Doctors in a Wired World: Can Professionalism Survive Connectivity?

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THE INFORMATION REVOLUTION HAS RAISED MYRIAD questions about how the health care system will function in the future (Gingrich and Magaziner 2000; National Research Council 2000). The consensus seems to be that new information technologies will significantly affect almost every aspect of health care, from the way that employers and individuals purchase health insurance to the way that doctors and patients provide and receive care (National Research Council 2000).

Although peer-reviewed evidence to support these predictions is scarce, the available data suggest that the major health care actors are actively experimenting with the new capabilities to exchange information. A February 2002 survey by Harris Interactive (www.Harrisinteractive.com) found that 137 million Americans were users of the Internet and the World Wide Web and 110 million reported going on-line at least three times a month to look for health care information (Landro 2002). An earlier survey by the Pew Charitable Trusts reported that of those Americans who used the Internet for health care purposes, 92 percent found the information useful. Indeed, 47 percent said that the material affected their decisions about treatment and care (www.pewtrusts.org). In a 2001 Harris Interactive survey of 400 physicians, 89 percent of the respondents said they used the Internet, of whom 90 percent said they used it to find clinical information (www.ihealth.org). Twenty-six

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percent reported communicating with patients on-line; 22 percent used electronic medical records; and 11 percent practiced e-prescribing. According to Yahoo, more than 19,000 health-related Web sites existed on the World Wide Web as of May 2001, of which more than 1,700 were devoted to cancer alone (Eng 2001). Even managed care companies are experimenting with new Web sites designed to facilitate enrollment and to educate consumers about their health (Eng 2001; Moskowitz 2000). And a new class of dotcoms proposes to revamp the health insurance market by allowing consumers to design and price on-line their own insurance plans using customized networks of providers (Silow-Carroll and Duchon 2002).

In the midst of such ferment, venerable institutions inevitably come under scrutiny. Questions arise about whether their roles and functions will change, whether their influence will diminish or increase, and how they must reform themselves to adapt to radically different conditions. In the field of health care, no institution is more venerable than the profession of medicine itself, and none has played a more central or enduring role in the day-to-day functioning of the health care system. A decade ago, it would have been unimaginable to suggest that the medical profession might be headed, if not for extinction, at least toward a profoundly diminished role and status in ministering to society's ills. Yet the information revolution, coupled with other recent developments like the rise of alternative types of health care personnel and the new health care consumerism, has made such changes seem not only imaginable but even a plausible extension of prevailing trends.

This article explores the potential effects of the information revolution on medicine as a profession. For our purposes, the information revolution is defined as the emergence of new communication technologies that have dramatically increased access to and opportunities to exchange new and existing health care information. Exploring the effect of this phenomenon on the medical profession is fraught with peril because of the inherent uncertainties about how the information revolution itself will unfold. For that reason, I focus on what I hope will prove to be more enduring contributions than any specific predictions: a conceptual framework for assessing the consequences of the information revolution for medical professionalism and a set of research directions to spell out what those consequences will be. I consider the following questions:

1. What are the principal attributes of professionalism in medicine?

2. What elements of the information revolution (as we currently know it) should affect this professionalism?
3. How may each of these elements affect each of the attributes of professionalism?
4. What are the implications of these interactions for doctors and their patients?

The article concludes that the information revolution will create opportunities to preserve and even enhance professionalism if physicians are willing to accept some basic changes in their training, attitudes, practices, and relationships with patients. To see how that outcome can be achieved, we must first define professionalism and point out the ways in which the information revolution may threaten its foundations.

Critical Attributes of Professionalism

Definitions of professionalism vary considerably (Medicine as a Profession 2000), but one of the most useful is Paul Starr's formulation in *The Social Transformation of American Medicine* (1982). Starr suggests that the essence of professionalism is its claim to a *distinctive competence*, an ability to provide a service that is valued by members of society individually and recognized through law and custom collectively. That distinctive competence makes society dependent on the profession and also confers professional authority. Another way of saying this is that at the core of medical professionalism is an *asymmetric* competence between patient and physician. This does not mean that the patient lacks the ability to contribute to her care or that the professional's contribution is inherently more valuable than the patient's. Rather, it indicates that the profession offers something distinctive that society cannot find elsewhere.

Starr goes on to state that the profession's competence rests on three attributes. The first is *cognitive*. Professionals possess skills based on technical and scientific information. In the case of physicians, these skills enable them to diagnose, treat, comfort, and (on occasion) cure. The second attribute is *moral*. Professionals commit themselves to using their cognitive abilities for the benefit of those they serve. In the case of physicians, this means putting the interests of their patients ahead of their own. The moral basis of professionalism creates trust in the profession, which is crucial to the physicians' status in society and to the success

of their work (Mechanic 1996). The third attribute of professionalism is *collegial*, a collective commitment to ensure the competence of the profession's members by means of self-monitoring and self-discipline. The collegial element of professionalism is essential because laypersons lack the competence to judge professionals' performance. In medicine, this attribute takes the form of peer review, which is recognized in statutes excluding from torts the proceedings of peer review from discovery.

