Medical Technology: A Critical Perspective

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Citation

R Sanders. *Medical Technology: A Critical Perspective*. The Internet Journal of Medical Technology. 2003 Volume 2 Number 1.

Abstract

Medical technology has embedded itself in our culture and has been a positive and powerful force in the improvement of life for millions of people. However, for every yin there is a yang, and with all things that are positive, there is also a negative component that must not be ignored. Most Americans are familiar with the benefits of technology, specifically medical technologies; the media reports on these benefits every day. However, it is not often that physicians have the opportunity to discuss what has been given up or lost as a result of using these same technologies. This commentary is about those unintended consequences resulting from our use of technology, in particular, physicians' use of medical technologies.

LEARNING TO BECOME LOVING RESISTANCE FIGHTERS

In the book, Managing Your Doctor, Arthur Freese ([1]) relates a story once published by the American Medical Association of a physician who called in a technician to check on the operation of an electrocardiograph that was not recording the heartbeat of the patient. Beginning by checking to see whether the machine was even plugged in, the technician traced the cause of the problem back to the patient, discovering that no heartbeat was registering because the patient was dead. This tale is the perfect preface to this critical perspective as it succinctly describes our modern day reliance on technology, medical technology in particular, and serves as an apropos lead-in to the consequences of our unquestionable faith in these technologies.

Much of what is written as critical theory has been promulgated in the sociological literature. The unintended consequences resulting from the use of technology has been a primary target for these theorists, with the focus of their commentary extending from the blind applications of technology in the humanities, arts, and sciences, to how technology is being applied in the field of medicine. Their critical perspectives, admonitions, and warnings have not been reserved for or limited to any one field or profession. Whether we are artists, teachers, police officers, or doctors, we all should hear their urgent message. However, there are unique and interesting variations in how these critical perspectives have been applied to each of these fields and professions. This paper will touch on some of the consequences of and potential “solutions” for the perspectives as they apply to the field of medicine and for the medical profession, attempt to create a greater awareness for the technological culture of which we are all a part, and ultimately encourage medical practitioners to reflect on the effect that this culture has had on their particular profession. The purpose of this paper is not, however, to promote a Luddite mentality. Medical technology has embedded itself in our culture and has been a positive and powerful force in the improvement of life for millions of people. However, for every yin there is a yang, and with all things that are positive, there is also a negative component that must not be ignored ([2]). Most Americans are familiar with the benefits of technology, specifically medical technologies; the media reports on these benefits every day. However, it's not often that physicians have the opportunity to discuss what has been given up or lost as a result of using these same technologies. This commentary is about those unintended consequences resulting from our use of technology, in particular, physicians' use of medical technologies.

THE STATUS QUO

There are numerous stories that could be shared which depict the status quo in terms of the blind trust physicians and patients put in medical technology. Most describe how various technologies and tests were applied and conducted, only to later discover that taking a medical history or conducting a thorough examination would have been sufficient for the correct diagnosis and treatment of the problems reported. Regardless of the specific circumstances, these stories can serve to illustrate two distinct points; first,

they reveal how dependent Americans are, both physicians and patients, on the technologies available. Whether these technologies are monitors or medicines, the American mind embraces technology wholeheartedly because of its effectiveness in helping to diagnose and/or treat health problems. Second, these stories often make a more subtle point that patients are not often talked to or questioned about why they might actually be suffering from problems they have.

Before rushing in to use technology as a means of treatment and diagnosis, physicians should first engage in some discourse regarding the value of good, old-fashioned, technology-free, dialogue between physician and patient. This approach however conflicts with the beliefs physicians and patients have about medicine and medical technology. In many instances, the patient's words have become less important to the physician than what the technology tells him. Therefore, no dialogue takes place. Likewise, the physician's actions have become incomprehensible to the patient, which in the mind of the patient equates to “good medicine” ([2]). Our culture demands the use of technology to treat disease, subsequently judging “medical competence” on the quantity and variety of technologies used to diagnose and treat the patients. Both figuratively and literally, actions speak louder than words when it comes to diagnosing and treating illnesses in today's culture.

