Bridges to Our Future

At the height of the Great Depression, the Golden Gate Bridge was built despite widespread opposition. This engineering feat was made possible by the drive and perseverance of a multidisciplinary group of engineers, bankers, and visionaries. The discipline of hand surgery—now fully established as a distinct medical specialty—must address the practical and ethical implications of exponential growth in technology that the dawning 21st century has brought with it. The challenges of dealing with the potential implications of this exploding technology are real and immediate. How we deal with the resultant diagnostic modalities, the surgical and nonsurgical treatments in the presence of finite resources, the conflict of interest policies, the role of advertising and anecdotal input, and the multiple regulatory agencies and often-conflicting "guidelines" will ultimately be our legacy.

THE BRIDGE

On August 18, 1869, Joshua Norton publicly called for the construction of a bridge across San Francisco Bay. Designed to connect the northern tip of the San Francisco peninsula to Marin County, the bridge would provide an alternative to the ferry. The project was met with widespread opposition. It would be too costly, too risky, too environmentally harmful, too disruptive, too unsafe, and an ungainly presence over the bay opening. The newspapers questioned the financing, and asked if this project would be a "boon or a burden" to the city of San Francisco. For years, the debate raged. Finally, on August 11, 1930, the War Department approved the construction of a 4200-ft main span with vertical clearances of 220 ft in mid-span and 210 ft at the side span. Although a $35 million bond issue was approved on November 4, 1930, the bonds remained unsold until Amadeo Peter Giannini, chairman of the Bank of America, agreed to finance the project. The stock market crash of 1929 and the ensuing recession/depression delayed the start of construction until 1933. In November of that year, the first 745-ft tower was initiated on the Marin County shoreline. When both towers were completed in June 1935, catwalks were built and cables were placed. The road work was initiated in June 1936, and the bridge was completed in 1937.

The existence of the bridge is, in no small part, due to the persistence and vision of Joseph B. Strauss, the chief engineer. His political acumen, as well as his orchestration of the cadre of specialized engineers—including Charles Ellis, professor of structural bridge design at the University of Illinois, and Leon Moisseiff, an engineer—were crucial aspects of the endeavor.

SIMILARITIES BETWEEN 1933 AND 2009

The global situation in 1933 resembles that in 2009 in several substantial ways. A stock market crash and the resultant economic depression affected the entire world. In 1933, at the height of the Great Depression, unemployment was 16.3% (adjusted to 24.9%) in the United States. Eight million (of 122 million) were without jobs, and one in 4 of the estimated 76 million people of voting age who wanted to work were unable to find employment. The precipitous stock market crash that initiated with Black Friday reached

its nadir in 1933, after suffering an 89% decline. From 1929 until 1933, the US gross domestic product (GDP) fell from $103.6 billion to $56.4 billion.

In contrast, the US GDP was $14.3 trillion in 2008. In May 2009, employment was 9.4% (adjusted to 15.9%). From October 2007 to February 2009, the Dow Jones 100 fell almost 7000 points. World markets followed suit. If this analogy to the 1929 depression holds true, the worst may be over, but additional recovery is necessary.

A rise in crime and terrorism, a fear about what the future would hold, and military challenges also defined the years immediately following the crash of 1929. This was the era of bank robbers: Bonnie and Clyde, Babyface Nelson, Pretty Boy Floyd, John Dillinger, and the Barker/Karpis Gang. Finally, after the Kansas Massacre in June 1933, in which 2 law enforcement agents were murdered, J. Edgar Hoover declared a "War on Crime," and the modern Federal Bureau of Investigation emerged as a national police force. Although the precipitating event is vastly different, the present-day impact is similar. The "War on Terror" arose from the horrific events of September 11, 2001, gained popular support, and led to the creation of the Office of Homeland Security as a national police agency.

THE EFFECT OF DEPRESSION/RECESSION ON HEALTH CARE

Health care reform and the resistance to the changes that accompany decreased available capital are not new. Hard economic times magnify the impact of health care needs. The roots of Social Security and Medicare were in the original proposal of Franklin D. Roosevelt's New Deal philosophy and were contained in his statement at the Conference on Economic Security on November 14, 1934, when he said, "whether we come to this form of insurance sooner or later on, I am confident that we can devise a system which will enhance and not hinder the remarkable progress which has been made and is made in practice of the professions of medicine and surgery in the United States." The scientific world was dealing with institutional divisions over "scientific" methodology and advances, and unrest existed in the medical community because of the likelihood of "reform" and the resultant impact on health care delivery.

