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The Sorcerer's Broom

Medicine's Rampant Technology

by Eric J. Cassell

Like the broom in "The Sorcerer's Apprentice," technologies take on a life of their own. To bring them under control, doctors must learn to tolerate ambiguity, resist the lure of the immediate, cease fearing uncertainty, and rechannel their response to wonder.

Major changes are contemplated for health care in the United States, motivated by economic forces and maldistribution of health services. Technology, a thing unique unto itself, however, will confound most any attempt to change the health care system or redirect its fundamental goals. Further, if there is one thing that can be singled out as the engine of the medical economic inflation now occurring everywhere in the world, it is the seemingly irresistible spread of technology into every level of medicine—irresistible to doctors, patients, and nations alike. Evidence that technology is a problem is everywhere in medicine. In intensive care units the world over, the technology of monitoring, organ support, and resuscitation is used where it is appropriate—related to the aims and purposes of the sick person. It is also used where it is inappropriate, defined by the capabilities of the technology and the consequent expertise of physicians rather than—or even contrary to—the good of the sick person.

Like the broom in "The Sorcerer's Apprentice," technologies come to have a life of their own, not only because of their own properties but also because of certain universal human traits. Technologies come into being to serve the purposes of their users, but ultimately their users redefine their own goals in terms of the technology. As a class, technologies are reductive, oversimplifying, impatient, intolerant of ambiguity, and democratic. They spread much more quickly than the ideas that inform them. Democracy has only gradually spread over the world: the transistor radio did it in a decade.

It is not necessary or useful to revisit the long history of the debate about the wonders or dangers of technology except to acknowledge its existence and the literature it has engendered, from Goethe's *Faust* to Huxley's *Brave New World*. On the other hand, systematic concern about technology is largely a child of the second half of the twentieth century. (The famous 1911 edition of the *Encyclopedia Britannica* has no entry on technology, while the 1974 edition devotes thirty pages to it.) This is not an antitechnology essay. In medicine, one can no more be antitechnology than antiscience. There is no going back to a prescientific or nontechnological medicine—who would want to? The issue is how to solve the difficulty epitomized by Emerson's observation, "Things are in the saddle and ride mankind." Technology is not the problem; it is the relationship to it of those who employ it that is problematic. If this is not solvable, our entire project is a waste of time.

The definition of technology presents problems for which dictionaries are no help, because the term can be used in a manner so broad as to defeat understanding. Thus, any tool employed in a craft could be said to be that craft's technology. In this discussion, I want to limit the term to the modalities and instrumentalities that greatly extend the power of human action, sensation, or thought in ways that are independent of the particular user. In addition to the instruments and devices usually considered as technology, we should include, for the sake of understanding, high-power medications—cardiac, antimicrobial, psychotropic, or whatever—that greatly extend our therapeutic power. It is our power that technology expands.

Technology is not science. They are frequently lumped together—as in "sci-tech"—but they are distinct. Science is not my topic. The topic is to see what there is about PET scanners, MRI, angioplasty, endoscopy, automated chemistry

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machines, and so on—the whole wondrous parade, not the science that spawned them—that poses problems for medicine.

Technologies are reductive and oversimplifying. Much of their hold on medicine, however, is a result of two prior reductive steps in the history of medicine. The first step was reducing the problem of human illness—with all its intricate physical, social, emotional, and cultural aspects—to the biological problem of disease. Diseases were initially defined as physical entities with unique anatomical (later biochemical) characteristics and unique causes. These two unique characteristics permitted precise definitions. Precise definitions, in addition to anatomically (or biochemically) discernable characteristics, finally permitted the productive entrance of science into medicine. The second reductive step follows from the scientific investigation of diseases. Here the findings of science become the accepted picture of the disease, further oversimplifying the problem. The scientific discovery of the disease agent completes the simplification as the agent, for example, the tubercle bacillus, becomes the virtual equivalent of the disease, tuberculosis. These definitions, identifiable characteristics, scientific investigations, and consequent technologies perpetuated the oversimplification of human illness. There is, however, a certain circularity whose presence should be acknowledged. Disease definitions permit the entrance of science. Science increases knowledge of the disease by employing technologies and promoting the development of further technology. These technologies come about because of the scientific understanding of the disease and reinforce the original picture of disease that started the cycle. This circle also contains the values that direct the technologies toward the facts that support the values. Breaking out of such a circle is one of our tasks—but not an easy one.