This definition of professionalism places less emphasis than some might like on two other attributes: collective advocacy for social welfare and the existence of professional autonomy. Though highly desirable, these attributes seem not to constitute a minimal condition for attaining professional status. In the United States, we have fully recognized the medical profession and granted it extensive rights and privileges even while the profession, collectively, has often failed to champion vital social causes, such as universal access to health care services or the protection of human rights (Blumenthal 1988).

The attribute of autonomy seems derivative of the three more basic elements just discussed. Society grants autonomy to professions in recognition of, and to facilitate, their distinctive competence. Thus autonomy exists in practice only when the minimal conditions for professionalism have been attained.

One other point about the nature of professionalism in medicine deserves mention. It could be argued that this view of professionalism—defined by distinctive competence based on technical know-how selflessly applied and collectively monitored—is a serious misreading of the true basis of medical professionalism in society. This definition implies that if patients had a sufficient knowledge of health and health care, the asymmetry in competence between physicians and laypersons could be either eliminated or drastically reduced and that the consequence might be to de-professionalize medicine. Some people wonder whether the information revolution will achieve precisely this result.

But how, then, can we explain why physicians enjoyed professional status long before they had real competence? Barbara Tuchman describes the elevated social position of physicians in 14th-century France at a time when they had little valid knowledge about illness or its cures and thus none that their patients did not also possess. Nonetheless, they were compensated generously for their services and benefited from special legal privileges: "In their purple or red gowns and furred hoods, doctors were persons of important status. Allowed extra luxury by the sumptuary

laws, they wore belts of silver thread, embroidered gloves and, according to Petrarch's annoyed report, presumptuously donned golden spurs when they rode to their visits" (Tuchman 1978, 106). Two hundred years later, Galileo's father tried to convince him to become a physician rather than a mathematician and physicist, because in 16th-century Florence, doctors earned six times what a professor of mathematics could command (Sobel 1999). Clearly, Western society highly rewarded physicians' services long before they possessed distinctive competence in the modern sense.

Only in the 20th century did biological science enable physicians to acquire sufficient skills that they could reliably add value to their interactions with their patients. Perhaps the professionalism of physicians—or at least their professional status in society—derives not from any validated distinctive competence but from something more enduring and deeply rooted: a primal human urge to project onto some group the power to heal. Even when no true asymmetry of ability exists, this argument goes, patients will insist that a profession of medicine (or its equivalent) continue to exist, with all its rights and privileges, because people want access to a healing class. The existence of a healing class offers hope that an apparently incurable illness may be overcome and that comfort is available when cure is not.

A brief vignette concerning the final days of Dr. Franz Ingelfinger, then editor of the *New England Journal of Medicine*, provides some perspective on distinctive competence and the healing role as bases for medical professionalism. Ingelfinger had stomach cancer. As the editor of one of the world's leading medical journals and a gastroenterologist, he must have known everything about his illness that was knowable at the time. No physician could enjoy distinctive scientific or technical competence beyond what Dr. Ingelfinger had. Writing after Ingelfinger's death, a colleague told the following story:

Franz Ingelfinger in his remarkable essay entitled "Arrogance" . . . recalled in his own time of need and indecision a wise physician friend said: "What you need is a doctor." When he found a doctor and allowed him to tell him what to do and assume responsibility for his care, Ingelfinger sensed an immediate and immense relief. (Lister 1986, 173)

One of the interesting characteristics of medical professionalism at the beginning of the 21st century is that perhaps for the first time in history, the profession derives its status from two powerful sources: a

true distinctive competence based on validated knowledge and skill, and its identification as the healing class. For once, the healing class has a validated power to heal.

An important question posed by the information revolution is, now that the profession truly has a distinctive competence, will its claim to professionalism be compromised if the information revolution empowers patients (or other nonphysicians) to make competent medical decisions that used to be the sole province of physicians? Or will society sustain physicians' professional role out of the desire to preserve them as a healing class? We cannot know the answer to this question, and it is almost certainly too starkly put. As we shall argue later, there is little prospect that the information revolution will completely eliminate the asymmetry of competence between physicians and patients. It seems likely, however, that physicians' current claim to the mantle of the healing class will give them time and opportunity to refashion their role and renew their professionalism in the face of any changes that the information revolution creates. And because of the profound human desire to anoint some group as healers, their patients will likely be cheering them on as physicians struggle to achieve this transformation.

The Information Revolution

A mind-numbing array of new devices propels the information revolution. These include the Internet, the World Wide Web, intranets, wireless communication, decision-support technologies (physician-order entry, bar coding, handheld personal digital assistants), electronic mail, telemedicine, and direct-to-consumer advertising. Contemplating the potential effects of these diverse technologies on medical professionalism seems a daunting challenge.