The Social Security Act was signed in August 1935, with the first payee receiving a lump sum of $0.17 (after $0.05 withholding tax). The first monthly payments were begun in 1940. The first recipient was Ida Mae Fuller of Ludlow, VT. From 1937 to 1939, she paid a total $24.75 in social security taxes. Her first check was for $22.54. She lived to be 100 years old and collected a total of $22,880.92.

Although no national health care program emerged during the New Deal, the prospect had a major impact. Major opposition from the American Medical Association delayed the passage of Medicare for almost 30 years. In the *Journal of the American Medical Association*, volume 100 (1933), criticism of the 1932 health plan, "Health Preservation Foundation of Los Angeles," included concerns that the plan would lead to "division of physicians," "unfair competition," "creation of divisions within medicine," and the fear that civic, charitable, social, business, and industry groups would use "pressure and advertising." These reactions are similar to the opposition to the Golden Gate Bridge and not dissimilar to concerns over current health care legislation.

When Medicare was finally enacted in 1965 and signed into law by President Lyndon Johnson, the chief concerns were funding and rationing of

care. However, it was balanced by the recognition that retiring 65-year-olds are replaced by younger workers. There were also concerns about gender discrimination, minorities, and agricultural workers.

MEDICAL ADVANCES AND TECHNOLOGY

Medical advances in 1933 were limited. An emphasis on public health and the management of epidemics, malaria, and tuberculosis were at the forefront. The development and distribution of vaccines for pertussis, yellow fever, and tetanus were major advances, and improvements in anesthesia and antisepsis stimulated surgical advances.

In contrast, 21st century medicine is distinguished by almost overwhelming technology. The identification of the human genome, the development and manipulation of pluripotential cells, nanotechnology, modern biomaterials, and regenerative medicine are all exciting and daunting. Constraints to delivery of these new technologies include cost, prejudice, fear (by providers, patients, and society), distribution problems, government regulations, political infighting, corporate policy, intellectual property considerations, and potential liability. These new technologies are not without a price tag: The total cost of health care in 2009 is estimated to approach $2.5 trillion. This represents 17.6% of the US GDP. Unfettered use of our current diagnostic techniques, drugs, and surgical techniques could expend the entire GDP. Therefore, how we most appropriately use these advances and reconcile them with ethical and political considerations in the presence of finite resources is the dilemma we face.

RATIONING HEALTH CARE

How do we ethically and morally provide these unparalleled advances in diagnosis and treatment to the 80 million people in the US who either do not receive available services or are unduly burdened by its cost? Providing care to the sick or injured is a moral prerogative. Failure to use the currently available knowledge and technology permits preventable pain, suffering, and death. And yet, at our current rate of health care expenditure, it is estimated that, in 26 years, one-third of the US GDP will be used for health care.

Currently, health care is indirectly rationed by (1) price, (2) convenience, (3) life choice demands or trade-offs, and (4) the distribution of providers and facilities. Private insurance is purchased either by individuals or groups or through employee-financed plans. The latter, tax-deductible plans are subsidized by approximately $200 billion per year. Most plans have some form of stratified service, either by price or by co-pay amount. Government and state plans (Medicare/Medicaid) are controlled (rationed) by waiting times, waiting lists, co-pay amounts, rigid coverage amounts, caps on use (eg, hand therapy), and low provider pay with resultant de facto rationing. Patients with no insurance must seek help in over-crowded emergency rooms or free clinics.

Whether the allocation of care is deliberate or not, it is clear that several factors contribute to the services provided. Joseph Doyle, professor of economics at the Massachusetts Institute of Technology, evaluated emergency care in Wisconsin after severe automobile accidents. Those patients without insurance received an estimated 20% “less care” and had a death rate that was 30% higher than that of those with insurance. There are 45 to 50 million uninsured in the United States.