What I have just noted may be the way technology entered medicine, but knowing this will not end its almost autonomous growth. We will not solve the problem of technology without providing other solutions or defenses against the human characteristics that lead to our difficulty. I will discuss five such characteristics: wonder and wonderment, the lure of the immediate, unambiguous values, the avoidance of uncertainty, and the human desire for power.

Wonder

The first hold that technology has on us I call wonder and wonderment. When I lecture at unfamiliar institutions, I'm frequently taken on a tour of the place. Once, in Pittsburgh, I was shown their new cardiac cath labs—four of them! Why? Did they think I'd never seen a cath unit? Why didn't they take me by somebody's office (whispering, so as not to disturb) and say, "There's one of our smartest doctors"? Because everybody loves the new and the shiny, especially when it does fantastic or seemingly inexplicable things that enthrall us. Wonder is a state that throws animals out of equilibrium—not just human animals, but also quizzical dogs. Make a funny sound at the dog and it tilts its head: what's this? Children get wide-eyed. The wonderment must be reduced to bring the world back into order. So people (and dogs, I guess) have to figure out what the wondrous thing is and how it works. And, of course, how to control it. I could demonstrate this in a minute to any audience of American physicians. If I were to put on a table a funny-looking device that had a screen and strange keyboard, people would soon start poking at it, manipulating the keys to see if they could bring up the control system, find out what it is and how it works. Wonder is not easily put aside and is quickly reawakened—one taste leads to a desire for more.

Wonder and wonderment cause physicians to use and overuse their technology. They like to see it in action—and they want a new model as soon as possible. Wonder may seem a childish motivation in a very serious pursuit. It is childish; that is one of its attractions. It helps solve the problems of boredom, absence of meaning, and loss of motivation. But it needs to be kept in check. The human body is wondrous and so is the psyche, which is why some doctors love to take the body apart and others love to pry into the psyche. Yet surgeons are socialized, as are psychiatrists, never to cut into the body or mess in the mind unless it is for the patient's good. We know that curiosity—an aspect of wonder—is not easily held in check, but much time in medical education is spent successfully socializing doctors to hold their curiosity in check. This says it can be done.

The Lure of the Immediate

The second reason for technology's hold on physicians is that it roots us in the immediate, the now of its presence. The numbers of the readout, images on film, dexterity required for its deployment, technical complexities, tubes, wires, plugs, valves, needles, gauges, mirrors, focusing devices, and on and on exist in the here and now—the immediate moment. But these things are immediate in another related, but perhaps more important sense: they are unmediated by our own reasoning. The technological output is a thing in and of itself. Computer jargon even has a name for it, WYSIWYG, What You See Is What You Get. The user doesn't have to reason from one output to another; each is distinct.

How different from the patient. A bundle of large questions, a life that exists only in the most fragmentary sense in the here and now. Look at a patient, see only the here and now, and you have missed the truth of a sick person. Any one moment of life—in an intensive care unit or a nursing home—contains only one bit of the importance of something much larger. A human life is a trajectory through time, the historic route of a society of complex parts, as Whitehead explained. Sick persons, all persons, are difficult to understand. The doctor in attendance is also a society of complex parts pursuing a historic route that interacts with the patient.

God bless the immediate—no need to get caught up in all that complex sick person stuff. That is why, given a complicated human question in the care of the sick, we doctors love to start talking about physiologic parameters, calling up diseases or planning some tests. For example, the attending physician and medical students stood outside the room of a dying patient whose suffering could not be controlled. Did they speak about her suffering, or what to tell her or do for her? No, they were reading her test results and X-ray films—irrelevant to her present problem but much simpler and more immediate.

