



Diversity, the Individual, and Proof of Efficacy: Complementary and Alternative Medicine in Medical Education

Patients will always have access to a variety of possibly effective, but unproved, therapies directed at maintaining health or treating illness. And there will always be complex, potentially therapeutic regimens that cannot be adequately tested for financial, ethical, or methodological reasons. Furthermore, even after adequate study of a given regimen, there will always be the fundamental uncertainty of medical practice: the fact that epidemiological research produces probabilistic results that cannot predict with certainty the best treatment for the single unique patient before us.

The exploration of complementary and alternative medicine topics in the medical school curriculum helps to elucidate the complex and uncertain nature of medical practice, sharpens skills for clinical decisionmaking, increases cultural sensitivity, and provides ideas for future research. (*Am J Public Health.* 2002;92:1568–1572)

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While the individual man is an insoluble puzzle, in the aggregate he becomes a mathematical certainty. You can, for example, never foretell what any one man will do, but you can say with precision what an average number will be up to.

Sherlock Holmes, *The Sign of Four*,
Sir Arthur Conan Doyle

WIDESPREAD DISCUSSION continues of when, how, and why to include complementary and alternative medicine (CAM) in medical school education,^{1–8} but the question of whether to address such topics at all, though still debated, appears to be settled in practice for most schools. Recent surveys show an increasing majority of American medical schools offering required courses or electives in this area,⁹ and continuing medical education courses in many disciplines regularly include sessions on CAM. A widely cited justification for this inclusion, sometimes offered in a spirit of resignation, is that with the growing number of patients using these therapies physicians must know about—and learn to educate patients about—potential dangers, including toxicities and drug interactions. A more CAM-friendly position adds that knowledge of the patient’s CAM use builds a stronger patient–physician relationship by allowing the patient to speak about and ask questions about CAM

and by giving the provider a window into the patient’s approach to health and healing. A still more CAM-friendly position further adds that at least some CAM therapies, though not adequately studied in well-controlled trials, might plausibly improve health outcomes, and patients should not be denied the option of these possibly helpful therapies when dealing with health concerns in the here and now.

Based on my experience teaching CAM-related topics in medical school, I present 4 additional arguments for the continuing incorporation of CAM into the medical school curriculum:

1. Medical schools are defining the mission of health care in progressively broader terms that are conceptually similar to those embraced by the integrative medicine movement.
2. Clinical decisionmaking requires the ability to deal with uncertainty, and the same skills are needed to assess all therapies, whether identified as conventional medicine or CAM.
3. There is growing societal interest in diversity, and training in CAM increases cultural competence.
4. As the boundaries of the medical sciences grow and more knowledge is accrued, exploring therapies currently identified as CAM will help direct productive biomedical, psychological, and sociomedical research agendas.

THE MISSION OF MEDICAL PRACTICE

Biomedical research and medical student education often occur side by side, and sometimes intertwined, in academic medical centers. It is clear, however, that the concerns of biomedical research and of medical practice, although related, are not the same. As in the case of engineering and architecture, the discoveries and principles of the first expand the options for the practice of the second. But drawing *only* on biomedical knowledge in medical practice can lead to mechanical, uncaring, unethical, and ineffective health care just as surely as drawing *only* on engineering knowledge in architectural design can lead to aesthetically, functionally, and socially unacceptable structures built to the wrong scale, in the wrong places. In both cases, there is a failure to serve individual and community needs.

The goal of medical practice is to maintain and improve the health of individuals and populations, and the goal of medical education is primarily to train practitioners, albeit with an interest in research for its own sake as well as for the benefit of patients. To better meet the needs and expectations of patients, the concept of health has evolved in recent years to include the interrelated concepts

of physical health and emotional health, as well as spiritual health.

