Introduction

Most Americans operate under the assumption that, unlike most other first-world countries, the supply and distribution of health care in the United States is in private hands and that market forces play the principal role in determining the quantity and price of medical services. However, while this might have been true at the beginning of the twentieth century it is far from the case today. Indeed, even if one puts aside the sizeable number of laws and regulations governing the structure, qualifications, and powers of the medical profession, the sale and distribution of pharmaceuticals, and the conduct of hospitals, and considers only the proportion of dollar expenditures, more than 45 percent of all such disbursements were made by some political entity and of that amount over 70 percent were made by the federal government in 2001.¹

The extent of federal involvement in the American health care system is truly massive. Besides annual expenditures of over half a trillion dollars,² federal agencies provide some form of hospital and medical insurance to more than 83 000 000 Americans,³ operate a system of hospitals staffed by physicians, nurses, and technicians that treat a veteran population of almost half-a-million inpatients and 4.5 million outpatients, provide medical and hospital services for 1.6 million American Indians and Alaska natives, over 8 000 000 military personnel and mobilized reservists, together with their families and survivors, and over 166 000 federal prisoners. Indeed, despite its reputation as a center of free-market medicine, the United States has one of the largest socialized medical establishments in the world.

Of course this has not always been the case. Barely more than a hundred years ago the federal government played almost no role whatever in the nation's health care. The only agency charged with responsibility for some medical aspect of Americans was the Public Health Service. Founded in 1798 as the Marine Hospital Service (MHS) during the administration of John Adams, it was originally charged with the care of sick and disabled merchant seamen and for this purpose it established several facilities along the eastern seaboard. The expenses of these hospitals were originally defrayed by a 20 cent-per-month deduction, later raised to 40 cents-per-month, from the wages of American seamen. In 1878 the Service's responsibilities were expanded to include administering quarantines, previously exclusively in the hands of the various states, and in 1891 the MHS was given authority over the medical processing of immigrants. However, its primary function throughout the

century remained the care of sick and infirm seamen. It is perhaps worth noting that the costs of this service continued to be borne by either seamen themselves or by ship owners until 1906 and that general tax revenues were not used to underwrite the costs of government-administered medical care.

To the extent that government at some level was involved in the nation's medical institutions during the nineteenth century, these activities took place at the state level and were quite modest. Indeed, there was barely any intrusion whatever into medical practice until the last decades of the century. It was not until the last few years of the century that states began enacting legislation that effectively prevented physicians from practicing without a state license.⁴ While a formal medical education was not required to offer oneself as a medical practitioner, the nation possessed a substantial number of medical schools at which the prospective doctor could enroll. These were privately owned for-profit institutions whose course of study customarily extended to two terms of three or four months each. While this might appear inadequate to prepare a student for general practice, the fact is that the state of medical knowledge was, for a good part of the century, extremely primitive and had not yet been placed on a scientific foundation.

It was not until 1864 that Louis Pasteur formulated the germ theory of disease after having conducted a series of experiments showing that diseases were caused by micro-organisms that were not spontaneously generated from non-living matter.⁵ It was partially on the basis of Pasteur's work that in the following year Joseph Lister introduced the use of carbolic acid as an antiseptic in the treatment of wounds. Prior to this, physicians had no compunction about ministering to the wounded or performing operations immediately after having dealt with patients with infections. Both Pasteur and Lister were originally treated with hostility and resentment by most physicians, Pasteur, because he himself was not a physician but a chemist and microscopist and Lister, because it was thought inconceivable that doctors could actually contribute to the illness and death of patients. In particular, French medical practitioners totally neglected Lister's recommendations, with the result that during the Franco-Prussian War (1870–71) thousands of wounded French soldiers died for no reason other than having been infected by filthy doctors.

The derision with which physicians greeted Pasteur and Lister's discoveries was nothing new. Throughout the nineteenth century doctors had stubbornly resisted almost every breakthrough in the development of their discipline. Orthodox medicine for the first half of the century had adopted a course of treatment which they themselves dubbed 'heroic therapy', whose therapeutic arsenal was so toxic that it killed far more than it cured. Operating on the principle that symptomatic treatment was all that was required to bring about a cure, physicians engaged in aggressive bloodletting to reduce fevers, blistering to encourage the emission of harmful pus, and to administering

massive doses of emetics and purgatives to ‘cleanse the stomach and bowels’. The most popular of these was calomel (mercury chloride), used to purge the intestines, and tartar emetic (tartrate of antimony), to produce intense vomiting. Both were lethal poisons, the effects of which were cumulative, and led to a substantial number of deaths.⁶ Those who survived this treatment were then given large quantities of arsenic, which was thought to act as a tonic and improve appetite!

In response to such appalling treatment, several different approaches predicated on radically differing theories regarding the cause and treatment of disease developed. The earliest of these was known as eclecticism, developed by Samuel Thomson, a New England farmer and amateur botanist who, in 1813, patented a system of treatment that relied exclusively on botanical remedies, steam baths, and rest. Thomson repudiated heroic therapy in its entirety, referring to its medications as ‘instruments of death’ and provided an alternative therapy, although equally flawed in its theoretical analysis of the nature of disease, that was easily understood and that was far less harmful in its effects.⁷ His favorite botanicals were lobelia, which was employed as an expectorant and emetic and which is still administered by practitioners today, cayenne, which served as a stimulant and tonic, and bayberry, employed as an astringent and stimulant. None was nearly as dangerous in moderate doses as were the mineral poisons associated with heroic therapy and all three still hold places in the modern medical armamentarium. Probably the most significant contribution eclecticism was to make to general practice was the benefit of rest to the patient’s recovery, which had been effectively neglected by most orthodox practitioners. Because of its comparatively benign therapy, eclecticism became extremely popular and made serious inroads into orthodox practice.

A far greater threat to medical orthodoxy was homeopathy, the creation of Samuel Hahnemann, a German physician who had undergone a formal, rigorous medical education. Hahnemann’s researches had led him to conclude that the most efficacious remedy for an ailment consisted in the administration of a drug that, when tested in a healthy person, most closely replicated the symptoms of the disease. This law, *similia similibus curantur*, formed the foundation of homeopathic therapeutics. Hahnemann had also developed a somewhat bizarre theory of optimal dosage which called for the administration of as attenuated an amount of medication as was possible, the more diluted, the better. Indeed, Hahnemann had recommended dilutions up to one-decillionth of a drop. While homeopathic medications might not have done much good, they certainly could have done no harm, a vast improvement over heroic therapy, or allopathic medicine as Hahnemann called it, which operated on the assumption that if it were shown that ten grains of some mineral poison were thought to improve the patient’s health, then 100 grains was likely to be ten times as effective.⁸ Equally important in Hahnemann’s theory of disease was

the prominent place given to the natural healing powers of the organism itself. Homeopathic physicians recommended fresh air, sunshine, bed rest, proper diet, and personal hygiene in an era when regular medicine regarded these as of little or no value. Certainly this aspect of homeopathy's therapeutic regimen accounted for its immediate and increasing popularity after its introduction in the United States in 1825.

