Chapter 2
How Has the US Health System Evolved?

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Keywords 20th century healthcare • Scientific medicine • Knowledge • Research • Quality chasm • Chronic disease • Effective care • Training

Toto, I've a feeling we're not in Kansas anymore (Dorothy, in the Wizard of Oz).
In 1992, I volunteered to attend a seminar at the Institute of Healthcare Improvement in Boston that introduced me to health system redesign and to Dr. Don Berwick. He asked the 40 or so physicians assembled from across the United States to consider this situation: "You ordered a urinalysis on a patient and came back to the hospital floor later that day to check the result. It wasn't in the chart, so you asked the ward clerk what happened. She said, 'The lab courier picked up the sample this morning. I'll call the lab.'" Back to Dr. Berwick: "What did she tell you the lab said?" The class responded in unison, "They lost the sample." His teaching point was that the problems and errors in any complex system usually happen at the handoffs."

J. Timothy Harrington

Look at that old photograph.
Is it really you
Smiling like a baby full of dreams?
Smiling ain't so easy now,
Some are coming true.
Nothing's simple as it seems.

Kris Kristofferson, This Old Road, C & P 2006, New West Records, Los Angeles, CA (Fig. 2.1 and Fig. 2.2)

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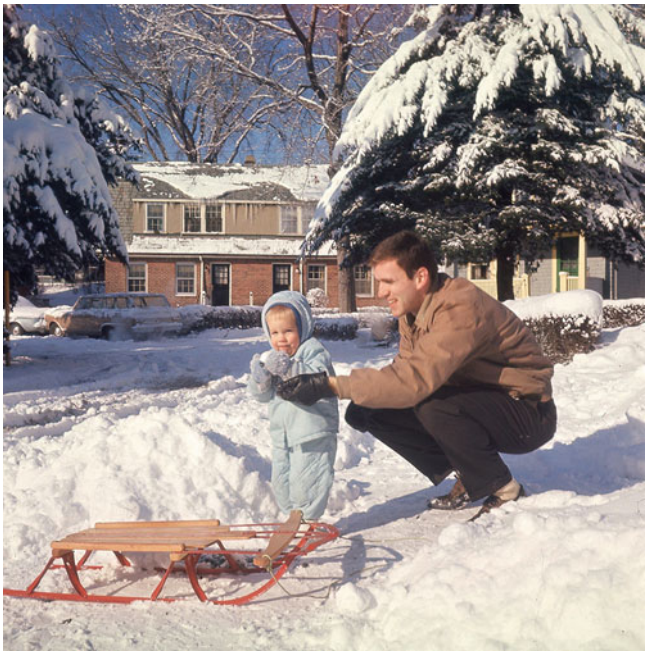

Fig. 2.1 Boston, 1966. Tim Harrington, Medical House Officer with Mark at 18 months

Fig. 2.2 Portland, Oregon, 2010. Mark Harrington, Hospitalist with Ursula, Amelia, Dante, and Mojo

What Was It Like in the "Good Old Days"?

Our understanding of chronic diseases began to change at the dawn of the twentieth century and accelerated in the 1950s. Previously, individual physicians usually provided a diagnosis to explain the patient's symptoms and an estimate of future problems and life expectancy – a prognosis. Diagnostic tests and treatments were limited by today's standards. Patients expected little more from their physicians because this was the way it had always been, and the brighter future of more effective medicine was largely unrecognized. A physician's esteem was derived from his "bedside manner," wisdom, and the acuity of his diagnostic skills. I tell my patients that I have several well-controlled chronic diseases that my grandparents suffered with and died from when they were younger than my present age.

This was the reality when I entered medical school in 1961. Dr. Ben Lawton (Fig. 2.3), a noted Wisconsin surgeon of that era, was fond of saying, "Give me morphine, foxglove (digitalis), and a knife, and I'll do everything for my patient that can be done." The internal medicine specialist of that era worked as an individual with his – rarely her – individual patients, offering diagnosis, prognosis, and comfort. A carefully performed history and physical exam was the tool of the trade that provided clues to the inner workings of the human body, often confirmed or refuted only by postmortem examination. William Osler, the renowned Johns Hopkins

Fig. 2.3 Doctor Ben Lawton (1923–1987). Thoracic surgeon, teacher, founding member of the Marshfield Clinic, Marshfield, WI, and member of the University of Wisconsin Board of Regents

physician, voiced his immortal aphorism in 1898: “Listen to the patient. He’s telling you the diagnosis.” Medicines and their uses were crude by today’s standards. Low potency diuretics, insulin, thyroid pills, and early antibiotics were available, but the stalwart arsenal of today’s options did not exist.