Why isn't the examining hand on the abdomen just as immediate as looking at a readout or computer-generated image? Because it isn't just a hand, or sensations in the fingers, it is a doctor feeling responsible for the approximation to an unseen reality of what fingers tell—and what it means. Why isn't the same thing true of the image on the film? It can be true, it *should* be true. The physician viewing the image *should* be reasoning about what must have come before and what will follow from the information contained in the image. And then how that information fits in with what he or she knows of the patient and the patient's interests, desires, purposes, fears, and concerns. But as the technology gets better it becomes more autonomous, it tells you directly what it means in immediate terms—like the computer-generated EKG interpretations. Or a specialist, whose sole job is to interpret the image, tells you what it means in unmediated terms. As we all know, physicians less often read their own X rays (even with the interpretation in hand), or go to the pathology department when the biopsy is being read, or question the precision, accuracy, or validity of the automated chemistry report. It is not that doctors are lazy; it's just that they have come to accept these technologies and their output as the equivalent of the thing being tested.

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There are specialties in medicine that have always lived more in the immediate than others—surgeons are the best example. The open wound, flowing blood, and exposed viscera are more immediate than the evolution of a drawn-out illness. The special attraction of the immediate is one of the reasons that surgeons are different from internists (or the other way around).

The systems of answers that we teach physicians about diseases are ill suited to frame the longer-term, larger questions raised by the sickness of the person to whom the monitors are connected. Science has ruled out of court the information from values and aesthetics by which we live our lives, allowing only brute facts. One of the advantages of the immediate is that it provides answers—information—when more relevant understanding would require deeper reasoning and greater involvement from doctors as persons. Understanding cannot operate separately from the reasoner, as can the computer. Immediacy and its lesser requirement for reason facilitates a detachment from the suffering of a patient. Thus we are held in thrall by technology as much by the seeming advantage of the immediate as we are by its wonder.

The Lure of the Unambiguous

The third aspect of technology, unambiguous values, keeps it employed sometimes even when it is inappropriate. Watch the movie of a coronary arteriogram. It's like a Western, where you can quickly tell the good guys from the bad guys. The values are clear and unambiguous. With adequate dye in the vessels, a good coronary arteriogram is anatomically clear. You can compare it to those taken previously and subsequently. A good coronary artery is open and a bad one is obstructed, although there are criteria for degrees of good and bad. A good obstruction is short, with adequate runoff, and not so tight that an angioplasty balloon won't get through it or that it cannot be bypassed. Although they may disagree with one another about details, cardiologists are absolutely clear and straightforward about such things. When they are not, they make new criteria to remove ambiguity.

Virtually all technology is marked by similarly unambiguous values. In fact, lack of ambiguity is essential to good medical science. If cardiologists at Cornell cannot speak the same language and mean the same thing by technical terms as those at Stanford, Oxford, and the Hôtel de Dieu, then international research is impossible and progress in medical science will be impeded. So, on the face of it, the unambiguous seems reasonable—except that we physicians do not generally know how or when to abandon it. Many, in fact most, of life's simple pleasures are also unambiguous. We generally know what is good and bad behavior, food, wine, and sex. On the other hand, the development of sophistication in nontechnological pursuits involves appreciation of complexity and ambiguity. Sophistication in technology, I believe, goes in the other direction. More sophisticated means less ambiguous; the better the piece of equipment, the clearer the values.

But good or bad as measured by technology is not necessarily the same thing as good or bad for patients. Coronary artery disease and its technologies are a case in point. Imagine an instance, common enough, where a middle-aged man without symptoms wants to join an exercise program. He is required to have a treadmill exercise test. His test results (following the usual Bruce protocol, which approximates no exercise you have *ever* done) are positive by published criteria. He is advised that these unambiguous criteria often indicate coronary artery disease and should be followed by a thallium stress test. The test (in this case) is also positive and he is advised that he should have a coronary arteriogram. (In many instances the thallium scan is considered redundant—the patient goes directly to the arteriogram.) The arteriogram shows (in this instance) significant obstruction of a coronary artery. Subsequently, a coronary artery angioplasty is done to reduce the obstruction. This little scenario is extremely common in the United States—and increasingly so elsewhere. There is no quality evidence that the outcome of this chain of events makes a positive difference in the life of such a patient—that asymptomatic patients with a positive test who go to angioplasty or bypass surgery do better than patients who are not so treated. The relationship between what is considered good and bad in the results of the tests and what is best for the patient is at the very least obscure and at the worst, just plain wrong.

