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Information Mastery –
Changing the Paradigm of Patient Care with
Patient-Oriented Evidence That Matters (POEM)

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1. Introduction

In many ways, physicians and surgeons practice in a manner reminiscent of individual care provided in the late nineteenth century. The patient presents with a complaint or condition, the physician queries the patient, gathers physical evidence from examination and other measures, performs a mental exercise that arrives

first at an answer of what the problem is, then what caused the problem then a solution (treatment) is selected from a menu of options. Though the patient presents with a problem, the approach to solving the problem was entirely driven by the education and training of the clinician. In earlier times, diagnoses and treatment were often lacking, and the role of the clinician became one of educator or comforter rather than healer.

In the early part of the 21st century more is expected of those physicians providing diagnostic and treatment services. There is a greater understanding of physiology and pathological process affecting human health, and there is a greater array of treatments for injuries and conditions. Among the contemporary patient expectations are 1) the physician is actively listening and placing the wants and needs of the patient above all else, 2) the healthcare provider is delivering the most effective means of arriving at an accurate diagnosis then providing the most appropriate care and 3) does the expected outcome of treatment meet the needs of the patient while remaining affordable. These new rules of engagement are woven into the framework of evidence-based medicine (EBM).

2. Patient centered care

EBM is patient centered, that is the patient is the center of the decision process starting with choice of diagnostic procedures, then the selection of treatment and is the evaluator of the success of treatment. Outcomes that matter to patients also matter to physicians and can be characterized as Patient Oriented Evidence that Matters (POEM). Reduction of pain, improved function, improved quality of life, reduced mortality, and reasonable cost are the cornerstone of value added to the lives of individuals who seek treatment. This might seem

commonsensical and physicians traditionally think that the 19th century way of providing care has been meeting the needs outlined above. In the United States and other countries with advanced medical knowledge systems, the evidence is mounting that the needs of patients are not addressed in a patient centered way, nor are outcomes as good as physicians believe.

The fundamental process of Evidence Based-Medicine (EBM) consists of five-steps: 1) developing a question using the populations-intervention-comparison-outcome (PICO) format, 2) finding research that may answer the question, 3) evaluating the research for validity, impact, and applicability, 4) applying the information to clinical decision making, and 5) periodically evaluating one's outcomes after implementation and performance of the previous four steps.[5] The development of the question to be answered is patient centered and the EBM process focuses on issues that matter to the patient. This is a labor intense process that involves finding several sources of evidence, analyzing, evaluating and then making the product understandable by the patient.

The introduction of EBM shifted the decision making to the patient while having the physician analyze the patient within the context of evidence that is relevant to that patient and their condition. After the analysis, the diagnosis is expressed in a relativistic way using likelihood or probability to the patient in a way he or she can understand. Offering treatment is more of a menu with expected outcomes and possible unwanted outcomes freely discussed with the patient. The treatment options are based upon the highest order of evidence available, and when possible treatment guidelines based upon best evidence is given as the most reliable means to predict outcome. At times there will be good evidence to cite in the discussions with the patient, other times there will be a paucity of good evidence and the patient's decision may reflect the lack of evidence, relying more on expert opinion.

One reason physicians and surgeons rely on textbooks and content experts is the time factor. It is very easy and quick to call a colleague for an opinion or formally consult a colleague for either input on evaluation or treatment- or to assume care of a challenging patient problem. When clinicians do spend their time searching for answers to questions or problems, the easiest sources are textbooks, review articles, audio reproductions of lectures and information provided by pharmaceutical and implant companies. Again, easy location of didactic information consumes less time and energy than a thorough search and analysis of possibly relevant, possibly useful information.

Clinicians develop idiosyncratic ways of evaluating, communicating and interacting with their patients- often a direct reflection of residency/fellowship training. One tactic is not providing answers to patient's questions or questions of care, probably due to a combination of factors- lack of time and little knowledge. Many feel that by reading current literature and attending CME courses that they are indeed keeping up with meaningful change and offering their patients the best practice based upon the best current knowledge. The clinician's sense of security by maintaining exposure to relevant topics in the literature is a culture of habit- reading familiar journal articles, reliance on consultants, compliance with local customs or referral patterns and reliance on quick sources of information-textbooks, review articles, electronic media, colleagues etc. While these sources may be of great value, there is a high probability that they are out of date or biased. One of the most ingrained biases in all medical literature is the highly selective patient population described

in texts and manuscripts- often the idealized patient in a study is not very similar to the patient in the doctor's practice, or the real world patient has multiple problems while the textbook discusses only one problem at a time.