America's obsession with technology is evidenced by the fact that US doctors perform more operations, diagnostic tests, and prescribe more antibiotics than their counterparts in Europe ([3]). And, despite the expense of these technologies employed by American physicians, nearly every medical center and facility in America has invested in as much technology as it can afford. As a result, per capita spending in the US ranks first in the world at $4,271 ([4]). In light of this ranking, one might assume that the US would also have the lowest rankings in death and disease, and the highest rankings in life expectancy. Unfortunately, this is not the case. There are numerous statistics, which illustrate how the US ranks poorly in the infant mortality rate, intestinal diseases death rate, respiratory disease child death rate, maternal mortality rate, and life expectancy at birth ([4]). These statistics are doubtfully new to health professionals. However, it is nevertheless surprising that despite being first in the world in health care spending, the US ranks so poorly in keeping its citizens healthy and alive, and ranks neither the lowest nor the highest in those statistics where it seems it should. It appears that America's expensive investment in medical technology has perhaps not paid off the way many had hoped or expected. While certain statistics can be explained through America's high rate of teen pregnancies, smoking, etc., these explanations do not address the larger issue looming behind these alarming statistics, that perhaps more money spent on technology is not the solution to better health.

Postman ([3]) suggests three basic and interrelated reasons for why Americans continue to be enamored with medical technology, despite what these statistics seem to be telling us. First, it is in our American character to embrace technology. Second, as a result of our belief that technological innovation is synonymous with progress, the development and proliferation of medical technologies have continued. Finally, our culture has gradually adopted the belief that technology is the foundation of the medical profession.

OUR AMERICAN CHARACTER

It is in our American character to embrace technology. We are an assertive and aggressive people with a history of vanquishing our enemy. We have conquered other nations, other cultures, even nature itself, and are now working on conquering disease and death. From a medical perspective, physicians take an aggressive approach in how they diagnose and treat disease, which they are confident can also be vanquished through their use of technology.

Technology and machinery are equated to accuracy, precision, and objectivity. Subjective forms of knowledge are, on the other hand, inaccurate, imprecise, and are given no official status in science and medicine. Therefore, the way of the medical history and the diagnostic interview is out; while the lab tests, the X-rays, and the system monitors are in. The belief today is that the findings of the laboratory will lead to the “true” path to diagnostic knowledge, and that any emotion-laden, value-tinted, or opinion-based diagnosis is misleading and distracting ([5]).

Technology, medical technology in particular, has a long and noble history based on the need to solve medical problems. Throughout the 17 th and 18 th centuries, and even throughout most of the 19 th century, technologies were considered tools to support the intellectual diagnosis conducted by physicians. Technologies developed prior to the mid 19 th century evolved out of a need to solve a problem and were recognized as mere tools to address some basic need. However, by the turn of the century and throughout the 20 th century, a shift occurred in which our reliance on technology

elevated it from a means to an end, whereby technology no longer emerged out of a need to solve a problem, but rather as a manifest destiny based on the belief that if it could be invented, it should ([3]). This shift in our view of technology subsequently discouraged 20 th century physicians from continuing to develop the art of diagnosis, now considered imprecise and time-consuming ([5]). Over the past hundred years, there has been an increased faith in science and technology, and on the reliance in scientific quantitative analysis conducted in the laboratory over the more qualitative diagnosis by the physician ([5]).

Throughout the history of medical diagnosis, there have existed three stages of the communication that takes place between physician and patient:

1. Direct communication with patient's experiences based on patient reports, questions, and observations;
2. Direct communication with patient's bodies through physical examination using technologies; and,
3. Indirect communication with patient's experience through technology and emergence of specialists who focus on data and interpret that data with no connection to patient.

