

What is evidence based medicine?

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Evidence based medicine (EBM) is a philosophy of medical practice and education, originally promoted in the 1970s by David Sackett and Brian Ames to instruct clinicians on how to best use clinical journals. The term EBM first appeared in print in 1991, in the ACP Journal Club, and was coined by Gordon Guyatt. (1)

There are various, overlapping, established definitions to the seemingly innocent question, what's EBM? which range from the short, for example:

“EBM is the integration of best research evidence with clinical expertise and patient values.” – David Sackett (2)

OR

“EBM is nothing more than a process of life-long, self-directed learning in which caring for patients creates the need for clinically important information about diagnosis, prognosis, therapy, and other clinical and health care issues.” -- The EBM Working Group (3)

... to the long, for example:

“Evidence based medicine (EBM) is the conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients. EBM integrates clinical experience and patient values with the best available research information. It is a movement which aims to increase the use of high quality clinical research in clinical decision making. EBM requires new skills of the clinician, including efficient literature-searching, and the application of formal rules of evidence in evaluating the clinical literature. The practice of evidence-based medicine is a process of lifelong, self-directed, problem-based learning in which caring for one's own patients creates the need for clinically important information about diagnosis, prognosis, therapy and other clinical and health care issues. It is not “cookbook” with recipes, but its good application brings cost-effective and better health care. The key difference between evidence-based medicine and traditional medicine is not that EBM considers the evidence while the latter does not. Both take evidence into account; however, EBM demands better evidence than has traditionally been used. One of the greatest achievements of evidence-based medicine has been the development of systematic reviews and meta-analyses, methods by which researchers identify multiple studies on a topic, separate the best ones and then critically analyze them to come up with a summary of the best available evidence. The EBM-oriented clinicians of tomorrow have three tasks: a) to use evidence summaries in clinical practice; b) to help develop and update selected systematic reviews or evidence-based guidelines in their area of expertise; and c) to enroll patients in studies of treatment, diagnosis

and prognosis on which medical practice is based.” -- The National Center for Biotechnology Information, NIH, ACTA Informatica Medica. (4)

The EBM process commonly involves:

1. Developing focused questions.
2. Efficiently determining the best evidence to answer the questions.
3. Critically appraising the evidence for validity and usefulness.
4. Clinical practice application.
5. Evaluating evidence performance in clinical application.

EBM was created as a response to the information overload generated from the explosion of technological databases, such as MEDLINE. There were simply not enough hours in the day to read all the applicable research in various disciplines, so EBM developed algorithms for using search engines in the literature, such as adding methodology terms and clinical filters along with subject terms to optimize retrieval. However, this information overload still haunts medicine, given the very slow rate of the adoption of new clinical research, often taking an average of 17 years for new evidence-based findings to reach clinical practice. (5)

Returning to the 5 steps in the EBM process:

1. Asking the right question is the first step. The P.I.C.O. model for clinical questions is commonly employed, which asks the following: what is the kind of Patient, population or problem? What is the main Intervention or prognostic factor? What Comparisons with the intervention? And what is the desired Outcome?
2. “Best” evidence is arguably the biggest problem. EBM searches the evidence depending on the type of question being asked, whether it’s: therapy, diagnosis, prognosis, etiology/harm, prevention, or quality improvement.
EBM then tries to qualify the evidence into 5 decreasingly useful levels: Level 1, randomized controlled trials (deemed the best). Level 2a, evidence from cohort or case control analytic studies. Level 2b, observational evidence from multiple time series. Level 3, the consensus of professional authoritative opinions. And Level 4, anecdotal experience (obviously not the most useful).
3. Appraising evidence has many handicaps: the perfect evidence may not be available to answer your question, or the duration of a study may be inadequate, but the biggest problems are the biases of many publications favoring big pharma or special interest groups. This is so bad that, “[a]s EBM became more influential, it was also hijacked to serve agendas different from what it originally aimed for. Influential randomized trials are largely done by and for the benefit of the industry. Meta-analyses and guidelines have become a factory, mostly also serving vested interests. National and federal research funds are funneled almost exclusively to research with little relevance to health outcomes. We have supported the growth of principal investigators who excel primarily as managers absorbing more money. Diagnosis and prognosis research and efforts to individualize treatment have fueled recurrent spurious promises. Risk factor

epidemiology has excelled in salami-sliced data-dredged articles with gift authorship and has become adept to dictating policy from spurious evidence.” (6)