Decision-making is another key element of evidence based medicine. There is the continual need to remind ourselves that patient care is about patients making decisions that affect outcome. The earlier notion of shared decision making has now shifted with the EBM paradigm to patient-centered decision making. The physician is once again a 'doctor'- from the Latin 'teacher'.

3. Sources of evidence

There are three main sources of medical information that can be used in generating evidence. First is primary sources material. This is the collection of original publications that answer questions about patient care. Next are the review articles, textbooks, synopses and curriculum of courses that are the first attempt to synthesize evidence with opinions. Most of the teaching at the Medical School level is in this second level, as are the popular texts and review courses. Third is the assimilation of best evidence via systematic reviews, meta-analysis and generation of evaluation or treatment guidelines.

The first level of primary source is the substrate that is entered into the evidence production cycle. The production cycle creates evidence in response to a clinical need, refines the results of investigations to craft an answer to the question raised by the clinical need. Once meaning is added to the data gathered, this evidence is now disseminated via publications or presentations, the evidence is put into practice and lastly the evidence is evaluated to determine if further evidence is needed to better solve the original need. The role of generating evidence is fundamental, however, the need for dissemination and implementation become almost as important if the evidence is to be used to improve quality of care.

The second level of information is the synthesis of opinions and creation of literature that informs clinicians about what is available. This group includes review articles, textbooks, online texts and review lectures. As a source of evidence, this second level is highly variable in that expert opinion may supersede the synthesis of the best evidence, and other bias may creep into the review product. The third level is the combination of best evidence with critical analysis provided by experts in methods of providing statistical support for best evidence. These are the systematic reviews of evidence and meta-analysis. Studies that combine first level evidence into stronger support statements, or non-support statements of diagnostic and treatment evidence.

Medical knowledge is stratified in a pyramidal formula created by Bloom in the 1950s (see figure 1). Recall or remembering is the entry level of knowledge with understanding and applying the next two levels that are necessary in medical practice. Most clinicians operate mostly in the first three levels of knowledge and rely on sources than can analyze, evaluate and create the understanding and application for improving medical knowledge. This taxonomy of learning is similar to the creation of best evidence and application to patient care.

The importance again of disseminating the evidence is essential for improving quality of care, and later on an evaluation of care after implementation is needed to determine if more and better evidence is still needed.

4. Information mastery

EBM has created several concepts and principles that are embodied in "a hierarchy of evidence and that conclusions related to evidence from controlled experiments are accorded