It may be less daunting, however, if we see them as what they are: instruments of connectivity that allow information to be transferred among various parties in the health care system. The information revolution's effect on the profession of medicine derives from the impact of these various forms of connectivity on the asymmetric competence of the profession and its underlying cognitive, moral, and collegial supports. We can structure our discussion by thinking about who is connected to whom, what kind of information flows between the parties, and how that information flow will affect the comparative competencies of physicians and their patients.

The information revolution can be seen as facilitating (or even creating) connections among the following parties in the health care system, using the following means:

1. *Patients with other patients (P2P)*. Patients communicate with one another using electronic mail, chat rooms, and Web sites of patients and patient organizations (National Health Council, American Diabetes Association, etc.).
2. *Patients with for-profit and nonprofit organizations (P2O)*. Health care organizations include managed care organizations and their subsidiaries (Aetna/Intellihealth; Blue Cross, Blue Shield; Humana; and others), new dotcoms (WebMD), provider organizations (www.Mayohealth.org), and pharmaceutical companies (Eng 2001; Goldsmith 2000; MD Net Guide 2002; Robinson 2000; Silow-Carroll and Duchon 2002). Mechanisms of communication include electronic mail, Web sites, and direct-to-consumer advertising. Some for-profit organizations are now providing on-line physician services (MDConsult), which borders on patient-to-doctor (P2D) communication.
3. *Patients with doctors (P2D)*. Patients communicate with doctors using e-mail, physicians' Web sites, and access to their own electronic medical records (which borders on P2O communication) (Freudenheim 2000).
4. *Doctors with health care organizations (D2O)*. Organizations include managed care organizations, insurance companies, provider organizations, pharmaceutical companies, and dotcoms (Eng 2001; Robinson 2000). Communication devices include e-mail, Web sites, decision-support technologies, intranets, and traditional advertising.
5. *Doctors with other doctors (D2D)*. Doctors communicate with other doctors using e-mail, intranets, electronic medical records, and physician Web sites. This is especially helpful for primary care physicians consulting with specialists, specialists with other specialists, and leaders of physician groups with their members.
6. *Health care organizations with other health care organizations (O2O)*. New modes of communication (Web sites, electronic mail, electronic medical records) can facilitate interaction between providers and insurers, vendors of supplies and purchasers, and providers and providers. One example is new companies forming to standardize

and process claims payment (Healtheon/WebMD). For reasons of space and relevance, I will not comment explicitly on O2O connections, since their effects on professionalism will be less direct.

The Information Revolution and Attributes of Professionalism

Although each of these axes of connectivity can affect the core attributes of professionalism, space and information permit us to speculate only at the most general level about their potential effects.

P2P

Better connections among patients allows them to exchange information more readily about their conditions, their experiences with doctors and health care organizations, and their treatments and their reactions to treatments. In many cases, the resulting information is available to patients for the first time and makes them far more intelligent consumers of health care services (Sangl and Wolf 1996).

A story from my own personal experience in a teaching hospital-based group practice illustrates this point. A patient with obsessive-compulsive disorder (OCD) visited me a few years ago with a question about his medicines. Fearing contact with others, he worked nights as a security guard so he could work alone. He was on two medications, Prozac and Klonopin, commonly used to treat OCD. He had a habit of “lurking” on chat rooms with other OCD patients, listening but, characteristically, never participating in the discussion himself. In this way, he found that most patients with OCD took two milligrams of Klonopin daily, whereas he took three. He wanted to know why his dose was different.

The details of his disorder and its treatment are less important than the implications of his question. Here was a person whose disease would normally have isolated him from other patients, who had used the Internet to overcome that disability, who had collected primary data on treatment patterns for his condition, and who was using those data in his care. He had, in effect, conducted a pilot study of patterns of care for OCD and, as a result, knew more about that topic than his primary care physicians did (and perhaps some psychiatrists as well).

The implications of this story, and the millions of others that are unfolding as we speak, for the cognitive bases of professionalism could be profound. P2P connectivity is one of several elements of the information revolution that may affect the asymmetry of technical competence between physician and patient, thus reducing the value that physicians add in their interactions with patients. Patients with rare and chronic illnesses have always collected information about their conditions that rivaled or exceeded that of many physicians, but the information revolution will dramatically reduce the cost of acquiring such knowledge and open unprecedented new sources. As a result, a much larger fraction of the patient population will have a knowledge of their problems that matches all but that of the most specialized physicians.

P2P communication will affect the collegial and moral bases of professionalism as well. Communication about experiences with physicians will inform patients' choice of physician. In this way, patients may create a collective mechanism for monitoring and regulating professional performance, thus reducing physicians' reliance on collegial self-discipline.

Like enhanced connectivity generally, P2P communication may also increase the importance to patients of the moral bases of professionalism. Confronted with a deluge of new data from other patients, consumers of health care services may come to value physicians more highly than ever as trusted advisers who can help them process new data and turn them into knowledge useful to their own care. After all, my OCD patient didn't know what the correct dose of Klonopin was for him—he knew only that his current dose was different from the norm. Physicians' dedication to the interests of the particular patient in their office becomes a critical source of distinctive competence under the influence of the information revolution.

