# Essential Evidence-Based Medicine

Second Edition

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# Preface

In 1992 during a period of innovative restructuring of the medical school curriculum at Albany Medical College, Dr. Henry Pohl, then Associate Dean for Academic Affairs, asked me to develop a course to teach students how to become lifelong learners and how the health-care system works. This charge became the focus of a new longitudinal required 4-year course initially called CCCS, or Comprehensive Care Case Study. In 2000, the name was changed to Evidence-Based Medicine.

During the next 15 years, a formidable course was developed. It concentrates on teaching evidence-based medicine (EBM) and health-care systems operations to all medical students at Albany Medical College. The first syllabus was based on a course in critical appraisal of the medical literature intended for internal medicine residents at Michigan State University. This core has expanded by incorporating medical decision making and informatics. The basis for the organization of the book lies in the concept of the educational prescription proposed by W. Scott Richardson, M.D.

The goal of the text is to allow the reader, whether medical student, resident, allied health-care provider, or practicing physician, to become a critical consumer of the medical literature. This textbook will teach you to read between the lines in a research study and apply that information to your patients.

For reasons I do not clearly understand, many physicians are "allergic" to mathematics. It seems that even the simplest mathematical calculations drive them to distraction. Medicine is mathematics. Although the math content in this book is on a pretty basic level, most daily interaction with patients involves some understanding of mathematical processes. We may want to determine how much better the patient sitting in our office will do with a particular drug, or how to interpret a patient's concern about a new finding on their yearly physical. Far more commonly, we may need to interpret the information from the Internet that our patient brought in. Either way, we are dealing in probability. However, I have endeavored to keep the math as simple as possible.

This book does not require a working knowledge of statistical testing. The math is limited to simple arithmetic, and a handheld calculator is the only computing

instrument that is needed. Online calculators are available to do many of the calculations needed in the book and accompanying CD-ROM. They will be referenced and their operations explained.

The need for learning EBM is elucidated in the opening chapters of the book. The layout of the book is an attempt to follow the process outlined in the educational prescription. You will be able to practice your skills with the practice problems on the accompanying CD-ROM. The CD-ROM also contains materials for "journal clubs" (critical appraisal of specific articles from the literature) and PowerPoint slides.

## A brief word about the CD-ROM

The attached CD-ROM is designed to help you consolidate your knowledge and apply the material in the book to everyday situations in EBM. There are four types of problems on the CD:

(1) **Multiple choice questions** are also called self-assessment learning exercises. You will be given information about the answer after pressing "submit" if you get the question wrong. You can then go back and select the correct answer. If you are right, you can proceed to the next question. A record will be kept of your answers.

(2) **Short essay questions** are designed for one- to three-sentence answers. When you press "submit," you will be shown the correct or suggested answer for that question and can proceed to the next question. Your answer will be saved to a specified location in your computer.

(3) **Calculation and graphing questions** require you to perform calculations or draw a graph. These must be done off the program. You will be shown the correct answers after pressing the "submit" button. Your answer will not be saved.

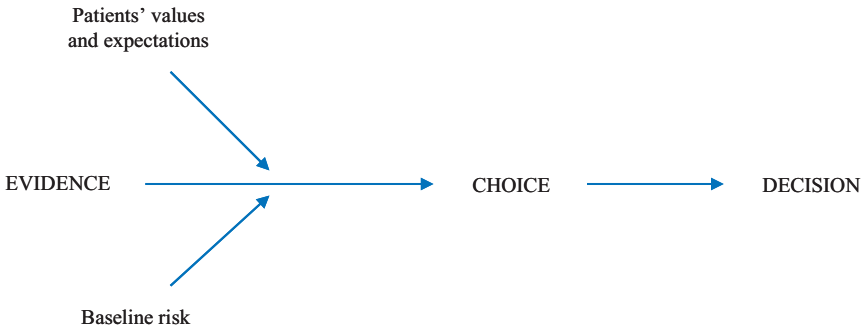
(4) **Journal clubs** require you to analyze a real medical study. You will be asked to fill in a worksheet with your answers in short essay form. After finishing, a sample of correct and acceptable answers will be shown for you to compare with your answers.

# Foreword

The impact of evidence-based decision-making on the way in which we work has had an impact on our understanding of the language that is used to make and take decisions. Decisions are made by language and the language includes both words and numbers, but before evidence-based decision-making came along, relatively little consideration was given to the types of statement or proposition being made. Hospital Boards and Chief Executives, managers and clinicians, made statements but it was never clear what type of statement they were making. Was it, for example, a proposition based on evidence, or was it a proposition based on experience, or a proposition based on values? All these different types of propositions are valid but to a different degree of validity.

This language was hard-packed like Arctic ice, and the criteria of evidence-based decision-making smash into this hard-packed ice like an icebreaker with, on one side propositions based on evidence and, on another, propositions based on experience and values. As with icebreakers, the channel may close up when the icebreaker has moved through but usually it stays open long enough for a decision to be made.

We use a simple arrows diagram to illustrate the different components of a decision, each of which is valid but has a different type of validity.



In this book Dan Mayer has demonstrated how to make decisions based on best current evidence while taking into account the knowledge about the particular patient or service under consideration. Evidence-based decision-making is what it says on the tin – it is evidence-based – but it needs to take into account the needs and values of a particular patient, service or population, and this book describes very well how to do that.

Sir Muir Gray, CBE
Former Chief Knowledge Officer
of the National Health Services, UK

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There are many people who were directly or indirectly responsible for the publication of this book. Foremost, I want to thank my wife, Julia Eddy, without whose insight this book would never have been written and revised. Her encouragement and suggestions at every stage during the development of the course, writing the syllabi, and finally putting them into book form, were the vital link in creating this work. At the University of Vermont, she learned how statistics could be used to develop and evaluate research in psychology and how it should be taught as an applied science. She encouraged me to use the "scientific method approach" to teach medicine to my students, evaluating new research using applied statistics to improve the practice of medicine. She has been my muse for this great project.

Next, I would like to acknowledge the help of all the students and faculty involved in the EBHC Theme Planning Group for the course since the start. This group of committed students and faculty has met monthly since 1993 to make constructive changes in the course. Their suggestions have been incorporated into the book, and this invaluable input has helped me develop it from a rudimentary and disconnected series of lectures and workshops to what I hope is a fully integrated educational text.

I am indebted to the staff of the Office of Medical Education of the Department of Internal Medicine at the Michigan State University for the syllabus material that I purchased from them in 1993. This became the skeleton structure of the course on which this book is based. I think they had a great idea on how to introduce the uninitiated to critical appraisal. The structure of their original course can be seen in this work.

I would like to thank Sandi Pirozzo, B.Sc., M.P.H., John E. Kaplan, Ph.D., Laura J. Zakowski, M.D., Shobhina G. Chheda, M.D., M.P.H., Christine S. Seibert, M.D., and Steven R. Simon, M.D., M.P.H., for their chapters on searching, the ethical conduct of research, communicating evidence to patients, and critical appraisal of qualitative studies, respectively. I would especially like to thank the following faculty and students at Albany Medical College for their review of the manuscript: John Kaplan, Ph.D., Paul Sorum, M.D., Maude Dull, M.D.

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Finally, the First Edition of the book was dedicated to my children: Memphis, Gilah, and Noah. To that list, I want to add my grandchildren: Meira, Chaim, Eliana, Ayelet, Rina, and Talia. Thanks for all of your patience and good cheer.