Bloom's Taxonomy for Thinking
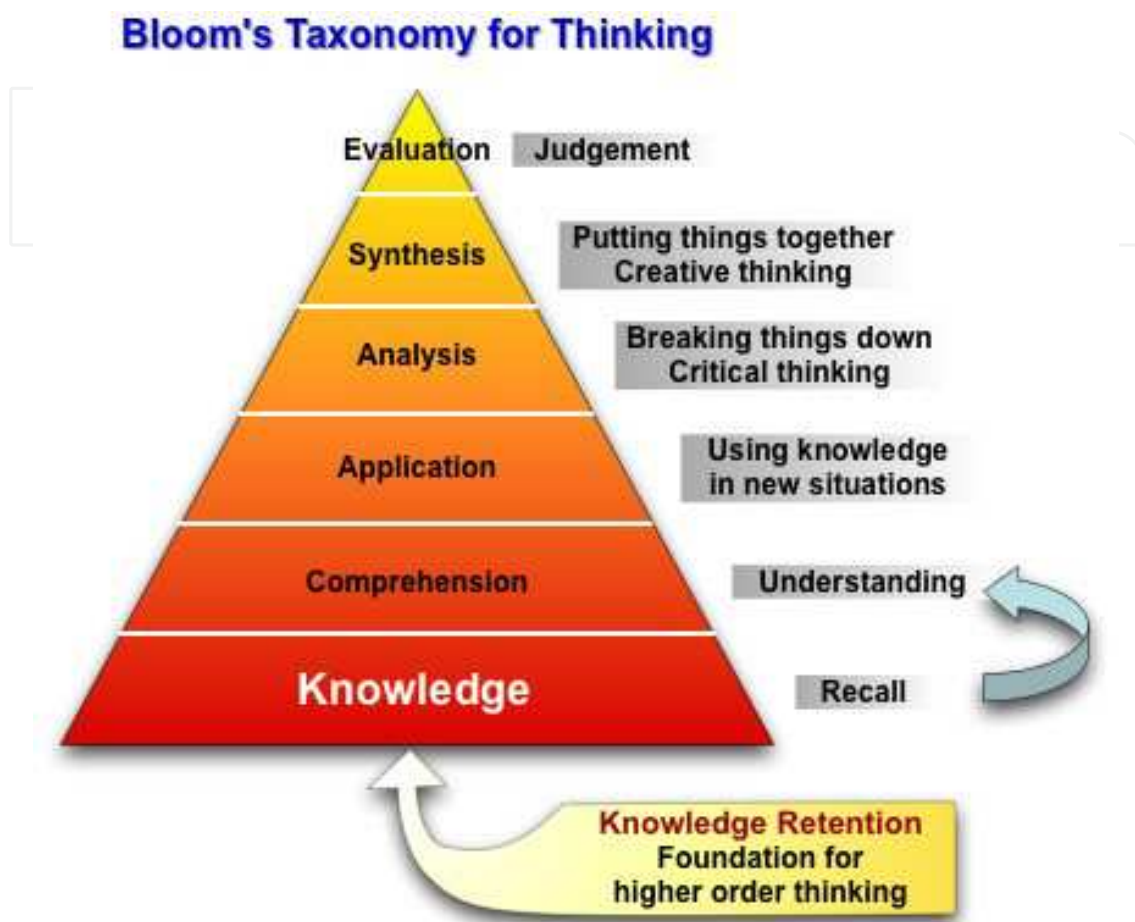
(University of Texas, Arlington, Center for Learning accessed via Google, 10/21.2011)

Fig. 1.

greater credibility than conclusions grounded in other sorts of evidence." In this hierarchy there is a (unproven) belief by advocates of EBM that randomized control trials- the highest level of evidence- should trump evidence from non-randomized trials and case-comparison studies. The lowest levels of evidence consist of case series and expert opinion. Though logical, there remains a great deal of reluctance on the part of practicing physicians to abandon their comfort zone in the reliance on expert opinion and studies that do not use comparative cohorts of patients. And the unaddressed problem of relevance, that is most studies do not include the complexity seen in most 'real world' patients.

5. The usefulness of evidence

With the advent of new and better evidence have come guidelines based upon evidence. Having guidelines is a shortcut for doctors who can follow key elements of evidence-based practice without having to do extensive literature research and analyses. This is one of the

fundamental principles of information mastery- the usefulness principle, expressed as an equation:

$$Usefulness = Relevance \times Validity / Work$$

Where **relevance** is the similarity of the real world patient to that portrayed in the guideline and general applicability of the evidence, **validity** is the scientific truthfulness of the information and **work** is the amount of time spent finding the answer to a question in clinical diagnosis or treatment. Validity is of prime importance with relevance a close second.

Simply stated, the Usefulness Equation is a form of Occam's Razor- finding the simplest solution to a problem with the important features of the process being 1) likelihood of success and 2) ease of access to the information needed to make judgments and decisions. This is not a quantitative equation but gives a sense of the relationship between the key elements of best evidence.

Learning mastery is a means of educating students in a linear fashion. Students are taught basics or fundamentals, and then they are shown how to apply process to the fundamentals to solve problems and create higher cognitive functioning. An example is learning numbers and then learning to make sentences with numbers- i.e. equations- applying addition, subtraction etc. Similar to learning mastery is information mastery. A process in which adult learners are instructed in basic functions about finding information that is used to solve problems and answer questions. An example is using the Internet to search for the best treatment of a 40-year-old woman who smokes, has a BMI of 34 and presents with pneumonia. With the patient care issue, the best use of the internet is not to have a search engine deliver thousands of journal articles that would take countless hours and a great deal of analytic skill to synthesize a treatment. The Internet can now provide rapid access to treatment guidelines, protocols and algorithm based upon high level of evidence that will produce good outcomes at reasonable cost, if the patient agrees with the recommended treatment.

With the advent of information technology and the availability of sources of reliable evidence vetted by experts in the EBM it is now feasible to instruct clinicians in where to find and how to implement usable best evidence. Rather than frustrate busy practitioners with the laborious process of generating their own best evidence, the time is best spent gathering evidence and EBM guidelines.