So too does their ability to help patients process information. Adding value through helping patients make sound, personal decisions may, as we shall see, constitute the basis for a new technical competence that will bolster the cognitive basis of professionalism in the future.

P2O

New opportunities for communication between patients and health care organizations will have an effect very similar to that of P2P communication, albeit magnified many times. The resources and economic motives of health care organizations will enable and propel them to provide vast

quantities of data to health care consumers, even to those not searching for such data.

Patients will be much better informed users of physicians' services. Here again, a personal example is useful (Blumenthal 1997). A middle-aged male patient came to my office some years ago complaining of fever and pain in the left lower part of his abdomen. After I examined him, he said he was glad I performed a portion of the physical exam looking for "rebound tenderness," a sign of irritation of the lining of the abdominal cavity, or peritoneum, often associated with severe infection. (He did not have it.) I asked him how he had learned about this element of the abdominal exam, and he said he had found it on a medical school's Web site. I told him I thought he might have diverticulitis and wanted to refer him to a surgeon, who would likely put him on antibiotics and might hospitalize him briefly. The patient said that that sounded right to him. He had looked up the differential diagnosis and treatment of abdominal pain on the same Web site.

A story published in the *New York Times* made the same point (Altman 2000). The report described how surgeons in Houston had removed a patient's heart from her body, excised a tumor, and used parts of a cow's heart to reconstruct the patient's organ. Known as "bench" surgery, the procedure is exceedingly rare: only a few surgeons in the world perform it. In passing, the article noted that the patient had found out about the procedure and located the surgeon on the Internet.

As in the case of P2P communication, P2O may have a dramatic effect on the collegial bases of professionalism. Commercial and noncommercial Web sites are already mining publicly available data to compile measures of hospital performance (Eng 2001; Goldsmith 2000; Rybowski 2001). Healthgrades provides data on the mortality rates for Medicare patients undergoing a variety of different procedures at virtually every hospital in the United States (www.Healthgrades.com). The same kinds of data are becoming available about groups of physicians caring for sufficient volumes of patients to generate statistically meaningful numbers (Eng 2001). In the near future, information about patients' satisfaction with their physicians should become available for virtually all doctors, even though in many cases, professional associations and state regulatory boards do not themselves collect such data. Even when professional organizations do have such data, internal opposition prevents them from using the information to improve physicians' performance. This stance threatens the collegial role of the profession in ensuring

quality of care and service and thus the legitimacy of the medical profession in the public's eyes. Another potential threat to the profession's legitimacy is the possibility, even the likelihood, that some practicing physicians will develop financial interests in Web sites evaluating their own performance. This will create ethical issues, which will be discussed later.

At the same time, P2O connectivity creates opportunities to enhance the moral basis of professionalism even while it may undermine traditional cognitive and collegial attributes. If the new information from P2P communication proves difficult for patients to assimilate, P2O connectivity could prove overwhelming. The problem derives not only from the volume of sources and information available to patients but also from concerns about the motives of suppliers. In the P2O world, commercial goals create biases, both apparent and hidden. The biases of pharmaceutical companies advertising directly to consumers are explicit. But companies need not identify themselves or their purposes in all cases, and advertisers may even affect the slant of seemingly objective sources of information, such as medical journals. When it comes to the information revolution, *caveant lector et viewer* is the watchword (Silberg, Lundberg, and Musacchio 1997). Indeed, patients evince little trust in most Web sites. A 2002 survey by the Pew Charitable Trusts shows that only 30 percent of Americans trust Web sites that sell products or services (www.pewtrusts.org).

This circumstance enhances physicians' potential roles as disinterested advisers and patient advocates, the trusted marshals, if you will, of the Wild West of the information revolution. To play this role, physicians must avoid the reality and appearance of having conflicts of interest in providing information. For those working for profit-making managed care organizations with their own Web sites, this may be a problem to the extent that those organizations benefit from how patients use the information dispensed. The same may be true for physicians retained as consultants and clinical recruiters for trials by pharmaceutical companies. The profession now faces the challenge of drawing up ethical guidelines for this new conflict of interest among its members.

P2D

A 2000 Harris survey found that even though the number of consumers seeking health information on Internet rose from 1999 to 2000, their

satisfaction with that experience declined (Landro 2000). The proportion of respondents who said that the Internet helped them understand their health problems or manage their personal health problems fell, respectively, from 73 percent to 56 percent and from 60 percent to 41 percent. According to this Harris survey, more patients wanted to use the Internet to connect with their physicians and to get advice and services from health care professionals on-line, and they were frustrated with physicians' apparent resistance to this mode of communication. As noted earlier, another Harris survey, this from 2002, found that while 89 percent of physician respondents in another survey used the Internet for some clinical purpose, only 26 percent used it to contact patients (www.harrisinteractive.com).