Successful clinical practice involves not only skilled interpretation and application of medical data with all its uncertainties, but also the ability to care about and care for individual patients as unique, total people in social and cultural contexts. Patient education, patient advocacy, and the incorporation of the patient's values and preferences into jointly made decisions are all part of the clinician's work. Thus, medical school curricula now present the practice of medicine as a complex activity drawing on emotional and interpersonal processes as well as cognitive processes, which themselves require a broad range of knowledge bases, including biomedical, epidemiological, psychosocial, cultural, economic, and ethical.¹⁰

The views expressed above are fundamental to the integrative medicine^{11,12} movement, and are widely prevalent in CAM and conventional medicine communities. It serves no useful purpose to overlook this commonality. Rather, we should develop curricula in which the contributions of each group are acknowledged and combined to further the common mission. Ideally, this collaborative effort would include CAM practitioners familiar with current teachings in biopsychosocial medicine,¹³ medical anthropology,^{14–16} patient-centered medicine,^{17–19} psychiatry, and public health as well as conventional practitioners aware of what can be learned from the rich diversity of healing traditions that address the totality of the human condition.^{20,21}

UNCERTAINTY AND MEDICAL PRACTICE

To practice joint clinical decisionmaking with patients, health care practitioners, whether regarded as conventional providers, CAM providers, or integrative medicine providers, must be able to share their “ways of knowing” and the levels of uncertainty in the data they draw on, especially as applied to individual patients. Curricula on the nature of evidence, taught by members of all these provider groups, would increase everyone's ability to think critically about all therapies—those considered proved and unproved, conventional and alternative. These discussions are crucial to any consideration of CAM in an academic context. Fortunately, students report to us that while it can be difficult to focus on discussions of epistemology and epidemiology, carrying these discussions out in the context of exploring CAM therapies makes them immediate, relevant, and interesting. Thus, the scholarly consideration of CAM-related topics creates, as an important byproduct, students better able to think about the rules of evidence and the nature of proof.

Origins and Limits of Different Types of Knowledge

Conventional medicine, like CAM, is fraught with uncertainty. Discussions of CAM provide regular opportunities for considering the evidence for all therapies and showing that there is a spectrum of certainty, with no absolute standards for what therapies should be considered proved and unproved.

Health professionals must understand how each of their knowledge bases attempts to es-

tablish “facts,” and they must feel comfortable with the levels of ambiguity and uncertainty inherent in various types of knowledge. Students would benefit from a basic background in epistemology, highlighting the scientific method, statistics, and causal inference, thus allowing them to appreciate the limitations of all types of data. This curriculum should be broad enough to include the various ways of knowing we draw on in daily practice.

Different aspects of the practice of medicine depend on different knowledge bases, and the data they contribute to diagnosis and treatment differ in method obtained, ease of testing, and level of certainty. For example, current case presentations of a chronically anxious, hypertensive cardiac patient might well discuss not only medications and cardiac procedures but also behavioral, psychological, and cultural issues. The “objective” blood pressure readings, the “subjective” symptoms, and the patient's observed anxiety would all be conditionally accepted as data, although they carry varying degrees of certainty and are arrived at by different means. Implicit in the case presentation would be questions of knowing, evidence, and uncertainty, even before the management discussion of the possible merits of various forms of psychotherapy or CAM mind–body stress reduction programs. But, despite these uncertainties in the data and despite the relatively unproved status of many conventionally accepted psychotherapies, it is the proposal of the controversial mind–body therapies that is most likely to provoke discussions of evidence.

Much of the data we use in conventional clinical practice, such as our perception of a per-

son's mood, and many tools we bring to the encounter, like empathy, and even many therapies, like psychiatry, involve extremely complex processes much harder to define, study, or monitor than blood pressure, which is itself a challenge. It is important for students, who may be attracted to the more certain data of “hard science,” to understand that the relative certainty of biochemical data compared with physiological data, or of physiological data compared with psychosocial data, is a natural consequence of statistical realities—such as the complexity of the study objects, the number and similarity of the objects available for study, and the difficulty of controlling experimental conditions. These differences in certainty are not an indicator of comparative merit, intellectual legitimacy, or relevance to medical practice. The proper use of the more complex and uncertain data that identify patients as total persons in social and cultural contexts can be crucial to the health care of the patient.