These three stages mirror the stages of American's use of technology, from; a tool-using culture, in which problems are solved by tools while continuing to serve the symbolic world, and in which direct communication with patient's experiences based on patient reports, questions, and observations was still the primary means of diagnosis; a technocracy, in which tools begin to play a role in the thought world of that culture and in which technology actually becomes the culture. In this stage, direct communication with patient's bodies is mediated through the physical examination using technologies; and, to a technopoly, where, according to Postman, we are today, in which there exists a “totalitarian technocracy” that renders alternatives to tools and technology invisible. Hence, the rational for the shift to indirect communication with the patient's experience through technology and the emergence of specialists who focus on data and interpret that data with no connection to patient ([3]). While there continue to be some physicians who have not made this shift with the others to this state of technopoly, and who still align themselves with stages one and two, believing that history-taking is more valuable than laboratory tests, the information these physicians value is usually collected and reviewed by relatively untrained persons rather than by the physicians themselves. While there are some who may believe they have not succumbed to the lure of technology, there are few of us who can still see and are able to stand up to this shift in technology from servant to master. According to Jacob Needleman, M.D. ([6]), the technopoly in which we now exist is causing physicians to lose their grasp on human interaction and relationships (one-on-one connections, communing with others, etc.) in their blind acceptance of technology. While others might argue that the benefits of the development of future and more “effective” technologies outweigh any potential harms resulting from these technologies, Needleman contends that the loss in human interaction and relationships is by far greater than any loss that might result from not developing a particular technology ([2]). What good are heart monitors when we no longer have the ability to share our hearts with one another?

GROWTH AND PROLIFERATION OF MEDICAL TECHNOLOGY

As previously mentioned, medical technology has had a noble history, beginning with the invention of the stethoscope in 1816, which is considered by many as the first “true” medical technology. The stethoscope is symbolic in that it began the distancing between patient and physician; not just physical distance, but also the emotional, psychological, and even healing distance ([2]). At the time the stethoscope was invented, America was still a tool-using culture and this new invention was considered to be an extremely useful tool that did much to assist physicians in diagnosing and treating chest diseases. It should also be noted that at time of this invention, only surgeons used tools (and were not considered physicians as they are today); physicians used intellect, knowledge and insight to diagnose and treat patients. However, an unintended consequence arose from the physician's decision to use this new tool. As mentioned, the stethoscope transformed the practice of medicine by interposing a tool between the patient and the physician, diminishing the more traditional methods of questioning, observing, and the taking of reports from the patient. What occurred then was a shift in a reliance on the tool itself rather than on the physician's own experiences and insights. The invention and use of the stethoscope also promoted two new key ideas; first, that medicine was about disease, not the patient; and secondly, that the patient was unreliable and that technology was reliable. While the stethoscope may not have been enough to cause these ideas

to take hold, the invention of countless other medical technologies over the next 180+ years amplified these ideas and made them part of the culture of medicine. As a result, there are thousands of medical technologies in use today, all of which work to supersede physicians' intellect, knowledge, and insight to diagnose and treat their patients.

OUR AMERICAN CULTURE

The American way is to embrace all new technology and our American culture is to view technology as the foundation for all that we are and all that we do. This includes our belief that technology should be the foundation of the medical profession. Patients must bear a large part of the blame for this perspective, as it seems that every time someone has a headache, he or she wants a CAT scan. Americans are fascinated with technology in all aspects of our lives, and expect it to be used and applied whether it is needed or not. When it comes to health, they demand the use of technology, including the prescription of drugs to treat what ails them. Patients view technology as "scientific intervention." Patients feel it is their right to be treated with the latest technological breakthrough, even though other, non-technical procedures would be just as effective ($_2$). These authors go on to argue that today's mindset is that newer is better, and doing more is better than doing less.