LIFE-CHOICE DEMANDS

A woman dies after a hypertensive cerebral vascular accident because she chose to buy food for her children instead of buying her medicine. Although this is extreme, patients and families make decisions daily and forego prescriptions, doctor visits, and other medical care because of cost. It is estimated that 43% of patients with "good insurance" do not follow a doctor's advice because the direct cost of the recommended service or the opportunity loss (eg, a day's work) is excessive. For patients with no or poor insurance (54%) the statistics are even worse. These decisions have other consequences, many of them disastrous: 60% of bankruptcies in the United States are related directly or indirectly to "illness." In stark contrast, only 13% of people in the United Kingdom forego the recommended treatments.

DETERMINING VALUE

Determining a value for health care services requires a complex methodology that might not be ethically sustainable or might be politically problematic. According to Talmudic doctrine, "to save one life is tantamount to saving the whole world" (Talmud, Sanhedrin, 37). This principle contains 2 basic concepts:

1. Every individual life has absolute, not relative, value.
2. There is a difference between action and inaction, and it is important to "do everything in our power to preserve and prolong life, regardless of its so-called quality."

However, it is appropriate to do what is best, taking into account the probability of risk, benefit, and cost.

Peter Singer, an economist, asks how much "public health insurance should pay for a treatment that would extend a patient's life for one year?" Is there an amount that insurance should pay to extend a life for a year? Now change "a life" to "your life." Is the answer different? In Great Britain, the National Health Service's advisory arm recommends that amount to be £30,000, or $50,000. The Department of Transportation will change highway safety standards to save lives at $5 million per life. A proposal to add seat belts to school buses was dropped when analysis suggested that the cost would be $40 million per life saved. It is estimated that the enforcement of the Occupational Health and Safety Administration standards for ammonia use cost over $1 billion per life saved—surely, this is extreme.

The risk of treatment and its side effects are crucial: Would you want a year of painful, nonfunctional extension of your life? Now assume that you can save either an 85-year-old or a child. Is there a difference? Saving the life of one teenager is equivalent to saving the lives of how many 85-year-olds? Is treating one and not the other an action or an inaction?

What about the quality of those lives? Suppose they are mentally and physically challenged? What about improved quality of life: How much is a good night's sleep worth? What about chronic pain? And who decides?

"Declare the past, diagnose the present, foretell the future; practice these acts. As to diseases, make a habit of two things—to help, or at least to do no harm," as noted in the writings of Hippocrates (not in the oath).

New and more expensive technology is neither always appropriate nor necessarily effective. How many ads for "free mobility devices" are aired daily? Why are magnetic resonance images ordered by providers who cannot use the diagnostic information obtained? How many patients have a mag-

netic resonance image before being properly examined? How much is spent from fear of diagnostic delay or from the economic benefit of the ordered services?

The hidden cost of health care is extraordinary. In 1996, we analyzed North Carolina Medicaid expenditures for cerebral palsy. Our patients used, on average, 10.6 therapy visits (occupational, physical, and speech therapy) per month—90% through school therapy, early intervention programs, and mental health programs that were not reflected in Medicaid expenditures. If the cost for these services had been "billed back" to Medicaid as required, it would have bankrupted the entire program. Our patients now receive less than 50% of those services, with no appreciable change in outcomes. Some health care plans limit therapy to 26 visits a year. The entire quota is often used (even if not necessary) for some, and others need more than 26. No plan requires "outcome-based feedback" for cessation or continuation. Home programs, initiated and overseen by therapists, are cost-effective and efficacious.

EVIDENCE-BASED MEDICINE

But what is in our power? Is new and more expensive any better? Who decides, and how? If we look back across the bridge of time, none of these problems are new. The *Journal of the American Medical Association* editorials from 1933 are startlingly similar and reflect the same concerns that we have today.

We need to treat one patient at a time, with all our skill and imagination, but because we have so many options, we need to fall back on the art of medicine until the science catches up. We can examine patients and order or prescribe only what is reasonable or prudent. The world cannot afford defensive medicine for its own sake. We must be politically active in order to protect our patients and defend the value of expertise and training. We must participate in the collection of data and the development of guidelines, and we must recognize that those guidelines are fluid and dynamic documents that must be allowed to evolve.

There are untold bridges to cross and more to build. The situation looked dismal in 1933, but the world survived, as will we. And we are fortunate to have the opportunity to help others and leave the world a better place.

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doi:10.1016/j.jhsa.2010.01.008