These data suggest that P2D connectivity creates both opportunity and challenge for the medical profession. The opportunity arises from the fact that patients seem to view the information revolution not just as an alternative to physician interactions but as a way to improve their relationships with medical professionals. For doctors, this is good news, since it means that patients still believe that professionals possess a distinctive competence to which they want access (Rybowksi 2001). The challenge results from physicians' resistance to P2D connectivity. Some physicians fear the advent of new connections with their patients, convinced that they will be driven out of practice by incessant, unreasonable, round-the-clock demands of patients with uncensored access to them (Bazzoli 2000). Physicians also fear liability problems and want assurance that they will be reimbursed for services provided through this new medium of communication. But the arrival of the telephone threatened the same problems, which physicians soon were able to overcome (Spielberg 1998). It did become necessary to limit telephone access by interposing secretaries and answering services between patients and physicians. In the same way, physicians can and will learn to manage e-mail and other new forms of connectivity with patients. One-third of patients, according to another Harris survey, are willing to pay for e-mail consultation (www.ihealth.org). And a consortium of malpractice insurers and 45 local medical societies recently announced their intent to issue guidelines to help physicians manage liability problems with physician-patient e-mail communication (www.ihealth.org).

Some of what patients want seems quite elementary: the ability to conduct administrative business, like scheduling appointments and learning about test results, using electronic methods. If physicians ignore these desires, they could turn an opportunity to improve service into an

example of professional arrogance that will undermine the moral basis of medical professionalism. Putting patients' interests before physicians' interests means responding to patients' reasonable requests for service using available technologies.

The information revolution's ability to strengthen the connectivity between patients and doctors prompts another interesting question: Will wired patients find that there is no longer a wizard at the other keyboard (or on the other side of the exam room curtain)? As we noted, P2P and P2O connectivity can reduce asymmetries in technical competence between physicians and patients. But new forms of information exchange between patients and physicians could be very unsatisfying to patients and undermine professionalism if physicians are unable to add sufficient value during their interactions with patients, electronic or personal.

Certain factors ensure that at least some physicians will continue to have distinctive health care competence compared with that of their patients. First, patients cannot conduct their own physical exams, colonoscopies, cardiac catheterizations, or heart transplants. Thus, physicians will retain a distinctive competence based on the physical and procedural requirements of medicine, although I should point out that non-physicians (nurse practitioners, physicians' assistants) can conduct quite competent physical exams.

Second, we should not underestimate the difficulty of assembling and interpreting health care information (Kleinke 2000). After all, much of what physicians learn in their training is how to organize information to make decisions, that is, how to turn data into knowledge. Critical to effective decision making is practice, the equivalent of flight hours for a pilot, including the experience of making decisions repeatedly and watching the result. Patients with chronic illnesses may be able to accumulate sufficient wisdom about a particular problem to make good decisions about their own care, and extremely intelligent patients with acute, isolated problems may be able to do the same. However, the average patient with a new problem and even the chronically ill patient with more than one ailment may be hard-pressed to match the wisdom of an experienced physician. Most people do not fix their own cars or sell their own homes. Fewer still are likely to treat their own health problems on-line. Understanding the interaction of illnesses and medications that travel together among the elderly and chronically ill (diabetes, hypertension, heart disease, peripheral vascular disease, stroke) is the bread and butter of adult primary care but will challenge many patients. Kleinke (2000) hypothesizes that one of the effects of P2P and P2O connectivity will be

to heighten the appreciation and demand for physicians' services rather than reduce them. His theory is that more information—some of it the result of Internet-based advertising by pharmaceutical companies—will awaken patients to services they never even knew existed. The predicted reaction: "You mean physicians can do *that* for me?" Part of the physician's job will then be to help patients distinguish between appropriate and inappropriate services in response to the flood of new information.

Third, the information relevant to medical decision making is constantly changing. In part because of the information revolution, the scientific basis of practice is exploding. Historically, physicians have often lagged in their ability to incorporate new knowledge into practice, and they are likely to display the same failings in the future (though D2D and D2O connectivity could improve this somewhat). However, the question is not whether physicians cope imperfectly with volumes of new information but whether they *will cope better than their patients*, who will face all the same challenges without the benefit of seven to ten years of postgraduate medical training.

Fourth, the 281 million Americans use information technologies differently. Functional illiteracy remains a crippling problem for many Americans. Many others are emotionally unsuited to confronting their health care problems. The elderly often lack the cognitive capacity to understand their illnesses and the other data available on the Internet (Hibbard et al. 2000), and some lack family support to help them with this task. Furthermore, the so-called digital divide, the gap in Internet access between the educated affluent in our society and the less educated poor, leaves many millions of citizens as dependent as ever on physicians (Eng 2001). Thus, for some large fraction of the American people, physicians' asymmetric competence will remain unchallenged.

Reassuring as this may sound, physicians should not assume that time-tested sources of distinctive competence will be sufficient to sustain medical professionalism in the future. More patients will be better informed about the basic facts of health and illness. Thus, the physicians' traditional role as dispensers of facts will decline in the future and, for a significant minority of patients, the well-educated chronically ill, may disappear altogether. The information revolution, however, creates opportunities to craft a new source of distinctive competence for physicians: the role of consultant. As consultants, doctors of the future will need two new skills.