Slawson and Shaugnessy (2003) have created and tested a curriculum to teach the principles of information management. The curriculum has three levels:

- Level 1 is for clinicians who can use the concepts to make better patient-care decision;
- Level 2 is for teachers and writers who teach clinicians the curriculum and provide evidence-based reviews of original research; and
- Level 3 is for researchers who are adept at conducting decision analysis, meta-analysis, and other techniques of synthesizing raw research information into useable clinical information.

5. Locating information from available sources

Finding the information at the point of care (just in time) is at the core of how the application of evidence-based medicine can transform the practice of medicine in ways that

save time, cost, suffering and lives. The combination of clinical and laboratory diagnosis with the technology to bring validated treatment plans into use makes for less reliance on the doctor's memory or experience. Given the current focus on patient safety and reducing medical diagnostic and treatment errors, there is great advantage to putting systems-based solutions in place that override the individual decision making of physicians. With evidence-based medicine, there is no need for doctors to memorize and catalogue volumes of information 'just in case' they need it. There now exists 'just in time' information that is processed into usable guidelines that inform and educate the patient while providing a more reliable process that protects patient safety and delivers better outcomes.

There are two 'tools' in information mastery that apply to 'just in time' application of evidence at the point of care. First are hunting tools, second are foraging tools (figure 2).

A high-quality foraging tool employs a transparent process that:

1.   filters out disease-oriented research and presents only patient-oriented research outcomes,
2.   demonstrates that a validity assessment has been performed using appropriate criteria,
3.   assigns levels of evidence, based on appropriate validity criteria, to individual studies,
4.   provides specific recommendations, when feasible, on how to apply the information, placing it into clinical context,
5.   comprehensively reviews the literature for a specific specialty or discipline, and
6.   coordinates with a high-quality hunting tool.

A high-quality hunting tool employs a transparent process that:

1.   uses a specific, explicit method for comprehensively searching the literature to find relevant and valid information,
2.   provides key recommendations supported by patient oriented outcomes when possible, and, when not, specified as preliminary when supported only by disease-oriented outcomes,
3.   assigns levels of evidence[+] or strength of recommendation[#] to key recommendations using approved criteria,
4.   coordinates with a reliable foraging tool.

(Ebell, 2003)

Fig. 2. Criteria for High-Quality Hunting and Foraging Tools

Hunting tools are information resources that have already organized the literature-based information by relevance, having synthesized the validity into a product that can be easily (quickly) accessed by electronic search media. There is a simple rating system for the combined validity and relevance called the Strength of Recommendation Taxonomy (SORT). The importance of a combined system such as SORT is that it meets the conditions of the Usefulness Equation- it is easy to locate (low work) and has high relevance and validity. An additional quality that is of value in a hunting tool is the transparency displayed. The issues surrounding transparency include the description of the process used in the generation of evidence as well as conflicts of interest with stakeholders in the results of the evidence. Though many physicians are capable of their interpretation and analysis of medical literature, including relevance and validity, it is time consuming and impractical to do this on a regular basis. Once again the Usefulness Equation discourages intensive searching or analytics because of the work involved. Perhaps such analysis and discovery is useful for

clinical research but is unwieldy for patient care. The ideal source for best evidence should be independent of bias, thoroughly searches the literature, expertly assesses the validity and then summarizes the content in a concise, readable outline for the reader.

In addition to hunting tools that zoom-in on the relevance and validity, are the second major type of location tools- foraging. These are sources that have valid information that helps the clinician keep current. Newer patient-oriented evidence may be published but unless the clinician knows of the existence of such newer knowledge, the physician does not know that there is a need to change practice. The incorporation of foraging tools into clinical does not require point of care application but is part of the background work that should be done by those assuming patient care responsibility. As with the hunting tools, these foraging tools are transparent, explaining methods, criteria for entry and exclusion and outlining conflicts of interest among stakeholders. The habitual use of a foraging tool prompts the clinician of patient oriented evidence that will keep practice current; however some review of the relevance and validity of these sources is needed before adopting recommendations. Unlike hunting tools, the practitioner is not looking for clinical pathways or immediate answers to patient care questions.

Relevance is the patient-centered aspect of EBM. The evidence that helps with patients making decisions is identifying patient-oriented evidence that matters (POEM). This POEM matters to the clinician as well and is what physicians and surgeons should be searching for and present to their patients for consumption prior to decisions.

