

Evidence-Based Emergency Medicine: Integrating Research Into Practice

This series is based on the work and vision of many clinicians, researchers, and librarians throughout the world who are continually evolving and disseminating the principles of EBM. We are particularly grateful to Gordon Guyatt, Deborah Cook, and the other faculty and tutors of the EBM teaching workshops at McMaster University for their encouragement and guidance. We also acknowledge a growing cadre of physicians and educators who, as members of the EBEM Task Force, helped inaugurate this series: Michael D Brown, MD; Carey D Chisholm, MD; William H Cordell, MD; Marc H Gorelick, MD; Stephen R Hayden, MD; Jeffrey S Jones, MD; Roger J Lewis, MD, PhD; Stephen Lloyd, MD, MPH; Thomas McGinn, MD; Stephen R Pitts, MD, MPH; S Chris Pappas, MD; Brian H Rowe, MD, MSc; Robert L Wears, MD, MS; and Stuart Weiss, MD. The *Annals* editors also congratulate Peter Wyer, MD, and Harold Osborn, MD, who, over the past 16 months, diligently worked to help design and implement this series and now serve as the EBEM series decision editors. Acknowledgment is also due *Annals* Director Margaret Levene for her invaluable assistance and creativity in helping design the format of this series.

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Medical journals generally have two missions—scientist-to-scientist communication and scientist-to-practitioner communication. The former is focused on the results of individual experiments and studies. The burden of interpretation and application and integration into practice is placed directly on the reader. The busy front-line clinician may not have the time, methodologic and statistical expertise, or access to current information sources required to keep up to date with clinically important information and to incorporate new information into patient care. This issue of *Annals* inaugurates a new series that will adapt the philosophy, principles, and skill set of evidence-based medicine (EBM) to the unique requirements of emergency medicine in an attempt to assist practitioners in overcoming these barriers.

EBM, succinctly stated, is the ability to track down, critically appraise (for validity and usefulness), and incorporate the rapidly growing body of research into front-line patient care. Sackett and Rosenberg wrote, "Given the extremely rapid growth of randomized trials and other rigorous clinical investigations, the issue is no longer how little of medical practice has a firm basis in such evidence; the issue today is how much of what is firmly based is actually applied in the front lines of patient care."¹ Therefore the main objective of this new *Annals* section, titled "Evidence-Based Emergency Medicine" (EBEM) is bridging the gap between research and practice.

We begin this new section with two contributions from advocates and educators of the evidence-based approach to clinical practice. Gordon Guyatt, of McMaster University in Ontario, one of the founders of the EBM movement, offers commentary regarding the importance of the development of EBM in emergency medicine. In the inaugural installment of this new series, Wyer and Osborn apply an evidence-based approach to answering the question, "In my community hospital ED, will the early administration of recombinant tissue plasminogen activator to patients with acute ischemic

stroke reduce mortality and morbidity?" Their installment sets the tone for the series.

The EBEM series will focus on specific and realistic patient scenarios or clinical policy issues that confront emergency physicians daily. Each installment will pose and refine pertinent questions that emergency clinicians ask in frontline patient care or department administration and management. The authors will apply EBM principles and skill sets to the clinically relevant question to formulate an answer that can be incorporated into decision making. The purpose is to recreate the thought process, in as realistic a manner as possible, that emergency practitioners follow in posing and answering questions.

Annals will continue to recruit and publish more traditional approaches as well. State-of-the-art articles, collective reviews, and metaanalyses are extremely beneficial when properly done. As evidence, in this issue Kasner and Grotta comprehensively review acute ischemic stroke with special emphasis on the role of the emergency physician and the dilemmas we face. Their excellent review is simultaneously published with the EBEM work to not only emphasize the importance of medical advances in the treatment of this potentially devastating disease, but to demonstrate the benefits to you, the readers, of the different approaches. Ultimately each approach must be of such educational value that you at least consider change if not implement change in your daily practice.

A standardized four-part format has been adopted for the EBEM series, drawing on the user's guides published in the *Journal of the American Medical Association* by the Evidence-Based Medicine Working Group centered at McMaster University.^{2,3} The first part is the scenario and application of the EBM core skill set—formulating the question, searching for best evidence, analyzing the evidence, and applying the evidence. The second part is a critically appraised topic (CAT) and study-review form. These comprise a summary of the installment in a concise and easily read format. The third part is called "Evidence-Based Emergency Medicine/Skills," a "mini-lesson" that will elaborate on specific EBM skills and issues. The fourth part features insights from the series editors and reviewers.

We anticipate that, with time, the *Annals* EBEM series will evolve and expand. We hope readers will not only find the EBEM series useful and innovative but contribute to its future success. Readers should forward insights and criticism to the *Annals* editorial office (ebem@annalsem.org) for potential inclusion in the Comments section of each installment. For those who wish to author future scenarios or skills for evidence-based emergency care, information for prospective authors may be downloaded from the *Annals of Emer-*

gency Medicine area on the American College of Emergency Physicians web site (www.acep.org).

Why is EBM important to *Annals* readers? Brian Haynes, from McMaster University, has identified the "knowledge-transfer gap," the gulf that separates the results of clinical research from the realm of day-to-day medical decision-making, as one of the important challenges facing modern medicine. Felch and Scanlon⁴ wrote, "The dream of medicine for the new millennium—that the care of patients will be evidence based, supported by carefully designed randomized controlled trials (RCTs), and validated by focused outcome studies—will only be fully realized when the major players in the health care arena find improved ways to work together." These players include the research community and the practice community, mostly physician providers of medical care.