The framework outlined above illustrates that conventional medicine and CAM must both draw on diverse knowledge bases with varying levels of certainty and different ways of knowing. It would be a welcome development if practitioners of CAM and conventional medicine had open, respectful discussions of what criteria they use to accept data as fact and why. Conducting such explorations in the context of the medical school curriculum would enrich the dialogue between current practitioners and help develop an open-minded generation of physicians better able to assess all therapies that might help individual patients.

The Uniqueness of Individuals: “N-of-1” in Epidemiological Perspective

The scholarly investigation of various CAM therapies presents a humbling opportunity to reflect on what we believe will help a particular patient and why. These reflections should be brought to all therapies, not just to those treatments deemed “alternative.”

Evidence-based medicine uses the methodologies of clinical epidemiology to identify and compare the health outcomes of various interventions.²²⁻²⁴ A fundamental fact of clinical practice is that we are applying data gained from populations to one person, without knowing how these probabilistic data relate to this one unique individual.²⁵ If a therapy is the best choice for 7 out of 10 people, how do we predict whether our patient is in that 70% or is in the 30% of exceptions? This inevitable uncertainty is often called the N-of-1 problem, referring to the fact that we can never do clinical trials on large numbers of patients identical to the one before us because that patient is unique. Progressively larger studies, with statistical power for deeper levels of subgroup analysis, can provide us with progressively more textured information on how the study results apply to patients resembling our single individual patient. But no matter how large the study and how detailed the subgroup analysis, we will never have data detailed enough to provide with absolute certainty the answer for our one unique patient.

It is instructive to consider how this reality of evidence-based medicine may affect patient and practitioner behavior, and the patient–practitioner relationship, in various types of therapeutic interventions. For some

interventions, like choosing one toxic drug over another or surgery over radiotherapy in cancer treatment, the patient and the disease process may change substantially with the passage of time or with each intervention, and there is no second chance to go down the road not taken. In such cases, practitioners may treat all patients with the 70% effective treatment, the best-documented strategy for maximizing group outcome. At other times, however, practitioners may want to rely on unproven, difficult-to-codify clues, personal experience, or even feelings (their own or the patient’s) to choose the other therapy.^{26,27} It is likely that most patients want their physicians not only to be well informed about evidence-based medicine²⁸ but also to have this individualizing option in clinical decisionmaking and to know individual patients well enough to exercise that option meaningfully.

Given this N-of-1 problem, it is likely that many patients seek additional complementary therapies not only to feel more comfortable or more generally in control²⁹ but more specifically to take part in the search for a package individualized to their unique needs. The fact that many CAM hands-on therapies appear to be based on the immediate perception and treatment of “findings” (e.g., muscle spasms, subluxed joints, or blocked energy), present at that time in that patient, probably increases the patient’s sense of being treated as a unique individual, a sense often missing in evidence-based medicine. If this therapy conveys an underlying message with personal meaning that speaks to that patient’s sense of self, it may prove particularly attractive.³⁰⁻³²

And if the therapy is understudied and considered unproved, but appears safe and feels good, it may be attractive exactly because it is not overtly associated with statistics, leaving freer reign for the patient’s imagination and sense of hope, both factors that may themselves have positive physiological as well as psychological effects.

A variety of therapeutic interventions in both conventional medicine and CAM do allow for serial trials with an individual patient over time, such as an internist trying out various antihypertensives or an acupuncturist trying out related acupuncture points on a given patient. There is a set of epidemiological rules for evaluating the observed results in so-called “N-of-1 experiments.”³³ Despite problems of proving causation, it is likely that these trials provide patients with therapies more suitable to their needs, as well as a comforting sense of being respected and cared for as unique individuals.

In cases in which they are feasible, therapeutic trials with individual patients play an important role in helping clinicians deal with the N-of-1 problem present in both conventional and CAM interventions. But these sequential trials regard the patient as effectively being the same person despite the passage of time. It is important to note that some traditional medicine systems do not accept this approximation under any circumstances and see themselves as always providing each individual with the most effective treatment possible at each point in time. Discussing this stance in an academic setting clearly provides an opportunity to question how any practitioner can claim to know for sure what is best in a unique case. It also provides an

opportunity to note and probe the therapeutic power of a conveyed sense of certainty and respect for the ever-changing individual. What is the nature of this appeal, which exists even when the patient’s cognitive processes dictate that such certainty is an extraordinary claim requiring extraordinary evidence?