The first is that of a decision analyst. Although physicians receive some training in turning data into information and helping patients

make good decisions, their skills in this regard are rarely well honed. They do not learn the basics of decision analysis, the science of making rational decisions under conditions of uncertainty. And they do not learn how to elicit patients' preferences systematically and incorporate those into the advice they provide. Even the most wired patients of the future will want sound advice about how to turn the science of medicine into a personal path of action. Physicians will be ideally suited to provide this advice if they choose to assume that role with the rigor it deserves. Ideally, the physician as consultant should employ the techniques of shared decision making pioneered by Wennberg, Mulley, and their colleagues (Dominick, Frosch, and Kaplan 1999). Based on various media, shared decision-making techniques provide patients with well-chosen, easily understood, and scientifically accurate data that help them participate as full partners in medical decisions, such as how to treat prostate cancer, breast cancer, or blocked coronary arteries.

The second new skill that physicians will need is that of health care informatician. Some physicians fear that if they consult the computer, in front of patients, for support of a decision, those patients will lose confidence in the physician's abilities, as though patients expected omniscience from professionals. It seems just as likely, however, that wired patients will lose confidence in physicians if they fail to demonstrate real-time competence in using the resources of the information revolution. In the future, physicians must demonstrate that they are expert at marshaling all the available new information technologies for their patients' benefit—that they are as good at surfing the Web as listening to lungs or performing an appendectomy. And there is every reason to expect physicians to be better at using the new information technologies for health care purposes than their patients are: after all, they do this for a living. A new motto for the physicians in the wired world may be, "Come let us search together" (Grandinetti 2000). Indeed, Healthwise, Inc., a nonprofit source of consumer health information, has begun advocating the concept of the "information prescription" in which physicians prescribe information packages and sources (including trusted Web sites) for their patients (Landro 2002).

D2D

The information revolution will facilitate physicians' new role as consultants in a number of important ways that will solidify this new distinctive competence. Anything that increases the amount of information

available to physicians to serve their patients' needs will add value to professional relationships, and new types of connections between doctors and between doctors and health care organizations should greatly augment the amount and usefulness of such information.

Physician-to-physician communication is essential to the coordination of care and to the reality and appearance of competence in their interactions with patients. Every primary care physician has had the unsatisfying experience of informing patients that she either didn't know the patient had recently seen a specialist or didn't know what that specialist's findings and recommendations were. The information revolution should vastly reduce the frequency of such events. The electronic medical record and electronic mail should enable all relevant patient data to be effortlessly available to all caretakers in real time. The information revolution should also enable rapid communication between physicians in ways that will add value to care compared with the horse-and-buggy world of paper and telephone communication.

Let me give you another example from my personal experience. One of my patients complained of a persistent, worsening itch and rash over his whole body. I had sent him repeatedly to dermatologists at my own institution and elsewhere seeking a diagnosis and therapy. We had ruled out many possible causes of his ailment, and skin biopsies had been nondiagnostic. Eventually, the patient saw still another dermatologist who had a new idea: could this be an unusual presentation of lymphoma? This dermatologist e-mailed me with this possibility, and we began a workup for this condition that ultimately made his diagnosis. Our e-mail exchanges continued regularly over the next several weeks, working out not only diagnostic decisions but also therapeutic choices, until the patient ultimately was referred to an oncologist for management. A buffy-coat smear made the diagnosis of cutaneous T-cell lymphoma. Before e-mail, this interaction might very well have proceeded through interoffice mail, with long gaps and the possibility of miscommunication. I still have never seen or spoken personally with this physician.

D2O

D2O communication has considerably greater potential than D2D communication to increase physicians' technical competence. We are just beginning to see an explosion in new technologies designed to increase physicians' access to useful information at the time of decision making

and thereby to enhance the quality of decisions and reduce the probability of error. These technologies include both hardware (desktop and laptop computers, personal digital assistants, bar-coding devices) and software (intelligent algorithms for a variety of medical decisions, including drug choice and dosing). The best studies of the effectiveness of such new devices pertain to medication administration. Using computerized algorithms to choose antibiotics in intensive care units reduces errors, length of stay, and overall costs (Classen et al. 1991). Using inpatient physician-order entry reduces errors and costs of care generally by minimizing errors in medical administration (Bates et al. 1998). There is every reason to expect, however, that real-time on-line decision support for physicians will improve the quality and reduce the costs of care in a wide variety of settings.

In my own office practice, the first thing I do when preparing to see patients is switch on my desktop computer, which gives me access to a variety of services that are useful to my patients. These include their laboratory tests (usually before the results have come back on paper), which I can show them on the computer screen; various reference texts (including Harrison's classic textbook of internal medicine, the *Physician Desk Reference*, and several others); Medline and Ovid, which enable me to search the medical literature broadly; decision algorithms developed by my hospital for various common conditions; formulas for medical calculations (body mass index, drug doses for patients with renal failure); and the World Wide Web. I use these resources daily. When patients ask advice about immunization for travel, I call up the Web site of the Centers for Disease Control and Prevention. When patients want to know how much weight they need to lose, I show them what the computer says they need to weigh to get their body mass index below 25.