Illustrating the importance of this knowledge-transfer gap to our specialty is the history of thrombolytic therapy in acute myocardial infarction (AMI). If the results of the early trials of thrombolytic agents in AMI had been subjected to cumulative metaanalysis at the time of their initial publication, this therapy would have been incorporated into emergency medicine practice no later than 1975. (Cumulative metaanalysis is a method that permits successive pooling of the results of small randomized trials as soon as they become available.) Only in the late 1980s did leading textbooks routinely recommend thrombolytic agents in the setting of AMI.⁵ Even today, 20 years after the evidence became clear and unequivocal, the gap in this area has not been fully bridged. Up to 25% of eligible patients are still not given this potentially lifesaving intervention.^{6,7} EBM is one way we can help assure that the information coming from the research community will be incorporated with reasonable speed and penetration into the armamentarium of practitioners. Physicians are complex creatures who gain information in a variety of ways, who must undergo a buying-in process, apply reality testing to innovations, and compare these innovations with existing internal frameworks.⁴ EBM provides lifelong, self-directed, problem-based learning tools to guide physicians in changing their practice behavior and adopting innovations in health care.

In addition to aiding the integration of research findings into practice, EBM provides the tools and skills to search and retrieve that evidence when needed at the point of care to guide clinical decision making. These are decisions that arise during clinical practice. The questions range from the routine to those of life-and-death importance. Should this patient with closed-head injury be hyperventilated? Will intravenous magnesium help stabilize this patient with severe asthma? Should I administer recombinant tissue plasminogen

activator to this older patient with AMI or to this young woman with ischemic stroke? Should I patch this patient's corneal abrasion?

Although EBM is a hot topic and a new "buzzword" in the health care community, we recognize that it is not without its detractors. Objections to EBM include, "It's a fad," "There's not evidence that it works," and "It's 'cookbook' medicine that will usurp clinician judgment." In the EBEM series, we hope to demonstrate that these views represent a misunderstanding of the philosophy and intent of EBM.

EBM is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.⁸ EBM builds on and reinforces, but never replaces, clinical skills, clinical judgment, and clinical experience.⁹ EBM does challenge us to base medical practice on scientific evidence rather than on myth, anecdote, dogma, belief, or opinion. However, EBM should not be construed as the practice of medicine on the basis of scientific evidence alone. Good doctors use both clinical expertise and the best available external evidence; neither alone is sufficient.⁸ Evidence from clinical research is only one component of medical decision making. Answers also depend on patients' and physicians' values and on the specific clinical characteristics of the individual patient.

Other misconceptions merit clarification. Medical knowledge is fluid, not "carved in stone." Because health care is rapidly changing, evidence relevant to a clinical problem may soon become obsolete. This aspect is underscored by our inclusion of an expiration date ("staleness" date) on the CATs, suggesting that the user update the search and integrate new information at appropriate intervals. As Gordon Guyatt notes, it would be misleading to portray EBM as something that can be achieved as the result of learning a few key concepts or taking a single course, any more than clinical medicine itself could be mastered so easily. Rather, EBM is an integrated discipline, inseparable from clinical practice itself. As with clinical expertise in general, EBM can only be learned through practice and the skills acquired through application. We hope to demonstrate, through scenarios and mini-lessons in each EBEM installment, that this discipline can be mastered, relatively painlessly, by any practitioner who has acquired the ultimately more difficult expertise and competence required to practice in a field as challenging as emergency medicine.

Who will benefit from the application of the tenets of EBM to emergency medical care? For the patient, EBM increases the likelihood that he or she will receive the most up-to-date therapy and care. For the clinician, EBM is an intellectually stimulating approach to patient care that can lessen the chances of boredom, burnout, cynicism, and nihilism.

These tools may assist survival, if not enjoyment, of practice in a rapidly changing health care system. EBM skills also make it easier to remain current with regard to new medical knowledge and to increase the efficiency with which a busy clinician deals with the large volume of medical literature. For institutions and health care delivery systems, EBM allows clinicians to deal more effectively with uncertainty in medicine, breaks down barriers between specialties, and identifies areas requiring further research. By incorporating EBM into their clinical practice, emergency physicians will be better able not only to address and answer specific patient care issues but to collaborate in the evaluation and development of practice guidelines and critical pathways in the ED and jointly with other services and care providers. Such skills are becoming essential tools for growth, if not survival, of emergency medicine in the 21st century.

As the *Annals of Emergency Medicine* celebrates a quarter-century of publication and achievement, it seems fitting that we also prepare for the growth of our journal. We are pleased to announce that EBEM is one of three new series that will premiere in *Annals* over the next half-year. The other two are "Emergency Medical Informatics" and "Emergency Medicine in the Third Millennium (EM3M): Envisioning the Future of Emergency Medicine." Although each of the three series will have a unique focus, the three enjoy common themes. They are forward-looking, challenging us as physicians to reexamine which skills will be vital to the practice of medicine in the 21st century. All three are intimately linked with information technology, underscoring the pivotal role of information and evidence in clinical decision making. Our goal for these series is to provide *Annals* readers with the skills, insights, and creative ideas to meet the challenges of a rapidly changing health care environment and to improve the care of patients, now and in the future.

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