Out of a fear of committing errors and an increasingly apprehension about trusting their own abilities, physicians chose to put faith in the technologies patients demand rather than in themselves. They do this to avoid malpractice suits, which have perpetuated this "total reliance on machine-generated information" ($_3$). As many are aware, there has been an increase in malpractice suits against physicians who allegedly failed to use all available technologies to treat their patients. Out of this situation has emerged a term, "defensive medicine," which refers to the use of more tests and procedures than necessary to avoid litigation. A physician's uncertainty and fear of missing something helps to encourage this reaction and was initially supported by a survey conducted as far back as 1972, in which it was found that of 16,000 surgeons, more than half admitted to ordering more tests than necessary to avoid suits. A later survey conducted in 1977 supported this finding, revealing that three-quarters of 111 physicians reported ordering unnecessary tests to avoid suit ($_5$). Since then, there have been other studies focused on the increasing reliance on the use of medical technologies throughout the 20 th century (lab tests and X-rays in particular). Most have been found to be unnecessary and excessive ($_5$). Reiser continues that being a physician means more about choosing tests and specialists, and less about the "intellectual act of using facts to deduce conclusions." Despite the fact that several of these surveys were conducted more than 20 years ago, one would have a difficult time arguing that this practice does not continue today since our infatuation with technology has grown worse rather than better.

In the not so distant past, malpractice was thought of as an ethical problem of negligence, callousness, or incompetence. Thanks to our reverence for today's technology and our belief in its accuracy and infallibility, malpractice is now viewed as a technical problem of "random human error," "system breakdown," "lack of specialized equipment" ($_7$). And, as might be expected, the ever-vilified insurance companies are to also take some of the blame as well. Reimbursements for medical care are based on what is done, not how much time is spent with the patient talking, questioning, and intellectually diagnosing their condition. The physician is then caught between the proverbial "rock and a hard place," between the expectations of their patients and the demands of the insurance agencies.

BETTER MEDICINE?

The question remains; does technology lead to better medicine? The answer is a simple; Yes and No. The answer is Yes if one can look at all the wonderful and amazing things that can be done with technology (diagnoses, procedures, minimized pain, outpatient surgeries, etc.). On the other hand, the answer is No if one considers the many needless procedures done because they can be done or those procedures that can potentially lead to other problems (i.e. X-rays and other iatrogenics, treatment induced illnesses).

Technology not only distances the physician from the patient, but also distances the physician from himself, his personal history, and the history of his profession. Ultimately, the physician is desensitized by the technology and the test results become a proxy for the patient, thus shifting the intentions and decisions from physician/patient to physician/machine ($_2$). Ironically, physicians do not often know how the tests they order are performed or what processes go into analyzing the test data; nor do they understand the variables that could potentially affect the outcome of the tests results. Therefore, physicians do not have the ability to intelligently interpret and apply the findings of the tests in caring for their patients ($_5$). According to Dr. George Pickering, Regius Professor of Medicine at Oxford, "To rely on data, the nature of which one does not

understand, is the first step in losing intellectual honesty" ([8]). It is imperative that if the physician is going to be honest with his patients, himself, and his profession, he must either take it upon himself to better understand the data or choose not to have the data collected in the first place.

The practice of medicine was once considered an art. According to Voltaire, "The art of medicine consists in amusing the patient while Nature cures the disease." For most, it involved the art of selecting appropriate actions from a wide spectrum of possibilities, one of the greatest skills in the practice of medicine. As physicians are less willing and able to make decisions for themselves, this art is being lost. And, as an initial result of the overemphasis of medical schools on the use of technology and their de-emphasis and even neglect of the "art of medicine," medical students are quickly learning that "state of the art" refers to the latest and greatest technologies and has nothing to do with the art of medicine. They learn that "technology pays" through grants, promotions, tenure, power, and prestige ([2]).

Medical technology is a double-edged sword. On one hand, it can help physicians better understand and treat disease. On the other hand, it erodes a physician's confidence in his or her own professional judgment. When a physician begins to mistrust his own non-technical, diagnostic abilities, he reduces himself to an intermediary between the patient and the laboratory technicians and their machines ([5]). It is doubtful that any physician wants to do this to himself or his profession. It is important to note that this criticism of medical technology does not imply a criticism of medicine in general. Physicians can still be pro-medicine but position themselves against the way medicine is practiced today. It is vital that physicians remember the impact that their presence, their touch, and caring approach can have on patients. According to Dr. Colin Phoon, a pediatric cardiologist at the New York University School of Medicine, "Touch, we seem at risk of forgetting, is a basic part of the healing process, a fundamental expression of caring. Yes, an echocardiogram is technically better than a stethoscope for examining the heart, and an automatic blood-pressure cuff can take as good a reading as a nurse. But you don't need a Ph.D. or a degree in psychology to realize we would all lose something very important if we cut human beings out of the healing loop" ([9]). Dr. Robert J. Weiss of Columbia University supports this view stating, "For a profession which considers itself scientific, we have approached in a most unscientific fashion the issue of the appropriate use of technology and treatment... Not only have we not been scientific, we have not been humanitarian" ([10]). It is on this note that physicians should look at becoming what Postman refers to as "loving resistance fighters" ([3]).