What has happened is that because available technology permits visualizing the major coronary arteries, atherosclerosis of these vessels, which can be demonstrated unambiguously, has come to be taken definitionally as the equivalent of coronary heart disease. Coronary heart disease is a more complex entity than merely atherosclerosis of the major coronaries, although the two are often associated. For example, at autopsy one will commonly see old people whose coronary arteries are so filled with the calcium deposits characteristic of advanced atherosclerosis that one wonders how blood ever gets through them. Why did they have coronary artery disease but show no evidence during life of loss of everyday function due to heart disease? Because they did not have heart disease. Unfortunately, physicians infrequently attend autopsies nowadays and thus are not exposed to this common phenomenon. Conversely, sometimes one sees a patient with clear-cut signs of coronary heart disease, but little evidence of obstructed coronary arteries.

The second demonstration of the absence of the disease but the presence of a marker that technology has elevated disproportionately is the person captured on the treadmill whom I described a moment ago. If persons like this have hearts with good pumping function—normal ejection fraction—they do very well with their operations or angioplasties. They ought to. They don't have heart disease.[1]

As I suggested previously, human sophistication is marked by tolerance for ambiguity, whereas sophisticated technology removes ambiguities. It does this by narrowing down the field of difference between what is good and what is bad, so that ultimately one test result is taken to be good and another result bad. And that is how the state of the coronary arteries became accepted as the equivalent of a disease of the heart itself in the circumstances I have described. This is Whitehead's fallacy of misplaced concreteness writ large.

We must not forget that technological measures of value, even as they achieve a life of their own, are derived from human values. When medicine's priorities (another word for values) are too simplistic, they will be represented by a technology that also exemplifies simple values. For example, giving a part priority over the whole allows you to sustain an organ but lose sight of what is best for the whole person. We value the preservation of structure over the preservation of function. We value the body over the person, we value survival over maximum function, and length of life over quality of life.

The development of technology is not an event but a process. Technology is invented to solve problems arising out of the pursuit of medical values. Technological values, however, foster medical values that are intolerant of ambiguity, which subsequently leads to a new stage of technology. As a result, the sophistication necessary for physicians to tolerate the ambiguity inevitably following on attempts to break out of the circle is stifled. The odd thing is that if one faulted modern physicians for lack of sophistication they would most likely dismiss the criticism by pointing to the sophisticated equipment they use.

So, to wonderment and the lure of the immediate, we add unambiguous values as a reason why technology runs doctors rather than vice versa.

The Pursuit of Certainty

The central problem that physicians confront is uncertainty, which is the next reason for the dominance of technology. It is doubt that grays hair. Many years ago Renée Fox wrote an essay called "Training for Uncertainty" that appeared in *The Student Physician*, a book about the socialization of medical students based on studies of the class of 1954 at Cornell.[2] She identified two reasons for uncertainty: first, defects in the knowledge of the individual physician, and second, the inadequacies of the profession's knowledge. Even if I, impossibility granted, knew everything medicine knew, I would not know everything. There would still be uncertainties. But in an ideal world of complete knowledge, in this view, we could be certain. Unfortunately, as Sam Gorovitz and Alasdair MacIntyre pointed out years ago at a meeting at The Hastings Center, there are two other roots of uncertainty that can never be removed.[3] The first is that every decision, small or large, is made about the future, and the future is ineluctably uncertain. All medical decisions are about the future, since the future starts an instant from the present. Second, uncertainty can never go away because all of science, medical science or any other, is about generalities. But every patient is a particular individual and necessarily different in some respect from the general. Thus, clinical judgments are always uncertain, and medical knowledge necessarily involves uncertainties. In clinical medicine as elsewhere, the more important the knowledge required by the decision, the less tolerable is the uncertainty. Since physicians commonly make decisions that have profound implications for the lives of others, uncertainty is a constantly disturbing factor in medical practice. Patients have the same uncertainties as physicians, or worse. They commonly solve them, ultimately by trust—trust in the physician—which increases the burden of the doctors' uncertainties. Physicians follow the same path as they trust their consultants and their technology.