Regular physicians reacted with alarm and hostility to the inroads made by eclectic and homeopathic doctors, both because their approach to illness was predicated on medical theories at radical variance from accepted practice and because of the competitive forces represented by physicians who had embraced them. Indeed, the American Medical Association (AMA), founded in 1847, had among its primary aims the introduction of effective licensing laws in the various states to reduce competition, especially the extremely effective competition posed by these heterodox sects. Yet despite the animus with which orthodox medicine regarded eclecticism and homeopathy, orthodox therapeutics was forced to abandon many of the more extreme recommendations of heroic therapy. By the 1870s homeopathy, emphasizing minute doses of medication and the recuperative energies of nature, and eclecticism, which relied on botanical and herbal remedies, had substantially altered regular medical therapeutics in the United States, lessening its dependence on huge doses of metallic medicines and bloodletting and adding to its *materia medica* a host of new botanical drugs. The two sects had firmly established themselves as competing systems of medicine, with homeopathy especially popular in the large urban areas of the east and eclecticism concentrated in the midwest and south. Of the 62 000 physicians practicing in 1870, estimates place the number of irregular practitioners at approximately 8000, with homeopaths accounting for two-thirds of this number.⁹ Despite a string of denunciations in regular medical journals and by regular medical societies that these irregular practitioners were quacks, pure and simple, both homeopathy and eclecticism continued to attract patients at the expense of orthodox medicine.

In the absence of constraining regulations, medical schools abounded. While most medical education at the beginning of the century was via apprenticeship with a practicing physician, the demand for larger numbers of graduates than could be thus accommodated led to the creation of a more formal educational structure, with classrooms, lectures, and degrees, to which was ostensibly added an apprenticeship period of a year or so. Medical schools, of course, reflected the appallingly low level of medical knowledge that marked most of the century. All were proprietary, requiring attendance at, at most, a brief two-year program for graduation. Entrants were not required to have a high school degree and were permitted to take whatever courses were required in any order they chose. A pass grade in a majority of them was sufficient to

receive a diploma. In 1871, when Harvard, under then President Charles Eliot, extended the academic year of its medical school from four months to nine, the length of training from two years to three, and compelled students to pass all their courses to graduate, they were the first school in the nation to impose such requirements. They were soon followed by some of the more academically oriented medical colleges, who in 1890 formed the Association of American Medical Colleges.¹⁰

It was not until 1910 that medical education was given its contemporary form with release of the Flexner Report, the name given a study sponsored by the Carnegie Foundation for the Advancement of Teaching entitled 'Medical Education in the United States and Canada'. The study's chairman was Abraham Flexner, a secondary school teacher and principal from Louisville, Kentucky, and the brother of Simon Flexner, onetime professor of pathology at the University of Pennsylvania and, from 1903, director of the Rockefeller Institute of Medical Research. Simon Flexner had been a firm adherent of stricter educational standards and was crucially influential in shaping his brother's views. Indeed, while Flexner's survey was ostensibly disinterested it was in fact undertaken at the behest of the AMA's Council on Medical Education, which, in 1908, had approached a receptive Carnegie Foundation to conduct the study on its behalf for the purpose of raising educational standards in medicine. The members of the Council, and particularly N. P. Colwell, Secretary of the AMA's Council, acted as advisors throughout and made substantial contributions to the Report's conclusions regarding each medical school and to the Report's general recommendations.

During his ten-month tour of inspection Flexner claimed to have visited and evaluated 156 graduate and twelve postgraduate medical schools in the United States and Canada. The Report was scathing in its indictment of the state of medical education in America.¹¹ Not only were the standards of admission and the education offered substantially below acceptable levels, but, Flexner insisted, all proprietary schools by virtue of being proprietary were totally unacceptable. By 1910 most states had introduced licensing laws that not only required that applicants sit an examination but that they also present evidence of having graduated from a medical school whose standards were at least those set by the licensing board.¹² Prior to the turn of the century the AMA had sought to raise educational standards by appealing to the medical schools themselves, but it soon became evident that this was hopeless inasmuch as the schools themselves were profit-making and therefore in competition with each other. It was only through legislative intervention and then only through the introduction of effective licensing laws in the various states that major reforms in the minimal educational level for practice were possible. Once licensing laws were established as the only portal of entry to the profession, it then became practicable to enforce whatever standards the state licensing board

wished by setting as a prerequisite of all applicants for licensure that they had graduated from an institution satisfying certain criteria.

The effect of the Report on medical education was no less than cataclysmic. Where, in 1906, the AMA reported that there were 162 medical schools from which 5214 students graduated, by 1920 this number had been reduced to 85 schools with 3047 graduates.¹³ It is true that this process had begun prior to release of the Report in 1910 but it was accelerated by the publicity the Carnegie study received and by the high costs associated with meeting Flexner's demands for clinical facilities, laboratories, and extensive libraries. The result was that a large number of schools were forced to merge and consolidate, and others to close. Particularly hard-hit were medical schools training heterodox practitioners, which tended to operate on tight budgets and whose students found it far more difficult to forego the opportunities to work that a shorter school-term allowed them. Indeed, one of the explicit goals of increasing the educational requirements for practice was to reduce competition from irregular physicians. Not only had allopathic doctors had to compete with homeopaths and eclectics throughout most of the nineteenth century, but they now found themselves having to contend with osteopaths and chiropractors as well.¹⁴ Structuring the requirements of a medical education so that it reflected orthodox theories of health and disease in order to meet licensing requirements gave regular practitioners a substantial competitive advantage.¹⁵

From the perspective of the twenty-first century, raising the educational requirements for medical practitioners appears perfectly reasonable. Following the Flexner Report all Class A medical schools¹⁶ instituted a year of college work as a prerequisite for admission and by 1918 this had been extended to two years. Medical schools were required to provide substantial laboratory facilities, whose use formed the core of a two or three-year curriculum comprising extensive clinical research. One effect of these reforms was that as the number of proprietary schools dwindled, more and more schools affiliated with universities, which in turn drew medical education away from private practice and more to medical research, at the cost, of course, of drastically reducing the number of schools and students.