On the inpatient service, the computer is now part of rounding on the teaching service. Residents consult the software on their palm pilots when questions arise about the doses and side effects of drugs. They consult Harrison's in real time when diagnostic issues come up. And of course, they enter all their patient care orders on the computer. Each year, the pace and sophistication with which physicians-in-training use these products of the information revolution increase.

The cost and economies of scale in developing such decision supports require that large organizations, both commercial and noncommercial, develop and deploy them. Because of where I work, that organization is an integrated academic health system. In private practice, the source

might be a dotcom, a managed care organization, an insurance company, a professional society, or even a pharmaceutical company (Maguire 2001). All that will be necessary to take advantage of D2O resources will be a desktop computer and a phone line, which even rural and solo physicians should be able to afford.

Perhaps Medicare and Medicaid will one day develop and deploy decision supports to help physicians care for their patients. Whichever the O in the D2O axis, the connection itself has the potential to increase the technical competence of physicians and the asymmetry in competence between them and their patients. Even though patients may have access to some of these sites, they will usually be less facile in navigating them than the professionals who use them daily. The availability of D2O connectivity should encourage and assist physicians to develop competence as decision analysts and informaticians.

While supporting the cognitive attributes of professionalism, D2O connections also have the potential to threaten its moral basis. If physicians rely on D2O connectivity to make decisions for their patients, the objectivity of the information transmitted must be assured, or patients' trust in physicians will decline. In the future, one can imagine discerning patients who ask (or wish to ask) physicians about who sponsors the information sources they use and whether the physicians have financial connections with the sponsoring organizations. For physicians working in capitated groups, relying on managed care organizations' Web sites might reduce patients' trust. Another challenge for developing D2O connectivity will be the development of secure means of exchanging data that meet patients' expectations and legal requirements for privacy protection (Eng 2001).

The Information Revolution and Professionalism

I hope this discussion has made clear that the information revolution is likely to have diverse and potentially contradictory effects on the cognitive, moral, and collegial bases of professionalism. New forms of connectivity will, to some degree, reduce patients' dependence on doctors, both individually and collectively, and create new opportunities for distrust. The asymmetry in factual knowledge between physicians and patients is likely to decline somewhat in the short run. Some patients,

with both routine nonacute problems and chronic illnesses, will likely feel that physicians have less to offer them than in the past, will see physicians less often, and will consult on-line sources for reassurance and advice. The availability of objective data about physicians' performance will reduce reliance on professional self-monitoring as an assurance of competence and quality of care, and new potential conflicts of interests created by physicians' financial relationships with information sources may increase some patients' suspicion of professionals. As a result of the information revolution, the magic, mystery, and power of the profession may be somewhat diminished in the future from what it has been in the past.

At the same time, a close analysis of the effects of the information revolution suggests that it will undermine traditional bases of professionalism less than is commonly supposed and will create unanticipated opportunities for physicians to bolster the cognitive and moral pillars of their professional identities. For many patients and many problems, physicians will continue to offer genuine technical competence that will be difficult, or impossible, to replicate from other sources. This competence will stem from the physical and procedural aspects of medicine, the wisdom that physicians gain through practice and experience, their ability to digest new information faster than their patients can, the limited time and abilities of many patients to master their own illnesses and confidently make their own health care decisions, and the healing value of a listening ear and a soothing touch. In addition, the deluge of information available to patients and the immense new resources provided by the information revolution will create a new role for physicians as consultants. The technical skills required to fulfill this role—those of decision analyst and informatician—are well within the reach of the profession and await its embrace. Ninety percent of physicians are already using the Internet. Furthermore, the flood of data available to patients over the Internet from sources of uncertain reliability will leave them desperate for advice untainted by a financial conflict of interest. This situation will create opportunities to bolster the moral basis of medical professionalism, provided that the profession has established appropriate ethical standards to manage conflicts of interest created by the information revolution.

The profession of medicine, therefore, does not seem headed for extinction—like some quaint species of the era between Hippocrates and Gates. Supported by humanity's need for a healing class and by physicians' genuine technical competence, the profession will survive.

However, the work it does will likely change somewhat, as will its role in society and the relationships between doctors and patients. A critical task for students of professionalism is to push beyond speculation—to document whether and what changes will occur and how they will affect the quality of, cost of, and access to care for citizens in this and other countries. This conceptual exploration suggests that from the standpoint of the medical profession, the answers to these questions cannot be fully anticipated, but neither should they be feared.

