from the Start menu and enter d:/setup (where d: is your CD-ROM drive letter).
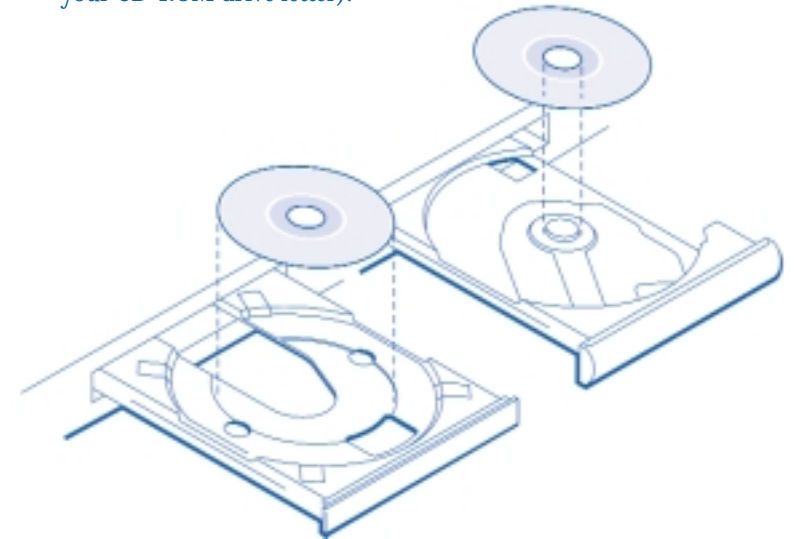
3. Follow the on-screen instructions. As part of this process, you can install Adobe Acrobat Reader so you can efficiently print *Clinical Evidence* topics – this can also be installed later. An additional 20 Mbytes of hard disk is required for this.

Minimum systems requirements

An IBM compatible PC with at least this specification:
- 60Mbytes hard disk space
- 90MHz processor
- 32 Mbytes of RAM
- CD-ROM drive
- Modem, if you want to access the Internet for updates, etc.
- SVGA monitor recommended

To access *Clinical Evidence* help:
- From within the *Clinical Evidence* CD-ROM, simply click on the link at the top of the screen or from within Windows, select > Programs > Clinical Evidence > Help (if you have already installed *Clinical Evidence*)

- For technical help, please go to the FAQs at www.clinicalevidence.com

- For damaged CD-ROMs please contact ce@unitedhealthfoundation.org

- More information is available in the paperback version of *Clinical Evidence,* Issue 8, Appendix 3.

How to Obtain Access to *Clinical Evidence* Online

As a recipient of the *Strategies for Leadership Evidence-based Medicine for Effective Patient Care* toolkit, hospitals are eligible to free access to *Clinical Evidence* Online for a six-month period beginning March 1, 2003.

Clinical Evidence Online includes all the information from *Clinical Evidence* Issue 8, plus monthly updates.

Instructions will be posted on the AHA's Web site soon. Visit **www.aha.org** and go to the "Quality and Patient Safety" section.

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