While these reforms in medical education might strike the modern reader as consistent with improvements in the medical care offered the public, the facts proved otherwise. Under the comparatively free market in medical care that had prevailed in the United States during most of the nineteenth century, the quality of medical practice had gradually increased, both as a result of the emergence of competing sects and advances in medical therapeutics. The overall result was that by 1910 a good many physicians were actually in a position to be of some help to their patients, at the least by directing them to the effective painkillers then available. Unfortunately, it was just at this point that the AMA was able to severely curtail the number of practitioners. The

reduction in the number of physicians was substantial, with the ratio of physicians to population dropping from one to 630 in 1906 to about one to 800 in 1929. More important, the transformation of the nation's medical colleges into institutions that emphasized laboratory work served little purpose inasmuch as the level of medical knowledge was so limited. At the turn of the century medical treatment, in the main, consisted of administering one of several palliatives, all of which were available to the patient directly at any of dozens of shops. Indeed, were it not for alcohol, morphine, and cocaine, the most commonly prescribed medications and the effective ingredients of most proprietary remedies, doctors could offer little help to their patients. One physician, writing of his practice prior to World War I, described it in this way:

The usual procedure for a doctor when he reached the patient's house was to greet the grandmother and aunts effusively and pat all the kids on the head before approaching the bedside. He greeted the patient with a grave look and a pleasant joke. He felt the pulse and inspected the tongue, and asked where it hurt. This done, he was ready to deliver an opinion and prescribe his pet remedy.¹⁷

Even as late as the turn of the century most practitioners still distrusted the findings of the new science of bacteriology, refusing to accept the fact that invisible micro-organisms could bring about such massive, horrifying effects. The major cause of adult deaths during the late nineteenth century was tuberculosis,¹⁸ which also struck a large number of those dying from other causes. In 1882 Robert Koch succeeded in isolating the bacillus that was responsible for the disease. Most physicians, however, dismissed Koch's discovery of the tubercle bacillus, preferring to hold that tuberculosis was an hereditary ailment. Nor did they support public health measures that would have substantially reduced the disease's transmission. Fortunately the situation with respect to diphtheria was somewhat different. The bacillus responsible for this virulent disease had been uncovered in the 1880s and a serviceable antitoxin was developed by Emil von Behring and Shibasaburo Kitasato, working in Koch's laboratory, in 1894.¹⁹ While there was some professional resistance to use of the antitoxin, public interest was so great that the cities' public health departments became strong supporters of its use. As a result, physicians in almost all the nation's larger cities were compelled to administer the serum, with excellent results.²⁰

Other than diphtheria antitoxin, however, the physician's arsenal of effective medications at the turn of the century was extremely limited. The most important of these were digitalis, quinine, morphine, and aspirin. The medical uses of digitalis (foxglove) had been discovered in the eighteenth century but its use as a drug for strengthening the heart was not common until the mid-nineteenth century when it became an important part of the

materia medica of eclectic physicians and when it came into general use by orthodox practitioners. Quinine, from cinchona bark, had been known since the seventeenth century and was in common use, especially in cases of malaria. Certainly the most impressive addition to the list of medications available to the physician in the nineteenth century was aspirin, which made its appearance in the last days of the century. A nonnarcotic, aspirin was found to have wide-ranging analgesic properties and soon was regularly prescribed for fevers, pains, and inflammations. Its properties were discovered by Felix Hoffmann, a chemist with Bayer AG in 1897 and patented by the firm in March 1899.

The area of medicine that experienced the most dramatic change over the course of the nineteenth century was surgery. One historian notes that ‘thanks to bold individuals and some epochal innovations, surgery changed more in the nineteenth century than in the previous two thousand years’.²¹ Despite this the modern reader would be shocked at how primitive in most other respects surgery remained. However, two important advances took place between 1840 and 1880 that revolutionized surgical interventions. The first of these was the introduction of anesthesia, which occurred in the 1840s when the anesthetic properties of nitrous oxide and ether were discovered in the United States. However, ether’s side-effects, irritation of the lungs and nausea, encouraged the search for a substitute and led to chloroform being employed to relieve labor pains in a pregnant woman in Edinburgh in 1847.²² While the use of anesthetics was an enormous boon to patients, who were now spared the excruciating agony of being operated on while fully conscious, surgery was still extremely dangerous and fatality rates were staggeringly high.²³

These death rates were largely a result of septicaemia, which was not eliminated until the introduction of antiseptics by Joseph Lister, who used carbolic acid to wash his hands and to bathe the wound. In 1867 he reported his procedure in the *Lancet*, Britain’s leading medical publication, but most of the surgical profession were incredulous and it was not until the first decades of the twentieth century that asepsis became universal. Even after physicians began to adopt carbolic washes prior to surgery, operating rooms remained quite dangerous places. One physician, writing of the last decade of the century, described them in this way:

The surgeon arrived and threw off his jacket to avoid getting blood or pus on it. He rolled up his shirt-sleeves and in the corridor to the operating room, took an ancient frock from a cupboard; it bore signs of a chequered past and was utterly stiff with old blood. One of these coats was worn with special pride, indeed joy, as it had belonged to a retired member of the staff. The cuffs were rolled up to only just above the wrists, and the hands were washed in a sink. Once clean (by conventional standards), they were rinsed in carbolic-acid solution.²⁴

Anesthesia and asepsis radically altered surgery but their full benefits did not emerge until the twentieth century, when the modern sterile and gleaming operating rooms became standard. Prior to that surgeons would penetrate the major body cavities only as a last resort. Indeed, septicaemia was so common that being sent to the hospital often constituted a sentence of death. However, by the start of the new century doctors began exploring the abdomen, chest, and skull, and obstetricians were prepared to perform caesarian sections, which earlier had been undertaken only in the direst emergencies.

While some of these surgical interventions took place in hospitals, most did not. Prior to the twentieth century there were few special advantages to performing surgery in a hospital rather than at home. Indeed, during most of the century the incidence of iatrogenic, that is, medically induced, infections in hospital wards was so high that a substantial proportion of physicians refused to send their patients there.²⁵ Instead, the kitchen in private homes served as a temporary operating room and continued to do so until the older charitable hospitals, most of which were filthy, squalid structures with inadequate ventilation, were replaced by more modern structures.²⁶ So long as the surgeon did not require a wide range of specialized equipment and so long as the household kitchen supplied most of what the physician needed, operations continued to be performed at home. However, this changed by the beginning of the twentieth century when small urban apartments became more common and more modern hospitals were constructed.

Hospitals had their origin in homes for those patients, mostly indigent, whose circumstances ruled out family care. Their costs were underwritten by the wealthy and whatever medical care was available was donated by local physicians. It appears that a good deal of prestige attached to those practitioners who were associated with a hospital, largely because hospitals were used as educational centers for future doctors. The result was that physicians vied for the privilege of associating their name with these institutions.²⁷ However, the establishment of more hospitals, despite their charitable nature, did not win universal support since, in the minds of many, they were for so many decades associated with pain and death. Towards the end of the century public attitudes changed as hospitals took on a more modern appearance and reflected a concern for cleanliness and good ventilation. Not only did the introduction of antiseptic surgery play a crucial role in this change but so did the emergence of a dedicated, trained nursing profession. At the same time, a series of technological innovations placed at the disposal of the diagnostician and surgeon equipment that permitted them to monitor the body. In 1895 X-rays were discovered and in 1900 the electrocardiograph was first employed.