References

- Altman, L. 2000. A Desperate Gamble for Surgeon and Patient. *New York Times* (December 26):D1.
- Bates, D.W., L.L. Leape, D.J. Cullen, N. Laird, L.A. Petersen, I.M. Teich, E. Burdick, M. Hickey, J. Klee field, B. Shea, M. Vander Vliet, and D.L. Seger. 1998. Effect of Computerized Physician Order Entry and a Team Intervention on Prevention of Serious Medication Errors. *Journal of the American Medical Association* 280:1311–6.
- Bazzoli, F., ed. 2000. Doctors Fear E-mail Overload. Available at <http://www.technologyinpractice.com> (accessed May 28, 2002).
- Blumenthal, D. 1988. Medicare: The Beginnings. In *Renewing the Promise: Medicare and Its Reform*, edited by D. Blumenthal, M. Schlesinger, and P.B. Drumheller, 3–19. New York: Oxford University Press.
- Blumenthal, D. 1997. The Future of Quality Measurement and Management in a Transforming Health Care System. *Journal of the American Medical Association* 278(19):1622–5.
- Classen, D.C., S.L. Pestotnik, R.S. Evans, and J.P. Burke. 1991. Computerized Surveillance of Adverse Drug Events in Hospital Patients. *Journal of the American Medical Association* 266:2847–51.
- Dominick, L., B.A. Frosch, and R.M. Kaplan. 1999. Shared Decision-Making in Clinical Medicine: Past Research and Future Directions. *American Journal of Preventive Medicine* 17(4):285–94.
- Eng, T.R. 2001. The eHealth Landscape: A Terrain Map of Emerging Information and Communication Technologies in Health and Health Care. Princeton, N.J.: Robert Wood Johnson Foundation.
- Freudenheim, M. 2000. Medical Web Sites Transforming Visits to Doctors. *New York Times* (May 20):C14.
- Gingrich, N., and I. Magaziner. 2000. Two Old Hands and the New New Thing: Interview by Rob Cunningham. *Health Affairs* 19(6):33.
- Goldsmith, J. 2000. The Internet and Managed Care: A New Wave of Innovation. *Health Affairs* 19(6):42–56.

- Grandinetti, D.A. 2000. Doctors and the Web: Help Your Patients Surf the Net Safely. *Medical Economics* (March 6):186.
- Hibbard, J., P. Slovic, E. Peters, and M. Finucane. 2000. *Older Consumers' Skill in Using Comparative Data to Inform Health Plan Choice: A Preliminary Assessment*. Washington, D.C.: Public Policy Institute, AARP.
- Kleinke, J.D. 2000. Vaporware.com: The Failed Promise of the Health Care Internet. *Health Affairs* 19(6):57–71.
- Landro, L. 2000. More People Are Using Internet Health Sites, but Fewer Are Satisfied. *Wall Street Journal* (December 29):A9.
- Landro, L. 2002. If Doctors Prescribe Information, Will Patients Pay or Surf Web? *Wall Street Journal* (April 25):D4.
- Lister, J. 1986. The Shattuck Lecture: The Politics of Medicine in Britain and the United States. *New England Journal of Medicine* 315:168–73.
- Maguire, P. 2001. New Breed of Gifts from Drug Makers: Good Care or Crossing the Line? *ACP-ASIM Observer* (January):1.
- MD Net Guide. 2002. The Rise of WebMD. *MD Net Guide* 4(2):4–7.
- Mechanic, D. 1996. Changing Medical Organization and the Erosion of Trust. *Milbank Quarterly* 74:171–89.
- Medicine as a Profession. 2000. Money and the Practice of Medicine. Briefing Book (November 15–16).
- Moskowitz, E. 2000. The Entrepreneurs Who Hope to Cash in on Internet-Based Health Insurance Plans. *Medicine & Health, Perspectives on the Marketplace* 54(46):1–2.
- National Research Council. 2000. *Networking Health: Prescriptions for the Internet*. Washington, D.C.: National Academy Press.
- Robinson, J.C. 2000. Financing the Health Care Internet. *Health Affairs* 19(6):72–88.
- Rybowksi, L. 2001. *Meeting Employees' Information Needs in an Evolving Health Care Marketplace*. Washington, D.C.: National Health Policy Forum.
- Sangl, J.A., and L.F. Wolf. 1996. Role of Consumer Information in Today's Health Care System. *Health Care Financing Review* 18(1):1–8.
- Silberg, W.M., G.D. Lundberg, and R.A. Musacchio. 1997. Assessing, Controlling, and Assuring the Quality of Medical Information on the Internet: Caveant Lector et Viewer—Let the Reader and the Viewer Beware. *Journal of the American Medical Association* 277(15):1244–5.
- Silow-Carroll, S., and L. Duchon. 2002. *E-health Options for Business: Evaluating the Choices*. New York: Commonwealth Fund.
- Sobel, D. 1999. *Galileo's Daughter*. New York: Penguin Books.
- Spielberg, A.R. 1998. On Call and Online. *Journal of the American Medical Association* 280(15):1352–9.

- Starr, P. 1982. *The Social Transformation of American Medicine*. New York: Basic Books.
- Tuchman, B. 1978. *A Distant Mirror: The Calamitous 14th Century*. New York: Ballantine.

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