Three questions that help assess the evidence as POEM:

5. Did the study or guideline evaluate an outcome, and is the outcome one that patients care about?
6. Did the study or guideline evaluate a condition, disease or issue that is congruent with patients in your practice?
7. If the evidence is true, would the discovery of that truth require you to incorporate this finding into your practice?

Validity is the most scientifically and intellectually challenging element of evidence based medicine. Analysis and assessment of information that is considered evidence is difficult and time consuming. For those without the background needed to dissect methodology, statistical plans, bias, accuracy and error- it is most difficult to arrive at a judgment about the validity of any medical research. And if the outcome is a disease status or a surrogate endpoint for what matters to most patients, it is an even more difficult challenge. Having reliable hunting and foraging tools brings the world of evidence back into the realm of patient care for the majority of clinicians who do not have the training, inclination or time to apply scientific rigor to patient care information. Again, some level of assessment of the relevance is needed in conjunction with validity in order to satisfy the Usefulness Equation.

Information that is not valid is not useful, and information that is not relevant is not useful. If the amount of work to find evidence is excessive, the clinician will not consistently put that amount of effort into the process. Other sources of information become the default search engine- textbooks, review articles etc.

Value in healthcare is currently defined as an equation:

$$Value = Quality/ Cost$$

Quality is the desired outcome of treatment while cost is monetary amount needed to provide treatment. Cost includes the added expense of treating complications, errors and poor results, plus the loss in earnings and savings required to pay for services. Providing improved quality increases value, as does decreasing cost. The potential for EBM and guidelines is the improvement in quality- by bringing the delivery of an outcome that is closer to the expectation of the patient the quality metric improves. There is evidence now that improved quality, by reducing unwanted outcomes and complications, will reduce cost. Thus a more robust increase in value is created if both the numerator and the denominator of the Value Equation can be properly affected.

6. Summary

A great deal has been written and taught about patient-centered decision making and patient centered care. The shift from expert opinion and experience-based learning toward best evidence and clinical practice guidelines is a shift in our medical learning and practice. Critical evaluation of patient care requires a metric that is based on outcome, which in turn requires reflection by the physician on how well the diagnoses and treatments are working in a given patient population. There is value to learning from one's practice- that is now considered a core competency in residency training in the United States. The improvement in patient outcomes that is expected with newer medical knowledge is, in itself, a delivery system of evidence to the point of care. Familiarity with sources of best evidence and practice guidelines is a reasonable next step to improve upon historical performance of physicians and surgeons. Reducing errors & complications, improving compliance with best practice, lowering costs, meeting patient expectations are lofty goals that require a newer way of problem solving than that of the past century. Tools exist for finding best evidence quickly and content experts have already done the heavy lifting by gathering and analyzing the primary sources, creating tertiary sources of good evidence. Though high-level evidence does not yet exist in many areas of clinical practice, there is ample evidence that could be put into practice now. Using available information sources and experience, information mastery facilitates putting that which is better into practice and will create evidence-based, patient centered care.

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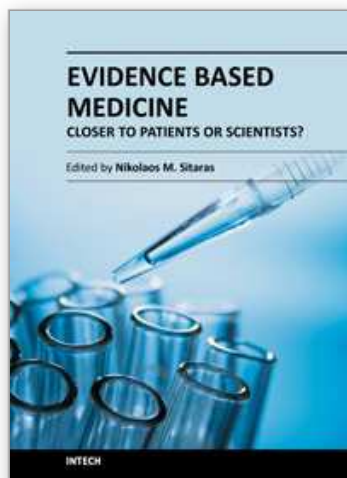
Evidence Based Medicine - Closer to Patients or Scientists?

Edited by Prof. Nikolaos Sitaras

Evidence-based medicine (EBM) was introduced to the best benefit of the patient. It has transformed the pathophysiological approach to the outcome approach of today's treatments. Disease-oriented to patient-oriented medicine. And, for some, daily medical practice from patient oriented to case oriented medicine. Evidence has changed the paternalistic way of medical practice. And gave room to patients, who show a tendency towards partnership. Although EBM has introduced a different way of thinking in the day to day medical practice, there is plenty of space for implementation and improvement. This book is meant to provoke the thinker towards the unlimited borders of caring for the patient.

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