Anesthesia, antisepsis, the introduction of specialized diagnostic and surgical equipment, the presence of a trained nursing staff, all contributed to the transformation of the hospital from the charitable almshouse for the indigent

sick of the nineteenth century to its twentieth-century counterpart. Unlike the other changes that were to revolutionize medical services, almost all these modifications were in place by the last decade of the nineteenth century. The number of hospitals is indicative of their reception by the public. In 1874 there were only 149 hospitals operating in the United States, each averaging 25 beds, or a total of approximately 3725 beds. By 1906 the number of hospitals had increased to 2411 and by 1927 had reached 6807, with a total of over 895 000 beds.²⁸ Over the next 50 years the number of hospitals remained fairly constant, reaching 6955 in 1980, and then declined to 5900, with 987 000 beds, in 2001.

The sophistication of modern biotechnology is reflected in the staggering increase in hospital costs between 1940, when a private hospital room averaged \$7.00 per day²⁹ (about \$88.00 in current dollars), to the present, when it varies between \$1200.00 and \$1800.00 a day. In addition, patients were, and continue to be, charged for the use of specialized diagnostic and intensive care equipment. While in 1940 a simple appendectomy cost \$188.00 (\$2367.00 in 2001 dollars), today hospitals charge about \$20 000.00 for a similar operation. However, a good percentage of the procedures currently undertaken did not exist 65 years ago, the most spectacular of which are the transplantation of organs. The charges for these procedures are equally dramatic. The average heart transplant costs \$150 000.00, while the price for an average liver transplant averages approximately \$250 000.00!

While the hospitals were undergoing transformation into the shape they take today, medical care in most other respects remained quite rudimentary. The chemotherapeutic revolution in medicine was not to occur until the 1920s. We would do well to remember that, prior to the turn of the century, beside immunization against rabies and smallpox³⁰ there were really only a handful of pharmaceuticals that could be said to be medically efficacious: digitalis, diphtheria antitoxin, aspirin, ether, morphine, and quinine. This is true despite the fact that mortality rates had been steadily dropping throughout the nineteenth and first quarter of the twentieth century. The reduction in the death rate, however, was a function – not of advances in medicine – but of improvements in nutrition and sanitation.³¹ Thomas McKeown, the pre-eminent historian of social medicine, has noted that:

With the exception of vaccination against smallpox, whose contribution was small, the influence of immunization and therapy on the death-rate was delayed until the twentieth century, and had little effect on national mortality trends before the introduction of sulphonamides in 1935. Since that time it has not been the only, or, probably, the most important influence.³²

The state of medicine at the turn of the twentieth century was thus one where the therapeutic abilities of physicians were extremely limited and where

the medical armamentarium available to practitioners was confined to a few effective medications. These were all available to the general population, whether prescribed by a physician or not, at a host of general stores and the few specialized pharmacies that were beginning to appear, both in unadulterated form or as constituent elements in a wide range of proprietary products. Pharmacists, like physicians, were for the most part unlicensed until state legislatures, under intense pressure from the state pharmaceutical societies, began enacting legislation licensing druggists in the last 15 years of the nineteenth century.³³ The sale and distribution of drugs, on the other hand, remained unregulated until after the turn of the century. There were no effective legal impediments to purchasing either cocaine or opiates – or their derivatives – throughout the country before the twentieth century.³⁴

The Progressive Era is the name given to the period that witnessed the enormous transformation that occurred in American social and economic life. Between 1885 and 1914 governments at all levels undertook the most extensive intrusion into the private affairs of citizens that has ever been attempted in the history of the nation. During this period both the states and the federal government enacted legislation touching on every facet of social behavior and created administrative agencies to direct, often in minute detail, how we were to act in particular situations. It was during this period that states passed laws licensing physicians and pharmacists, began to regulate the sale of certain drugs, and instituted a wide range of social hygiene measures aimed at eliminating physically or psychologically unhealthy behavior.³⁵ At the federal level this philosophy of government was wedded to the personal ambitions of President Theodore Roosevelt. Roosevelt and his supporters envisioned an America in which the government, acting in the public interest, would direct a wide range of our actions.

In the area of public health, this ideological shift from the primacy of individual rights to an aggressive concern for social justice through government regulation led to the creation and enlargement at the federal level of several bureaus empowered with supervising various aspects of the nation's health. In 1902 the Marine Hospital Service changed its name to the Public Health and Marine Hospital Service to reflect the agency's greater role in overseeing federal health programs and ten years later it was shortened to the all-inclusive Public Health Service. Four years following the renaming of the Marine Hospital Service, in 1906, the administration of Theodore Roosevelt achieved one of its greatest legislative victories with passage of the Meat Inspection Act and the Pure Food and Drugs Act, which fixed certain standards for the purity of food and drugs, prohibited their distribution or sale if they were either adulterated or misbranded, and mandated that certain ingredients be shown on their labels. Responsibility for enforcing the Pure Food and Drugs Act was originally placed in the Bureau of Chemistry of the Department of Agriculture,

which in the 1930s became the Food and Drug Administration with plenary authority over which drugs could be sold and for which purposes.

The proliferation of federal programs dealing with the nation's health was interrupted by World War I but resumed in 1921 with the establishment of the Veterans' Bureau, which was empowered – among other benefits – to extend medical and hospital services to veterans who had been injured or incapacitated during the conflict. Some nine years later a division of the Public Health Service that had devoted itself to bacteriological research was elevated to the National Institute of Health (NIH). The NIH was authorized to conduct its own inquiries into biomedicine and to underwrite extramural research through fellowships and grants. The Institute's funding in its first year of operation as the NIH was \$43 000. This marked the advent of public funding of medical research and led to the truly phenomenal growth of the NIH, whose fiscal year (FY) 2004 budget is slightly less than \$28 billion.

The most recent extension of the national government into the area of health care occurred in 1965 and was some half a century in the making. In the decade and a half prior to the outbreak of World War I a number of European countries had enacted mandatory national health-insurance schemes. Their seeming success encouraged American reformers to agitate for similar legislation in Washington, with the aid of a number of high-ranking politicians, among them Theodore Roosevelt, who lent his support to the proposal in 1912. Despite repeated attempts over the next 50 years to enact a health-insurance bill, however, Congress was unsuccessful until the first session of the 89th Congress. After successes in both the House and Senate, President Lyndon Johnson, on 30 July 1965 was able to sign a measure extending health-care insurance to all Americans over the age of 65 and to the indigent.

What follows is an account of these five agencies – the Public Health Service, the Food and Drug Administration, the Veterans Administration, the National Institutes of Health, and the Medicare program – which make up the overwhelming proportion of federal efforts in the area of health care. The discussion touches on the efforts that were made to initiate these programs, the forces that opposed them, and the dynamics that account for their spectacular growth. We would do well to keep in mind that we are here dealing with administrative structures that are political in nature and are therefore subject to political forces which often bear no relation to the underlying realities. Thus, the actual demand for a specific medical service need not, and most probably does not, reflect the expenditures Congress was prepared to allocate for that purpose. Nor, one need hardly add, do these expenditures reflect the efforts invested in enforcing specific regulations, which were often counter-productive.

