

Emphasizing basic science research in medical training for evidence-based practice

Nicholas R. Blickenstaff, Garrett C. Coman, Howard I. Maibach

Medical education is the foundation for high-quality healthcare. The medical landscape is constantly changing as physicians, scientists, and innovators regularly develop new ways to diagnose and treat disease. Due to this rapidly evolving environment, there is a need for continuous evaluation and modification of the medical education system to reflect the ideas of contemporary practice, in addition to a medical community willing and able to integrate new evidence from laboratory research into practice.

Basic science research has been instrumental in the development of evidence-based medicine and the quantum leap modern medicine has made technologically. The body of knowledge amassed by basic research enables physicians to construct a more rational and systematic approach to diseases currently plaguing society. Basic science improves patient care by facilitating the development of new diagnostic devices, prevention methods, and treatments that are assessed through clinical trials. In turn, clinical trials stimulate questions that alter the direction of basic science.

A physician who is skilled in basic science research and clinical medicine has a unique advantage in patient care. By caring for patients, a physician can

identify unmet clinical needs and learn about various disease processes as they manifest in patients. This knowledge and experience allows one to develop research questions that can then be assessed in the laboratory. The opposite is also true, as laboratory research provides a physician-researcher with insights that can be applied to the treatment and understanding of human disease. Furthermore, by performing bench research, physicians have the potential to impact the lives of patients on a much grander scale. Breakthroughs in the laboratory often lead to the establishment of new treatment standards and improvements in our understanding of disease. Many of the medical advances currently influencing patient care were derived from fundamental theories and concepts discovered in the laboratory.

Today's medical landscape has become increasingly complicated as healthcare practitioners are expected to keep up-to-date with a growing body of research frequently complicated with differing information. This challenge has necessitated medical education to provide physicians with the tools to ensure their practice aligns with the current best evidence. This prevents patients from receiving ineffective, unnecessary, or potentially harmful treatments.^[1] Traditional research has generally been thought to increase our understanding of a topic through the collection and analysis of information, while evidence-based practice in medicine has a more specific goal of improving the decision-making ability of practicing professionals.^[2] By using the scientific method, one can formulate an answerable research question, search for and critically appraise-related evidence in the research literature, make a decision, and transfer it into clinical practice. Additionally, organizations such as the international Cochrane Collaboration have been developed to synthesize research evidence and produce high-quality, relevant, and systematic reviews for healthcare providers to use.

Department of Dermatology, University of California, San Francisco
94115, CA, USA

Address for correspondence: Nicholas R. Blickenstaff,
90 Medical Center Way, San Francisco CA 94143,
E-mail: BlickenstaffN@derm.ucsf.edu

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By performing research, one becomes proficient not only in laboratory methods, but in performing literature searches, using research databases, and sifting through the hierarchy of research. Because each patient presents a unique challenge and learning opportunity, these physicians can then use the scientific method to conduct research studies and efficiently analyze pertinent medical literature to diagnose and tailor treatment to meet individual patient needs. Additionally, an in-depth knowledge of the practical aspects of research will allow the clinician to be critical of the research methods and conclusion of their peers, thus ensuring the integrity of peer-reviewed literature.

An important point is healthcare practitioners need not have formal training or a laboratory to perform useful research. One can make profound changes in healthcare simply by understanding the scientific method, as evidenced repeatedly throughout medical history. Dr. John Snow, an English physician helped end London's cholera epidemic in 1854 by studying the pattern and distribution of cholera cases. He astutely identified the source of the outbreak around a public water pump, which he illustrated using a spot map.^[3] Snow then used statistics to demonstrate the quality of the water source coincided with the cholera cases. His study was a major event in the history of public health and geography, and is regarded as the founding event of the science of epidemiology.

Furthermore, when you support basic science research, you are helping physician-scientists build the future of medicine. It is the tireless effort of

countless medical professionals that has made many once life-threatening diseases and conditions a faded memory. It will be the researchers of the future who are responsible for the significant advances in patient care and medical knowledge that will come in following generations.

Although the art and practice of medicine has changed remarkably through the years, the core tenet of medicine, caring for patients, remains what physicians do best. Now is a pivotal and exciting time in healthcare and medical education. Attention and resources must be paid to educate, foster, and develop a community of physicians who are adept in both clinical medicine and basic science research. By working together, we can make a concerted and coordinated effort to ensure that evidence-based medicine becomes the mainstay, with a continued stream of high quality research generating the evidence to push medicine forward. Medical education programs that stress the importance of basic science research to their trainees will create an educated medical community able to formally assess, interpret, and utilize this evidence.

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