ON BECOMING LOVING RESISTANCE FIGHTERS

There is nothing neutral about technology. For every intended benefit, there can be identified an unintended harm. Postman ([3]) argues that technology creates it's own imperatives and subsequently, a social system to reinforce these imperatives. When it comes to medical technology, technology changes medicine by redefining physicians, redirecting their focus, and reconceptualizing how they view their patients and illness. In essence, physicians don't use technology to do what they do. Rather, they are "used" by technology ([3]) to do its bidding.

Fortunately, physicians do not have to allow themselves to be servants to technology's reign. While considered somewhat radical by some, there are ways in which physicians can respond to the control of technology. First of all, they can combat technology by considering what individuals can do irrespective of the pro-technology culture in which we all live. In other words, they must go against the grain by questioning, and in some cases, rejecting technology. Do not use technology because culture forces you to use it. Be conscious about what technologies are used; remember that we are the masters of technology and should use it appropriately as the tool that it is. Second, physicians can also combat technology by considering what culture can do irrespective of what individuals do. Keep it in your hearts and minds that things don't have to be this way; they weren't always this way, and they will eventually change, despite how immersed in and obsessed with technology those around us may be. Culture is not simply a reflection of what the masses believe and value at a given time. Rather, it is product and process of communication as well as ongoing interaction and group consensus. Through the process of interaction, culture is formed, shaped, and changed on a daily basis. Culture grows out of the sharing of perspectives, the expectations that individuals have for certain perspectives, and the confirmation and support of these perspectives by interacting with one another in expected ways ([11]). By taking an alternative perspective on technology, physicians can begin to change the culture of today into the culture of tomorrow.

The charge is for physicians to become "loving resistance fighters." By "loving," they are to "keep in their hearts the

narratives and symbols that made America great and the hope of the world" ([3]). By "resistance fighter," Postman charges them to remember that "technology must never be considered part of the 'natural order' of things and that every technology is the product of the economy or politics and has a program, agenda, and a philosophy, and must therefore be scrutinized, criticized, and controlled. Maintain an epistemological and psychic distance so technology never seems natural and is always strange."

Reiser ([5]) supports Postman's position in stating, [The physician] "can use his strongest weapon – a refusal to accept bondage to any one technique, no matter how useful it may be in a particular instance. He must regard them all with detachment, as mere tools, to be chosen as necessary for a particular task. He must accept the patient as a human being, and regain and reassert his faith in his own medical judgment."

Some physicians may be persuaded to reflect on their practice and profession, and be encouraged to consider ways in which they can comfortably become one of Postman's "loving resistance fighters." For some, this may simply mean asking questions about technology. For others, this resistance may manifest itself in more extreme ways. Regardless of the response, physicians must know that is a difficult responsibility to take on, but one that will pay off over time for themselves, the medical profession, and for the American culture. Consider this final quote from Dr. Jacob Needleman ([6]), a statement on science and technology he intended for an audience of physicians who might have been on the verge of becoming loving resistance fighters of technology:

It was not science you believed in, it was man. But today it is science you believe in and science, great as it is when it is good, is less than man, far less. When science was new to you, you believed in using it – but you were so very careful about it...

But now science is no longer new for you. You no longer put it to the test when you act. More important, it no longer puts you to the test. It has swallowed your mind. There is no longer a creative struggle in you between your own intuition and the whole of science.

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