A more fundamental problem with evidence is exposed in the ACTA definition of EBM mentioned earlier (4), in the phrase: “[T]he application of formal rules of evidence...” This dogmatically relies on the scientism of the Scientific Method. Scientism is the claim that scientific method allows humanity to gain privileged insight into the structural processes of nature. Unfortunately, the notions that scientific evidence corresponds to reality, and that the scientific method is the **only** way to investigate nature, have both been refuted. (7) The Scientific Method is the best tool in the toolbox, but it’s not the only tool. Humans somehow progressed, fumbling around without the Scientific Method before Galileo, and many died trying.

4. Applying findings to one’s clinical practice may be easy or difficult. EBM was not intended to be a cookbook, though there are critics that claim EBM may have cookbook dangers. (8) Clinicians may lazily use EBM guidelines to the detriment of the patient. They can become complacent in their clinical approach and feel they if they follow the EBM guidelines they’re golden. Of course, this is failing to adhere to integrating clinical expertise which is part of EBM.

In some clinical environments, practitioners may have problems with their peers, insurance companies, or the hospital administration for deviating from their Standard of Care. Insurers endorse old recommendations that, over time have proven to be unnecessary and even harmful. Insurers and government regulators fall behind the evidence, perpetuating out-of-date knowledge.

5. Evaluating the performance of your evidence is commonly done with pre-and post-treatment test results. It may be important to assess at frequent intervals as to whether or not any of the four steps discussed above need improvement.

EBM is a useful reminder that physicians must pay attention to cutting-edge research and challenge the status quo. It’s also convenient that there are institutions, like the Center for Evidence Based Medicine (9), which assist one’s continuing education along these lines. Yet in standardizing and teaching a definitive EBM paradigm, these institutions ironically run the risk of turning EBM into a status quo of its own.

NOTES:

1. *Evidence-based medicine, ACP J Club. 1991 Mar-April;114:A16. doi:10.7326/ACPJC-1991-114-2-A16*
2. *Sackett DL, Straus SE, Richardson WS, Rosenberg W, Haynes RB, Evidence Based Medicine: How to Practice and Teach EBM, Edinburgh: Churchill Livingstone.*
3. *Evidence Based Medicine Working Group. Evidence based medicine. A new approach to teaching the practice of medicine. JAMA1992;268:2420-5.*

4. *"Evidence Based Medicine – New Approaches and Challenges," Acta Inform Med. 2008; 16(4): 219–225. Published online 2008 Dec. doi: 10.5455/aim.2008.16.219-225*
5. *"Managing clinical knowledge for health care improvement", Balas EA, Boren SA. Managing clinical knowledge for health care improvement. In: Bommel J, McCray AT, editors. Yearbook of Medical Informatics 2000: Patient-Centered Systems. Stuttgart, Germany: Schattauer Verlagsgesellschaft mbH; 2000:65-70J.*
6. *P. Ioannidis MD DSc, Journal of Clinical Epidemiology, vol. 73, pp. 82-86, May 2016.*
7. *For more on the pitfalls of the scientific method I refer you to the classic, "Against Method and Science in a Free Society," by physicist/philosopher Paul Feyerabend.*
8. *Evidence-Based Medicine or Cookbook Medicine? Addressing Concerns over the Standardization of Care. Sociology Compass 8(6):823–836 · June 2014, DOI: 10.1111/soc4.12184*
9. *CEBM, Center for Evidence Based Medicine, University of Oxford.*