Table 1 National Health Care Expenditures: Aggregates and Per Capita Amounts by Type of Expenditure and Source of Funds, Selected Calendar Years 1929–1965

Type of Expenditure	1929	1940	1950	1955	1960	1965
National Health Expenditures (\$ billions)	3.6	4.0	12.7	17.7	26.9	41.7
As a percentage of GNP	3.5%	4.0%	4.4%	4.4%	5.3%	6.0%
Source of Funds						
Private Expenditures (\$ billions)	3.2	3.2	9.2	13.2	20.3	30.9
Public Expenditures (\$ billions)	.5	.8	3.4	4.6	6.6	10.8
Federal Expenditures (\$ billions)	—	—	1.6	2.0	3.0	5.5
State/Local Expenditures (\$ billions)	—	—	1.8	2.6	3.6	5.2
<i>Per Capita</i> Expenditures (\$)	29.49	29.62	81.86	105.38	146.30	210.89
Source of Funds						
Private Expenditures	25.49	23.61	59.62	78.33	110.20	156.32
Public Expenditures	4.00	6.03	22.24	27.05	36.10	54.57
Federal Expenditures	—	—	10.49	11.90	16.42	27.97
State/Local Expenditures	—	—	11.75	15.15	19.69	26.60
Percentage Distribution of Funds	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Private Funds	86.4	79.7	72.8	74.3	75.3	74.1
Public Funds	13.6	20.3	27.2	25.7	24.7	25.9
Federal Funds	—	—	12.8	11.3	11.2	13.3
State/Local Funds	—	—	14.4	14.4	13.5	12.6
Annualized Percentage Change from previous year shown						
National Health Care Expenditures	—	.8%	12.2%	7.0%	8.7%	9.2%
Private Expenditures	—	.1%	11.2%	7.4%	9.0%	8.8%
Public Expenditures	—	4.6%	15.5%	5.8%	7.8%	10.2%
Federal Expenditures	—	—	—	4.3%	8.5%	12.9%
State/Local Expenditures	—	—	—	7.0%	7.2%	7

Table 2 National Health Care Expenditures: Aggregates and Per Capita Amounts by Type of Expenditure and Source of Funds, Calendar Years 1966–1973

Type of Expenditure	1966	1967	1968	1969	1970	1971	1972	1973
National Health Expenditures (\$ billions)	45.1	51.3	58.2	65.7	74.7	83.3	93.5	103.2
As a percentage of GNP	6.1%	6.4%	6.7%	7.0%	7.5%	7.0%	7.9%	7.8%
Source of Funds								
Private Expenditures (\$ billions)	32.5	32.4	36.1	40.8	46.9	61.6	58.1	63.9
Public Expenditures (\$ billions)	13.6	19.0	22.1	24.9	27.8	31.7	35.4	39.3
Federal Expenditures (\$ billions)	7.4	11.9	14.1	16.1	17.7	20.3	22.9	25.2
State/Local Expenditures (\$ billions)	6.1	7.0	8.0	8.8	10.1	11.3	12.5	14.1
<i>Per Capita</i> Expenditures (\$)	230.29	253.73	284.97	318.50	357.90	394.23	437.77	478.34
Source of Funds								
Private Expenditures	162.47	159.98	176.82	197.78	224.68	244.36	271.89	296.19
Public Expenditures	67.82	93.75	108.15	120.72	133.22	149.87	165.88	182.15
Federal Expenditures	37.19	58.90	69.05	77.95	84.69	96.18	107.13	116.75
State/Local Expenditures	30.63	34.84	39.10	42.77	48.54	53.68	58.75	65.40
Percentage Distribution of Funds	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Private Funds	70.6	63.1	62.0	62.1	62.8	62.0	62.1	61.9
Public Funds	29.4	36.9	38.0	37.9	37.2	38.0	37.9	38.1
Federal Funds	16.1	23.2	24.3	24.5	23.7	24.4	24.5	24.5
State/Local Funds	13.3	13.7	13.7	13.4	13.6	13.6	13.4	13.7
Annualized Percentage Change from previous year shown								
National Health Care Expenditures	10.5%	11.4%	13.4%	12.9%	13.6%	11.5%	12.3%	10.3%
Private Expenditures	5.1%	[−.5%]	11.6%	13.0%	14.8%	10.1%	12.5%	10.0%
Public Expenditures	25.7%	39.7%	16.5%	12.7%	11.6%	13.9%	11.9%	10.9%
Federal Expenditures	34.5%	60.1%	18.4%	14.0%	9.8%	15.0%	12.6%	10.0%
State/Local Expenditures	16.5%	15.0%	13.3%	10.5%	14.7%	12.0%	10.6%	12.4%

Table 3 National Health Care Expenditures: Aggregates and Per Capita Amounts by Type of Expenditure and Source of Funds, Calendar Years 1974–1981

Type of Expenditure	1974	1975	1976	1977	1978	1979	1980	1981
National Health Expenditures (\$ billions)	116.4	132.7	149.7	169.2	189.3	214.6	248.1	287.0
As a percentage of GNP	8.1%	8.6%	8.7%	8.8%	8.8%	8.9%	9.1%	9.4%
Source of Funds								
Private Expenditures (\$ billions)	69.3	76.5	86.7	99.1	110.0	124.5	142.9	165.8
Public Expenditures (\$ billions)	47.1	56.2	62.9	70.1	79.4	90.1	105.2	121.2
Federal Expenditures (\$ billions)	30.4	37.1	42.6	47.4	53.7	60.8	71.0	83.3
State/Local Expenditures (\$ billions)	16.6	19.1	20.3	22.7	25.7	29.3	34.2	37.9
Per Capita Expenditures (\$)	534.63	603.57	574.14	754.81	835.57	936.92	1054.0	1207.0
Source of Funds								
Private Expenditures	318.18	348.08	390.63	442.14	485.29	543.61	607.0	697.0
Public Expenditures	216.44	255.49	283.51	312.67	350.27	393.31	447.0	510.0
Federal Expenditures	139.86	168.61	191.73	211.39	236.84	265.41	302.0	350.0
State/Local Expenditures	76.58	86.88	91.78	101.28	113.44	127.70	145.0	159.0
Percentage Distribution of Funds	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Private Funds	59.5	57.7	57.9	58.6	58.1	58.0	57.6	57.8
Public Funds	40.5	42.3	42.1	41.4	41.9	42.0	42.4	42.2
Federal Funds	26.2	27.9	28.5	28.0	28.3	28.4	28.6	29.0
State/Local Funds	14.3	14.4	13.6	13.4	13.6	13.7	13.8	13.2
Annualized Percentage Change from previous year shown								
National Health Care Expenditures	12.8%	14.0%	12.8%	13.1%	11.9%	13.4%	15.6%	15.7%
Private Expenditures	8.4%	10.5%	13.3%	14.3%	10.9%	13.2%	15.1%	16.0%
Public Expenditures	19.9%	19.2%	12.0%	11.4%	13.2%	13.5%	16.2%	15.2%
Federal Expenditures	20.9%	21.8%	14.8%	11.4%	13.2%	13.3%	16.4%	17.3%
State/Local Expenditures	18.2%	14.6%	6.6%	11.5%	13.2%	14.0%	15.8%	10.9%