There are a number of strategies to reduce uncertainty, and technology can play a part in each of them. The first strategy is to shrink the clinical problem until it is not that of a particular sick person, but of an organ. For example, a patient complains of pains in the chest that are of an unusual type. The pain does not seem to be related to exercise, position, or food, yet it has been persistent. The question of heart disease is raised, yet one test for heart disease after another is shown to be normal. The patient is reassured that the pain does not represent heart disease because the tests are negative. This may in fact be correct, but the pain, not the presence or absence of heart disease, is the problem. The positive or negative certainty of each test provides an answer to the redefined problem and reduces the physician's uncertainty. Perhaps the patient will also be reassured, but perhaps not. The physician's statement, "Your problem is not . . ." is not nearly as good a response as a positive answer to the question raised by the symptom: "Your chest pain is a result of . . ." Further, the question of chest pain has been changed to the question of coronary heart disease, which is changed to the question of coronary artery disease. And, as I have noted, changing the question is a result of available technology.

Redefinition of the problem in terms of a technological answer is often employed in the case of back pain. Here, the questions of cause and treatment with regard to the patient's pain become a question about the pathological anatomy of the spine, which can be answered by consulting a picture of it. As we know, the cost of this picture has risen steadily over the last decade as the initial simple X rays of the spine have been superseded by computerized tomography and most recently by magnetic resonance imaging. The image on the film—with its implication of objective certainty—comes to stand for the patient's back pain, to the point where greater weight is given to the image on the film than to the patient's pain.

Problems such as chest or back pain were previously addressed by taking the patient's history and doing a physical examination. But these diagnostic methods were fraught with uncertainty and were particularly dependent on the skill of the individual physician. These techniques had the further disadvantage of forcing the physician to confront an intractable source of uncertainty: the individuality of the patient. Technological methods move the evidence employed in diagnosis away from the patient and reduce the impact of the patient's particularity on the physician. In using them, physicians mistakenly believe they can reduce uncertainty by changing the patient's problem to one for which there is a technological answer. They then reduce the problem from that of the patient to that of an organ or body part for which a technology exists, and they distance themselves from the patient by employing that technology. On the therapeutic side, technologies may reduce uncertainties by providing treatments that, although of unquestionable value in some situations, are employed in situations where they have no utility.

Technology would not produce problems in relation to uncertainty if it did not, in fact, frequently reduce uncertainty, sometimes dramatically. Probably because of the change produced by effective technologies, I believe that doctors are no longer trained in the management of uncertainty in the fashion first described by Fox. As a consequence, they tend to utilize any diagnostic or therapeutic technique that promises to reduce uncertainty. This leads to a sort of Gresham's law of technology: whatever technique promises greatest certainty, even if inappropriate, will diminish the use of techniques associated with greater uncertainty. It is the case that hard facts drive soft facts into hiding, which in turn drive softer facts into oblivion. Technologies produce hard facts.

All the wonder, dislike of ambiguity, and fear of uncertainty that afflict doctors are present among patients. And the stakes are highest for them. In the current medical world of the United States, patients have a significant voice in the choice of diagnostic strategies and treatment. They are generally knowledgeable to an unprecedented degree. Not surprisingly, their knowledge is greatest about new technologies and treatments, details of which fill the pages of newspapers, magazines, and health promotion newsletters. It is fair to say that many patients believe that it is the test rather than the physician that makes the diagnosis, and the drug rather than the physician that effects the cure. (If a CAT scan shows a lung tumor, did it make the diagnosis? A physician chose a CAT scan rather than, say, a plain film of the chest and decided to image the chest rather than, say, the abdomen. The CAT scan was employed in the diagnosis.) Consequently, patients have been an active force in the increasing deployment and dominance of technology.

Technology Is Self-Perpetuating

Employing one technology frequently leads to the use of another. This is most easily demonstrated by the function of computers in neonatal intensive care units. Commonly, each "bed" in a neonatal unit has its own computer to analyze and display the physiological state of the infant. The requirement of computers for digital information encourages the proliferation of instrumentation that produces such data. Similarly, when automated blood chemistry machines make redundant the manual skills of technicians, other automated laboratory examinations become necessary because technicians no longer do the tests by hand. The results consequent on the use of one technology frequently raise questions that can apparently only be answered by other technologies. Computerized tomographic images of the central nervous system may introduce doubt that only magnetic resonance imaging can resolve. General expectations have been created among physicians about levels of accuracy, certainty, and lack of ambiguity that can only be met by other technologies—even if such accuracy, certainty, and lack of ambiguity are not important in a particular instance.