Hospitalizations were longer, and in-patient treatments more often than not were limited to nursing care, rest, nutrition, and physical therapy. Patients in heart failure with lungs full of fluid were treated with positive pressure breathing masks and rotating tourniquets to relieve the congestion, we thought. We only had primitive mercurial diuretics to remove their excess fluid. Tubes were placed under the skin in their lower legs to drain edema. Arthritis patients were consigned to weeks of bed rest in hospitals and sanatoria. There, warm water therapy and even hay heated in ovens were applied in a futile attempt to tame the inflammation destroying their joints, and to ease their suffering. Surgery was the answer for many problems that are treated medically today, ulcer disease being one example. The risks of anesthesia and surgery were higher, making this a last resort in many cases. Patients suffered more and died sooner from diseases that can now be held in check or cured – diabetes, rheumatoid arthritis, heart disease, stroke, asthma, and even many cancers.

These were the realities we faced as student doctors then. We could not have imagined the changes we would witness during our professional lifetimes. Many of the “truths” we were taught were based more on our teachers’ individual experiences at the bedside and less on formal research. Eminent clinician teachers like William Osler, McGee Harvey, Paul Dudley White, William Middleton, and Walter Bauer became legends. Their seminal clinical observations suggested the basic and clinical research that informs today’s medical care. They were the examples of excellence presented to young physicians of my era.

Most 1950s physicians made a living through fee-for-service payments, based on either time spent or procedures performed. Many patients were without insurance and were often cared for with no expectation of payment. When their personal physicians could no longer afford to treat their complex problems, these “charity” patients were referred to public hospitals where physicians-in-training like my contemporaries and me picked up the baton. Measured against today’s standards, physicians lived modestly. Many physicians actually resisted Medicare when it came along in the 1960s, though its infusion of new revenues changed physicians’ earnings and patients’ access to care for the better.

The Emergence of Scientific Medicine

Changes that had been forecast by the isolation of insulin and control of malaria, among others, came more rapidly in the 1950s due to a tipping point in biomedical research. Previous research had emphasized descriptions of clinical symptoms, disease classifications, and studies of human physiology in health and disease. Then biochemistry, molecular biology, and molecular genetics emerged as new scientific disciplines, each contributing profound insights into the causes of diseases and

Table 2.1 Growth of NIH appropriation 1940–2010

Year	Dollars × 1,000
1940	707
1945	2,835
1950	52,714
1955	81,151
1960	399,380
1965	959,159
1970	1,061,007
1975	2,092,897
1980	3,428,435
1985	5,159,459
1990	7,576,352
1995	11,259,522
2000	17,820,577
2005	28,495,157
2010	31,008,788

Source: National Institutes of Health Office of Budget. http://officeofbudget.od.nih.gov/approp_hist.html. Accessed 15/04/11

novel approaches to their treatment. Previous funding of research from private sources – the Rockefeller and Carnegie Foundations as two examples – was increased dramatically by commitments from the National Institutes of Health and other federal agencies. This sustained investment by the American people continues today, supporting a robust system of medical schools and academic research centers [1] (Table 2.1).

My first awareness of this research tsunami came during a summer job in 1958 at the University of Wisconsin's McArdle Laboratories under Dr. Charles Heidelberger. He had synthesized 5FU, a drug that blocked cancer cell growth by mimicking one of the building blocks of DNA. 5FU became the first effective cancer chemotherapy and is still used today. His home was next door to mine, and he took an interest in me, becoming a mentor over the earlier years of my medical career. During one of my medical school assignments several years later, I found myself giving intravenous 5FU to patients enrolled in cancer research studies. This was my first personal appreciation of the vital connection between bench research and bedside patient care.

The explosion of new knowledge gleaned from biomedical research in the last 50 years is beyond comprehension, but a few additional examples will illustrate its impacts. Unraveling the cholesterol abnormalities that cause atherosclerosis has led to treatments that delay the onset of heart disease and stroke. Molecular biology disclosed how cells build their intricate structures, carry out their specialized functions, and communicate with one another. The genetic code was cracked. These discoveries led in turn to understanding many diseases that are caused by abnormal functioning of our cells and organs, and how they might be treated.

New chemistry methods enabled scientists to study the body's large molecules like proteins and fats, whether normal, or altered by abnormal genes or diseases.

Defining the mechanisms of tissue healing and inflammation led to new treatments for arthritis and many other inflammatory diseases, and to preventing rejection of organ transplants. The kidneys' roles in removing waste and balancing fluids and salts were defined, and understanding the failures of these processes in heart and kidney failure led to diuretics, kidney dialysis, and organ transplantation. Vaccines conquered polio and other childhood diseases that were frightening realities for children of my generation and our parents. New antibiotics cured many previously fatal infections. Fiberoptics bent light, allowing physicians to look into the many recesses of the body, and more recently, to perform minimally-invasive surgeries. An expanding array of laboratory and imaging tests produced more precise insights into the functioning and structure of the human body, reducing the emphasis on the physical exam for today's physicians, and on the autopsy for understanding what had gone so wrong for the deceased patient.