Table 4 National Health Care Expenditures: Aggregates and Per Capita Amounts by Type of Expenditure and Source of Funds, Calendar Years 1982–1989

Type of Expenditure	1982	1983	1984	1985	1986	1987	1988	1989
National Health Expenditures (\$ billions)	323.6	357.2	390.2	420.1	452.3	492.5	544.0	604.1
As a percentage of GNP	10.2%	10.5%	10.3%	10.5%	10.7%	10.9%	11.2%	11.6%
Source of Funds								
Private Expenditures (\$ billions)	188.4	209.7	230.7	245.7	260.9	282.9	315.8	350.9
Public Expenditures (\$ billions)	135.3	147.5	159.5	175.1	191.3	209.6	228.2	253.3
Federal Expenditures (\$ billions)	93.2	102.7	111.7	123.6	132.6	143.5	156.7	174.4
State/Local Expenditures (\$ billions)	42.1	44.8	47.8	51.5	58.8	66.2	71.5	78.8
<i>Per Capita</i> Expenditures (\$)	1348	1473	1595	1700	1813	1955	2139	2354
Source of Funds								
Private Expenditures	784	865	943	992	1046	1123	1242	1367
Public Expenditures	563	608	652	709	767	832	898	987
Federal Expenditures	388	424	456	500	532	570	616	680
State/Local Expenditures	175	185	195	208	236	263	281	307
Percentage Distribution of Funds	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Private Funds	58.2	58.7	59.1	58.3	57.7	57.4	58.0	58.1
Public Funds	41.8	41.3	40.9	41.7	42.3	42.6	42.0	41.9
Federal Funds	28.8	28.8	28.6	29.4	29.3	29.1	28.8	28.9
State/Local Funds	13.0	12.5	12.3	12.3	13.0	13.4	13.1	13.0
Annualized Percentage Change from previous year shown								
National Health Care Expenditures	12.8%	10.4%	9.2%	8.9%	7.7%	8.9%	10.5%	11.1%
Private Expenditures	13.6%	11.3%	10.0%	8.5%	6.5%	8.4%	11.6%	11.1%
Public Expenditures	11.6%	9.1%	8.1%	9.6%	9.3%	9.6%	8.9%	11.0%
Federal Expenditures	11.9%	10.2%	8.7%	11.4%	7.3%	8.2%	9.2%	11.3%
State/Local Expenditures	11.1%	6.4%	6.8%	5.3%	14.2%	12.6%	8.1 %	10.2%

Table 5 National Health Care Expenditures: Aggregates and Per Capita Amounts by Type of Expenditure and Source of Funds, Calendar Years 1990–1997

Type of Expenditure	1990	1991	1992	1993	1994	1995	1996	1997
National Health Expenditures (\$ billions)	697.5	761.3	833.6	892.3	949.4	993.7	1042.5	1092.4
As a percentage of GNP	12.6%	12.9%	13.3%	13.6%	13.7%	13.7%	13.6%	13.5%
Source of Funds								
Private Expenditures (\$ billions)	413.1	441.0	477.0	505.1	528.6	536.5	561.1	585.3
Public Expenditures (\$ billions)	284.3	320.3	356.5	387.2	420.8	455.2	481.4	507.1
Federal Expenditures (\$ billions)	195.8	224.4	254.8	278.5	303.6	326.0	348.0	367.0
State/Local Expenditures (\$ billions)	88.5	95.8	101.8	108.6	117.2	129.2	133.4	140.0
Per Capita Expenditures (\$)	2688	2902	3144	3331	3510	3637	3781	3925
Source of Funds								
Private Expenditures	1592	1681	1799	1886	1954	1970.7	2034.9	2103.1
Public Expenditures	1096	1221	1345	1445	1556	1665.9	1745.5	1822.0
Federal Expenditures	754	856	961	1040	1122	1193.0	1262.0	1318.9
State/Local Expenditures	341	365	384	406	433	472.9	483.7	503.1
Percentage Distribution of Funds	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Private Funds	59.2	57.9	57.2	56.6	55.7	54.2	53.8	53.6
Public Funds	40.8	42.1	42.8	43.4	44.3	45.8	46.2	46.4
Federal Funds	28.1	29.5	30.6	31.2	32.0	32.8	33.4	33.6
State/Local Funds	12.7	12.6	12.2	12.2	12.3	13.0	12.8	12.8
Annualized Percentage Change from previous year shown								
National Health Care Expenditures	11.6%	9.1%	9.5%	7.0%	6.4%	4.9%	4.9%	4.8%
Private Expenditures	10.6%	6.7%	8.2%	5.9%	4.7%	2.6%	4.2%	4.3%
Public Expenditures	13.2%	12.7%	11.3%	8.6%	8.7%	7.7%	5.7%	5.3%
Federal Expenditures	11.9%	14.6%	13.5%	9.3%	9.0%	8.2%	6.8%	5.5%
State/Local Expenditures	16.0%	8.3%	6.2%	6.7%	7.9%	6.2%	3.2%	5.0%

Table 6 National Health Care Expenditures: Aggregates and Per Capita Amounts by Type of Expenditure and Source of Funds, Calendar Years 1998–2003

Type of Expenditure	1998	1999	2000	2001	2002	2003
National Health Expenditures (\$ billions)	1149.8	1215.6	1309.9	1426.4	1559.0	1678.9
As a percentage of GNP	13.1%	13.1%	13.3%	14.1%	14.9%	15.3%
Source of Funds						
Private Expenditures (\$ billions)	628.8	666.5	717.5	771.8	841.0	913.2
Public Expenditures (\$ billions)	520.9	549.0	592.4	654.6	718.0	765.7
Federal Expenditures (\$ billions)	366.9	386.2	416.0	463.8	508.6	541.7
State/Local Expenditures (\$ billions)	154.0	162.8	176.4	190.8	209.4	224.0
Per Capita Expenditures (\$)	4177	4377	4560	4914	5317	5671
Source of Funds						
Private Expenditures	2285	2400	2498	2659	2869	3084
Public Expenditures	1893	1977	2062	2255	2449	2586
Federal Expenditures	1306	1359	1448	1598	1735	1830
State/Local Expenditures	544	578	614	657	714	756
Percentage Distribution of Funds						
Private Funds	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Public Funds	54.7%	54.8%	54.8%	54.1%	53.9%	54.4%
Federal Funds	45.3%	45.2%	45.2%	45.9%	46.1%	45.6%
State/Local Funds	31.9%	31.6%	31.8%	32.5%	32.6%	32.4%
	13.4%	13.8%	13.4%	13.4%	13.4%	13.3%

Annualized Percentage Change from previous year shown

National Health Care Expenditures	5.4%	5.7%	5.8%	8.9%	9.3%	7.7%
Private Expenditures	6.8%	6.0%	6.1%	7.6%	9.0%	8.6%
Public Expenditures	3.7%	5.4%	5.3%	10.5%	9.7%	6.6%
Federal Expenditures	2.5%	4.7%	5.2%	11.5%	9.7%	6.5%
State/Local Expenditures	6.8%	7.1%	5.6%	8.2%	9.7%	7.0%

Note: National Health Expenditures are defined as comprising all spending for individual health care, including the administrative costs of non-profit and government health programs, the net cost to consumers of private health insurance, non-profit health research, and construction of medical facilities.