Doctors who have mastered a technology tend to use it as often as possible—not necessarily for reasons of profit, but because they love their skills and technologies. As noted earlier, problems tend to be redefined so that a technology becomes appropriate when it might otherwise not be. A saying that makes the point has become popular among physicians, "To the man with a hammer, everything is a nail."

Power

The final reason for the inappropriate use of technology is the power it confers on physicians and their institutions. While the meaning of power seems self-evident, some further explication is required. The power to act is basic to human existence and is employed to control or influence events. In its absence we feel powerless, which is a self-destructive state. We exist for ourselves and for others in our actions; when we act, we simultaneously create ourselves and our world. The scope and effectiveness of our actions in both self-creation and influence on the world are determined by the degree of our power. Since we are social beings, virtually all of our actions take place in a world of others, and our power is relative to the power of others. Thus, my ability to act among others is partly dependent upon permission to exercise my power by those more powerful or my desire to exercise my power in relation to those less powerful. Frequently the word 'hierarchy' is used to refer to social ranking according to power. Power does not reside in us only as individuals but also by virtue of our acknowledged place in society—in our social status. Thus, hierarchy

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may be role dependent rather than the result of self-generated power. Power relationships—which also exist among and between animal groups—are dynamic. It is difficult to exaggerate the importance of the exercise and experience of power.

Even in sophisticated societies, the ability to do things better than others do them confers power. Possessions confer power because they bestow status—material wealth is the most obvious example—but so does access to objects of superior efficacy. In fact, changes in one's access to things containing superior efficacy in themselves may alter one's status. A well-known ethnographic example involves a culture in which the only available axes, made of stone, were in the possession of the tribal elders. These axes were not only used to cut wood, but were also a measure of status and a factor in barter among tribes. Western missionaries came to the tribe and offered steel axes as incentives for conversion to their religious beliefs. Wide distribution of these powerful objects—both totemic and effective—dramatically altered hierarchical and status relations within the tribe and its associations with its neighbors.

Technology, as noted earlier, is employed in this discussion to refer to modalities and instrumentalities that greatly extend the power of human action, sensation, or thought and that have this efficacy independent of the particular user. There is little doubt that one of the attractions of technology is its ability to confer status and rank on individuals. Medical power is demonstrated when a plastic surgeon makes someone look younger, when infection is treated, blood pressure is lowered, or pain relieved. Every therapeutic and diagnostic act is a demonstration of efficacy and thus of power. The therapeutic effectiveness of the relationship between patient and doctor is dependent in part on a belief in the physician's individual and institutional power over the forces of nature. In previous epochs, the physician's power came not only from his or her shared knowledge of the body and disease but also from the personal development of knowledge about the sick and sickness and demonstrated effectiveness in the diagnosis and treatment of patients. Personal power of this sort takes many years to develop and is inevitably a result of the ripening of the medical self. Technology confers power on individual doctors with much less personal involvement. The modern tendency toward specialization encourages this more easily gotten power because it narrows the amount of knowledge necessary to exercise it.

Technology also gathers to itself personnel and space that exhibit power and tend to be self-perpetuating. Intensive care units are the perfect examples, as are transplant units. In medicine as elsewhere, technology engenders special training, which furthers the world view of technology, which further increases political power. Employing or having access to technology also garners social power or status from laypersons, the press, the university, or the hospital trustees. In like manner, technology confers status on hospitals and other medical institutions. The example I gave earlier about being shown around shiny cardiac cath labs when I visited a Pittsburgh hospital can also be used to exemplify a hospital showing off its power.