Because of the complexity of total patient care and the individual needs of each unique patient, there is more to the practice of both conventional medicine and CAM than the information emerging from clinical trials. To address the N-of-1 problem, both conventional and CAM practitioners operate outside the bounds of evidence-based medicine, at least some of the time. A discussion of this reality and how practitioners and patients cope with it, conducted by practitioners of CAM, integrative medicine, and conventional medicine, would help students deal with uncertainty as they care for each individual patient.

DIVERSITY AND CULTURAL COMPETENCE: N-OF-1 IN SOCIOLOGICAL AND PSYCHOLOGICAL PERSPECTIVE

Gaining perspective on how information about aggregates relates to an individual member therein is a fundamental challenge from sociological and psychological perspectives as well as from the purely statistical perspective above. Societies are struggling with ways to be responsive to culturally based needs without cultural (ethnic, religious, etc.) profiling. Similarly, individuals themselves feel a tension between their unique identity and their desire to identify with groups. Patients want to be

recognized as individuals, but many are vocal about wanting also to be recognized and respected as members of various groups from which they gain a sense of identity.

Good medical practice requires seeing each patient as a unique individual and avoiding stereotyping, while acknowledging and respecting the sociocultural identities that help give meaning to the patient's life. A number of organizations recommend or mandate the teaching of cultural competence in medical school.^{34–38} There is a natural role for CAM teaching in this endeavor since the practice of culturally sensitive health care clearly requires an awareness of and respect for cultural traditions and practices, especially those related to health and healing. It could be argued that CAM curricula are important here, not only because they provide information on traditional and folk health care systems but also because the growth of CAM in the developed world itself reflects new, or newly blended, cultural ideas and themes. Medical anthropology and medical ethics would provide conceptual frameworks for such a curriculum, which would be taught by faculty in these fields as well as by providers of CAM and conventional medicine and by patients themselves.

CAM-RELATED RESEARCH DEVELOPMENTS

The inclusion of CAM in medical education encourages ongoing research in CAM-related areas, and vice versa. CAM has already increased interest in the exploration of possible new therapies and contributed to the development of new areas of in-

quiry.¹ In addition, there is growing recognition of the difficulties in understanding the full impact of complex therapeutic regimens by isolating their constituent parts. The current research interest in botanical products, dietary supplements, micronutrients, and special diets is an example of this. Basic and clinical science reach a point in their own development when it becomes clear that micronutrients exist and that the presence of one ingested may influence the absorption and metabolism of another. Thus, interest grows in whole foods and in the dietary and botanical knowledge acquired over centuries by various healing traditions. This interplay between planned scientific inquiry and sociocultural folk knowledge helps drive both basic and CAM research.

Similarly, with the explosion of interest in the association between illness and stress^{39–45} and with recent advances in mind–brain–body research, the Cartesian mind–body duality is losing its grip on medical thinking. It is not surprising that there is increasing interest in CAM therapies based on conceptual frameworks that posit connections between the mind and the body, thus enabling the mind to affect bodily health and vice versa. Research in neuroendocrinology,⁴⁶ neuroimmunology,^{47,48} and the autonomic nervous system⁴⁹ have identified many humoral and neurological systems that could take part in mediating such mind–brain–body connections. With a number of recent studies on the placebo effect involving CAM therapies and their related therapeutic tools, such as the power of suggestion, CAM is playing a role in directing parts of this research agenda.⁵⁰

It is intriguing that the placebo effect, long invoked to downplay patients' positive responses to CAM, is coming to be understood as a complex and powerful therapeutic tool as well as a confounder of scientific inquiry.^{30,31,51} The emerging vision of medicine is one in which mental and bodily functions cannot be cleanly separated. Studying the placebo effect may provide insights into how the brain functions and into the fundamental nature of health and healing. Thus, popular therapies, which have survived over centuries but remain unproved, may ultimately help elucidate the complexities of human beings—the very same complexities that we may in future years invoke to critique our current understanding of proof in medical practice. ■

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