The Growing Awareness of the Quality Chasm

These thrilling discoveries and the possibilities they created distracted physicians from the growing evidence in health policy circles during the 1990s that all was not well with health care. In 1996, Vanessa Northington Gamble wrote in the Encyclopedia of the United States in the twentieth century, "A relatively uncomplicated system centered on the individual doctor-patient relationship evolved into a far more intricate one influenced by a myriad of institutions and participants … factors external to the practice of medicine have profoundly influenced its delivery" [2–4].

In 2001, the Institute of Medicine (IOM) sounded the alarm in a series of reports on the status of health care in the United States, describing an epidemic of avoidable errors, and a "Quality Chasm" that had grown between this profound new scientific knowledge and medical advances on the one hand, and the failure to deliver the best care dependably, efficiently, and safely on the other [5]. The Chasm Report focused on the chronic diseases, their costs, the delays in their diagnosis and treatment, and the frequent errors that often result in irreversible damage to the patient's body and life. The IOM experts defined the problem as a widespread inability of a health system, designed in simpler times, to deliver the best care at the lowest cost in an era of greater complexity. They advocated for fundamental system redesign.

To state it in a slightly different way, the traditional methods, values, and business practices could not cope with the growing options for diagnosis and treatment and technology. Physicians had specialized increasingly to do just that, to cope with it all, but their practices and health systems weren't organized around putting this knowledge to its best uses at the lowest possible costs. Moreover, research has become the highest priority for many medical school faculties – an end unto itself. The goal became to obtain grant funding to create new knowledge, which would in turn support winning more grants. Understanding and improving the delivery of this knowledge lagged behind – a lesser goal. In these environments, physicians-in-training may be steeped in data, but have not learned essential clinical process skills, or how to work in teams.

Table 2.2 United States Healthcare costs, resource use, and outcomes compared to other countries

	Per capita spending ($)	% GNP	Doctors/100,000	Life expectancy
United States	6,719	15.3	26	78
Canada	3,673	10	19	81
Germany	3,465	10.6	34	80
France	3,420	11	23	81
United Kingdom	2,815	8.2	23	80
Italy	2,631	9	37	82
Japan	2,581	8.1	21	83
Russia	698	5.3	43	66
Cuba	674	7.7	59	78
China	216	4.6	14	74

Source: World Health Organization, 2009. www.who.int/whosis/whostat/2009/en/index.htm. Accessed 15/04/11

So we find ourselves in a broken system where …

- Much care is duplicated or unnecessary.
- Insurance companies and many physicians are getting richer while …
- Vital medical care is delayed or omitted.
- The patients and the public are getting sicker and going broke.
- The costs of health care are increasing the national debt beyond redemption.

Our population's health is not what it should be, nor are we doing as well as many other countries, in spite of our far higher costs of care (Table 2.2).

The Distinction Between Being Knowledgeable and Being Effective

From a personal perspective, when I consider the differences between my medical training over 40 years ago and that of younger physicians who have joined my health system in recent years, three differences stand out. First, the dramatic increase in medical school tuition; they have paid 30-fold what I did to get my degree. Second, the imbalance between knowledge and process learning in today's medical schools. And third, the diminished role of experienced clinicians in physicians' training, in particular as related to teaching critical skills for outpatient chronic disease management. As a medical student, I spent considerable time shadowing experienced physicians to observe the nuances of their patient care and the satisfying relationships experienced by physician and patient. This approach is considered less relevant today. Trainees often work with patients alone and then have their work product reviewed by faculty. The same has occurred in nursing education. In my training years, most nurses attended hospital-based programs for 3 years, learning both in the classroom and at the bedside under the tutelage of experienced caregivers. Now they attend 4–5-year degree programs, know much more, but require postgraduate training to develop their hands-on clinical skills.

Table 2.3 Critical questions for clinical quality improvement

Why do it	Benefit for patients
What to do	Research and guidelines
How to do it	Planning, algorithms, PDSA
Who will do it	Defining provider roles and communication
Who will does it work	Tracking key indicators
Who will pay for it	???

We the editors have developed a list of essential questions that should be answered to organize effective health care within local and broader health systems (Table 2.3). Currently, the focus remains disproportionately on what care is best – "What to do?"

Understanding "what to do" is the product of research, and research has been compiled over the last generation into clinical guidelines for managing every chronic disease. So far so good; we have a fat package of necessary information making us smarter. But health care has not improved. That is because we are neglecting the other questions that would make all the difference in helping us to deliver this package to the patient and lead to effectiveness of care, better disease outcomes, and lower cost.

Answering these questions depends on clinical improvement methods more than scientific inquiry. The rest of our book will emphasize these approaches and describe their use.

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