Technology would not confer power on doctors and the profession of medicine if it were not seen by the larger society as having power in itself. It erroneously appears to free the patient from the necessity of depending on the individuality and individual skills of the physician. Uniform fee schedules that pay for a particular act—office visit, surgery, etc.—reflect the falsehood that doctors dispense a uniform technology rather than a personal individual service. It is not a surprise, in view of this widespread public belief in the independent power of technology, that physicians, who are influenced by the public they serve, depend increasingly on technology regardless of whether its use is appropriate.

Knowledge at a Distance

In our daily lives we are accustomed to confronting much of our world in its representation, rather than in itself—in photographs, recordings, radio, movies, and television. This has produced the widened perspective and scope of knowledge about things distant and close to us with which we are all familiar but which, especially for doctors, cause problems. Technology represents a kind of knowledge. In fact, it epitomizes the twentieth century ideal of knowledge—scientific, objective, and existing seemingly separate from humankind. In medicine, the scientific knowledge and subsequent technology developed in response to the challenge posed by sickness and suffering has assumed an actuality more convincing than the reality of sick persons themselves. Consider this common situation. A patient has severe pain in the hip, and the doctors can find no evidence of disease. With each negative test, increasing doubt is raised about whether the patient is truly in pain. Then a radionuclide bone scan is done, showing cancer in the hip bone. The patient will now be believed. Why is the celluloid rectangle with fuzzy black dots more believable than the patient's pain? The usual answer, that the pain is subjective, won't hold water. The pain may be subjective, but the report of pain is a thing that can be evaluated. Further, we are of a piece. We cannot have severe pain without its being reflected in other aspects of our physical, social, and psychological selves.

A person with severe pain moves, acts, thinks, feels, displays emotion, and relates to others differently from the same person pain free. All of these features are apparent to others or can be evoked—they are objective.

Objectivity alone isn't the issue. The way we would know that the man really has pain does not meet the ideal of medical scientific knowledge developed over the last 150 years. Scientific knowledge, surely not the only way to know things, has come to be accepted as more actual than patients or their pain or suffering. Medicine's technology also produces representations of patients' original reality that are another reality in themselves. For example, EKGs, X-ray machines, monitors, CAT scanners, magnetic resonance imaging machines, and PET scanners are all imaging devices that distance physicians from the sick person. Their focus of interest is inevitably drawn away from the patient and onto the part or the disease—out of the context of the whole patient and the patient's lived world.[4] Realizing this, physicians and commentators and critics of medicine have largely depended on moral injunctions to return medicine's focus to the sick person. It is an uphill struggle because the problem is based, in part, on the nature of medical knowledge itself and is firmly embedded in the mindset of the late twentieth century.

The Counterspell for the Sorcerer's Broom

Technology holds sway over medicine and its public because of its self-perpetuating character and its enhancement of power, as well as its capacity to induce wonder, root us in the immediate, remove ambiguity, and increase certainty. Since this is not well understood, it is hardly surprising that technology, by itself inert and useless (although beckoning for attention through its inherent purposes), should be blamed for the troubles it brings. The real culprits, however, are the doctors who use it, the public that loves it, and the narrow knowledge on which it is based. Medical technology's form and character arise from medicine's focus on disease and pathophysiology as the arena in which the origins and solutions to human sickness are to be found. The values on which it is based come primarily from the spectrum of pathophysiological and anatomical criteria for disease and normality, now largely defined and perpetuated by the technology. Our task, it seems to me, is to stop blaming, regulating, and complaining about technology—without which modern medicine is unthinkable—and start working toward a solution based on understanding, as we have done with so many others. The search for new goals of medicine now going on at The Hastings Center can be one step in such a task. I believe the new goals will turn out to be old ones, that we should be trying to return medicine and doctors toward a focus on persons sick and well and on their suffering. Conversely, no change in the ends and purposes of medicine is possible without bringing technology under control. Toward this end we must learn how to teach doctors, who are in themselves the primary instruments of diagnosis and treatment, to tolerate uncertainty, accept ambiguity, deal with the complex, and turn away from mere wonder. Accepting these assignments and redirected goals and following them as far as they lead will be a sufficient task for decades.

References

1. Because this essay is about technology, I have simplified the discussion of coronary heart disease and its relation to coronary artery disease. A thorough analysis of the issue and the evidence that bears on it does support the same conclusions.

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