Sources: Data for 1929 through 1979: Robert M. Gibson and Daniel R. Waldo, 'National Health Care Expenditures, 1980', *Health Care Financing Review*, III (September 1981): 1–54.

Data for 1980 through 1984: Daniel R. Waldo, Katharine R. Levit, and Helen Lazenby, 'National Health Expenditures, 1985', *Health Care Financing Review*, VIII (Fall 1986): 1–21.

Data for 1985 through 1989: Helen Lazenby and Suzanne W. Letsch, 'National Health Expenditures, 1989', *Health Care Financing Review*, XII (Winter 1990): 1–26.

Data for 1990 through 1994: Katharine R. Levit, Helen C. Lazenby, *et al.*, 'National Health Expenditures, 1994', *Health Care Financing Review*, XVII (Spring, 1996): 205–242.

Data for 1995 through 1997: Health Care Financing Administration, Office of the Actuary, National Health Statistics Group, 'National Health Care Expenditures, 1960–1997' (cited 7 October 1999), available from the World Wide Web @ <http://medicare.hcfa.gov/stats/nhe-oact/tables/nhegdp97.txt>

Data for 1998 and 1999: National Center for Health Statistics, Centers for Disease Control and Prevention, US Department of Health and Human Services, *Health, United States, 2002* (Hyattsville, Maryland: Health and Human Services, 2005): 288 (Table 113).

Data for 2000 and 2003: National Center for Health Statistics, Centers for Disease Control and Prevention, US Department of Health and Human Services, *Health, United States, 2005* (Hyattsville, Maryland: Health and Human Services, 2005): 360 (Table 119).

NOTES

1. Aggregate health expenditures in fiscal year 2001 were \$1424.5 billion, of which \$454.8 billion were federal disbursements and \$191.8 billion were state and local disbursements. See Center for Medicare and Medicaid Services, National Center for Health Statistics, Centers for Disease Control and Prevention, Department of Health and Human Services, *Health, United States, 2003* (Hyattsville, Maryland: National Center for Health Statistics, 2003): Table 112, 306. The Bureau of Management and Budget calculates federal medical outlays in fiscal year 2004 as \$559 billion.
2. We live in an age where government expenditures are so far beyond what we are accustomed to dealing with in our day-to-day lives that they have lost all meaning. A half trillion dollars per year is equivalent to slightly less than \$1 million per minute, every minute of every day.
3. In 2001 approximately 40 400 000 million Americans were enrolled in medicare programs and an additional 42 800 000 had received some form of medicaid.
4. See Ronald Hamowy, 'The Development of Medical Licensing Laws in the United States, 1875–1900', *Journal of Libertarian Studies*, 3 (Winter 1979): 73–119. While a number of jurisdictions had some form of 'licensing' law prior to the Civil War, they were poorly enforced or short-lived. In most cases no penalty attached other than precluding unlicensed doctors from using the courts to sue for the recovery of fees. See William G. Rothstein, *American Physicians in the Nineteenth Century: From Sect to Science* (Baltimore: Johns Hopkins University Press, 1972): 332–9.
5. His work was carried forward by Robert Koch who, in 1876, established an experimental protocol, known as Koch's postulates, that permitted him to conclusively link anthrax with a specific bacillus. Koch later discovered the bacillae that produced tuberculosis (1882) and cholera (1883).
6. One physician, writing in 1879, estimated that the mortality from this regimen ranged from 10 to 50 percent. J. M. Scudder, 'A Brief History of Eclectic Medicine', *Eclectic Medical Journal*, 39 (1879): 298, quoted in Rothstein, *American Physicians in the Nineteenth Century*, 54. These figures are probably too conservative; while the immediate mortality rate might have been within the range suggested, heroic therapy almost certainly contributed to the deaths of a far greater percentage of patients.
7. For a contemporary account of Thomson's life and system of medicine, see John Uri Lloyd, 'Life and Medical Discoveries of Samuel Thomson', *Bulletin of the Lloyd Library of Botany, Pharmacy and Materia Medica*, Bulletin No. 11, Reproduction Series 7, 1909. The author himself was a well-known proponent of herbal medicine, founder of the Lloyds Brothers Pharmacy, and was twice president of the American Pharmaceutical Association.
8. Hahnemann himself argued that this benefit alone should encourage orthodox physicians to embrace homeopathic therapeutics. 'A dose that appears to [the regular physician] like nothing, could have no worse results', he writes, 'than that of producing no effect at all, which is at least far more innocent than the effects resulting from the strong doses of allopathic medicines'. Samuel Hahnemann, *Organon of Homoeopathic Medicine* (3rd American edn; New York: William Radde, 1849): 222.
9. Stanford E. Chaillé, 'The Medical Colleges, the Medical Profession, and the Public', *New Orleans Medical and Surgical Reporter*, n.s. 1 (May 1874): 818–19. American Medical Association statistics on medical schools and graduates for 1880 show that of the 100 medical schools in operation in that year, fourteen of them taught homeopathic medicine, graduating 12 percent of all new physicians, while nine schools taught eclecticism, from which close to 6 percent of all graduates issued. 'Medical Education in the United States', *Journal of the American Medical Association* 75 (7 August 1920): 382–3.
10. See Paul Starr, *The Social Transformation of American Medicine* (New York: Basic Books, Inc., 1982): 113–15. When the medical school at Johns Hopkins University opened in 1893, it was the first to impose a requirement that all entrants possess a college degree.
11. For those interested in reading the Report, the Carnegie Foundation has made it available online at http://www.carnegiefoundation.org/eLibrary/docs/flexner_report.pdf
12. See Hamowy, 'Development of Medical Licensing Laws', 113–17.

13. 'Medical Education in the United States', *Journal of the American Medical Association*, 79 (1922): 629–33, quoted in Rothstein, *American Physicians*, 287. It has been estimated that the Report was responsible for anywhere between 7 and 22 percent of all school closures and mergers. Mark D. Hiatt and Christopher G. Stockton, 'The Impact of the Flexner Report on the Fate of Medical Schools in North America After 1909', *Journal of American Physicians and Surgeons*, 8(2) (Summer 2003): 39.
14. Osteopathy was the brainchild of Dr Andrew T. Still, who formulated the underlying theories associated with the movement in 1874, soon after having taken courses at the Kansas City School of Physicians and Surgeons. He held that disease was primarily the result, not of germs, but of 'anatomical abnormalities followed by physiological discord'. He opposed the use of drugs, vaccines, and serums, regarded surgery only as a last resort, and believed the cures could be effected by 'correcting the mechanical imbalances within and between the structures of the body'. In 1892 Still founded the American School of Osteopathy at Kirksville, Missouri.
 In 1895 D. D. Palmer, a grocer from Davenport, Iowa, propounded the notion that most disease was the product of misalignments of the spine, known as 'subluxations', which interfered with nerve signals from the brain. Chiropractic provided the theoretical blueprint that allowed practitioners to adjust these misalignments and thereby restore the nerve signals. As with osteopathy, drugs and surgery play almost no role in chiropractic's therapeutic arsenal.
15. An additional benefit that followed from more rigorous standards and hence an increase in the costs of training was that fewer 'undesirable elements', recent immigrants – among them Catholics and Jews – and blacks and other minorities entered the profession. See Martin Kaufman, *American Medical Education: The Formative Years: 1765–1910* (Westport, Conn.: Greenwood Press, 1976): 172–3. The Report explicitly supported the closure of all three medical schools devoted to the education of women, arguing that 'it is clear that women show a decreasing inclination' to become physicians inasmuch as 'any strong demand for women physicians or any strong ungratified desire on the part of women to enter the profession . . . is lacking'. In addition, he urged that the seven medical schools for negroes be reduced to two, and that hygiene rather than surgery be emphasized in their curricula!
16. With release of the Flexner Report, the AMA's Council on Medical Education, which had been rating all medical schools in the nation, effectively became an accrediting agency to which the various state licensing boards conformed.
17. Arthur Hertzler, *The Horse and Buggy Doctor*, quoted in Roy Porter, *Blood and Guts: A Short History of Medicine* (New York: W. W. Norton, 2002): 41.
18. One authority on the disease noted in 1894 that 'one-seventh of the total mortality of the civilized world is due to tuberculosis, and one-fourth of the deaths occurring during the working period of life is caused by it. Over 30,000 deaths were reported to the New York City Health Department as having been caused by the tubercular diseases during the five years ending January 1, 1893. Of these more than 26,000 were caused by pulmonary tuberculosis. . . . As compared with this, the total number of deaths caused by the other infectious diseases, including small-pox, typhus fever, typhoid fever, scarlet fever, diphtheria, measles, and whooping-cough, was only a little over 21,000, or about two-thirds of the number produced by tuberculosis alone.' Hermann M. Biggs, 'To Rob Consumption of its Terrors', *Forum* (February 1894): 763.
19. Both Behring (1854–1917) and Kitasato (1852–1931) are giants of the bacteriological revolution. Among their numerous achievements, both were instrumental in the development not only of the first serum against diphtheria but also of the first therapeutic tetanus serum. In the same year that Behring and Kitasato developed their diphtheria antitoxin, Kitasato uncovered the infectious agent for bubonic plague.
20. For an extended discussion of the reception given to the findings of bacteriology by the American profession toward the end of the century, see Rothstein, *American Physicians*, 261–81.
21. Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity* (New York: W. W. Norton, 1997): 360. Sherwin B. Nuland offers an excellent brief treatment of the development of anesthesia. See chapter 10, 'Surgery without Pain: The Origins of General

- Anesthesia', in *Doctors: The Biography of Medicine* (New York: Alfred A. Knopf, 1988): 263–303.
22. It appears that large numbers of fundamentalists opposed the use of any anesthetic in childbirth since Scripture had pronounced that women would bring forth children 'in sorrow'.
 23. One historian of medicine notes that before the introduction of antiseptic techniques the mortality rate for amputations was approximately 40 percent. Darlene Berger, 'A Brief History of Medical Diagnosis and the Birth of the Clinical Laboratory', *Medical Laboratory Observer*, 31 (July 1999): 33.
 24. Berkeley Moynihan, Baron Moynihan, quoted in Porter, *Greatest Benefit to Mankind*, 373.
 25. The number of preventable deaths due to medical error in America's hospitals remains substantial, amounting to approximately 98 000 deaths per year. See the study by HealthGrades, entitled *Patient Safety in American Hospitals*, released in July 2004. The American Iatrogenic Association estimates the number of deaths at more than twice this figure.
 26. Similarly, childbirth took place in the home, with a midwife rather than a physician commonly assisting in delivery. The advent of the modern hospital in the twentieth century spelled the end of birth and death as an integral part of the life cycle that was observable to the whole family. These events are now sequestered in cold, streamlined buildings that are foreign to our daily lives, thus shrouding birth and death in fearsome mystery.
 27. Starr, *Social Transformation of American Medicine*, 152.
 28. Cleon C. Mason, 'Are Hospital Costs Too High?' *North American Review*, 228 (July 1929): 57–8.
 29. Anonymous, 'I Can't Afford to Be Sick', *Forum and Century*, 8 (March 1940): 109.
 30. In 1885 a rabies vaccine was developed at the Pasteur laboratories and Pasteur administered the vaccine for the first time to a nine-year-old boy who had been bitten numerous times several days prior by a rabid dog. Smallpox inoculation originated in China around 1000 AD and was imported to Europe through Turkey. It consisted of administering a small dose of live smallpox virus to patients, who then contracted a mild form of the disease. In England, variolation was popularized through the efforts of Lady Mary Wortley Montagu, wife of the British ambassador to the Ottoman Empire. In 1796 Edward Jenner, having discovered the connection between cowpox (a mild but related disease) and smallpox, demonstrated that the administration of cowpox virus brought about immunity to smallpox. It might be noted that Jenner's findings were received with ridicule by the medical profession and Jenner was originally labeled a charlatan. In 1979 the World Health Organization noted that smallpox had been eradicated from the planet.
 31. Thomas McKeown, *The Role of Medicine: Dream, Mirage or Nemesis* (Princeton: Princeton University Press, 1979): 78.
 32. McKeown, *Role of Medicine*, 78.
 33. See Ronald Hamowy, 'Introduction: Illicit Drugs and Government Control', in Ronald Hamowy, ed., *Dealing With Drugs: Consequences of Government Control* (San Francisco: Pacific Research Institute for Public Policy, 1987): 10–11.
 34. A history of the various states' attempts to regulate the distribution and sale of opiates and cocaine can be found in Hamowy, 'Introduction: Illicit Drugs and Government Control'.
 35. The literature on the Progressive Era is immense. One of the best overviews remains that offered by Robert H. Wiebe, *The Search for Order, 1877–1920* (New York: Hill and Wang, 1967).