

Editorial

Leadership in American Medicine as I See It:

A Background in the Beginning

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INTRODUCTION

For many years, I have thought much about the role of leaders in medicine. The concept of how medical leadership is defined has varied greatly depending upon authors and use, but to my way of thinking, a medical leader is that person whose contributions made a major impact on the entire scope of medicine, including education, healthcare, and the fundamental or clinical areas of research. Noteworthy individuals make important contributions of landmark breakthroughs (as termed in the lay press). They make dramatic and innovative scientific findings that are usually developed on the shoulders of earlier investigators in that area of scientific inquiry. As important as their work is, they may not affect the overall delivery of medical education, general healthcare delivery, or research, and I therefore do not consider them medical leaders.

My ideals for leaders in medicine are focused on role models, teachers, and investigators. Among my selection of leaders in American medicine are those people who made landmark contributions impacting all 3 areas of academic medicine: medical education, healthcare delivery, and research. My thinking about these leaders has been developed from teaching, stimulation from clinical practice, and, of course, clinical investigation. In arriving at my selections, I have restricted my choices to American leaders who made their contributions during the 20th century. Their outstanding work had an impact on each of the foregoing 3 spheres of academic medicine that, to my way of thinking, was tremendously vital to what we now consider the golden age of American medicine.

My first choices of outstanding American medical leaders are, by chance, brothers. One brother, Abraham Flexner, created a special, new, and unique concept of medical school education in the United States (US) that also embodied his vision of the related roles of clinical practice and research. His new educational proposal was subsequently extended by medical educators in Great Britain and Europe and, eventually, worldwide. The other brother, Simon

Flexner, created the premier medical institution in the US that was also devoted to innovative excellence in medical education, practice, and the fundamental and clinical conduct of American medicine. He initially developed his innovative medical program for the Rockefeller Institute (now Rockefeller University) and based it around his brother's new concept of medical education.

EARLY 20TH CENTURY MEDICAL EDUCATION REFORM

Over the years, American medicine has benefited from leaders who left indelible footprints on the growth pathways of our nation's medical history. These leaders shared a special vision and dream for excellence in medical education, clinical practice, and the medical sciences. Appreciating the basic sciences underlying medicine, they recognized the need to clearly understand and master the fundamental mechanisms of diseases. Moreover, they were acutely aware of the need to develop facilities to educate physicians who could deliver modern healthcare to society. To accomplish their goals, they brought absolute credibility to their leadership positions and used their unique power to influence leaders in social philanthropy regarding the need to improve the emerging American academic medical establishment.

In the Beginning

At the close of the 19th century, most physicians in the United States learned their profession as apprentices to clinicians or as students in the large number of medical schools in the country. The knowledge they gleaned from their mentors involved, for the most part, experiential and descriptive clinical observations about diseases and their recognition and management. Research laboratories in those days were few and far between, and new findings were primarily related to the many existing infectious diseases.

In the early 20th century—when the US had a population far less than at the end of the century—

there were far more medical schools (155) than at the century's end (about one-half that number) and, for that matter, today. Most of the existing medical schools were devoid of the intellectual commitment and ability necessary to educate professionals capable of practicing medicine. No established criteria or guidelines proscribed the fundamental requirements for a medical curriculum, specific course material, or the scientific knowledge that students must assimilate during medical training. Classroom teaching primarily consisted of long and tedious lectures and faculty recitations frequently delivered by rote to unquestioning and fatigued students. In early medical education, an individual one-on-one physician was usually assigned to student apprenticeships, an arrangement under which a senior clinician accepted a younger aspiring apprentice for 1 or 2 years to learn the concepts of the doctor-patient relationship and the rudiments of how to manage the variety of problems likely to be seen in routine medical practice. While most mentors had clinical talents and techniques, many simply did not possess the capabilities adequate for these responsibilities.

Consequently, early medical education was based primarily on the mentors' clinical backgrounds, experiences, abilities, and well-honed senses. Physicians used their hearing to carefully obtain the patient's medical history, draw stethoscopic conclusions about the heart and lung, and listen to sounds from joints and underlying organs. Fine perception vision was required to ascertain tell-tale color changes, localize the extent of swelling, and estimate the size or abnormalities of underlying organs or masses. Exquisite sensitivity of touch perceived raised skin lesions, roughness, the distinction between the underlying solid or liquid contents of the body, transmission of fluid waves, and so forth. The olfactory sense was necessary to perceive characteristic subtle changes of breath, perspiration, and excretory matter. Taste was also a necessary sense; how else would the physician detect the urinary excretion of sugar and acetone in the absence of yet-to-be-developed laboratory techniques?

In partial support of this early education model, we must remember that most clinical problems of the day were acute, and their diagnoses were based on a careful (or not-so-careful) medical history. On the other hand, most apprenticeships and schools regrettably depended primarily on payment of a fee in order to grant the degree or certificate.

Most of the classical medical training programs in Europe already had established special apprenticeships that most American medical schools lacked. The European schools developed other pedagogic experiences to train the aspiring physician, including

anatomical dissections and lectures on the scientific bases of disease. Skilled and experienced lecturers from other institutions and countries were invited to discuss new concepts in science and medical practice. Medical students whose imaginations were stimulated and challenged usually sought further education and scientific discipline from scholars at major European medical centers in Berlin, Frankfurt, Heidelberg, Vienna, London, Oxford, Paris, Budapest, and other cities.

To be sure, some US medical schools provided a meaningful and well-rounded education in the theory and practice of medicine. However, in contrast to these institutions, many of which still exist today, other schools were not by any stretch of thinking fit to deliver an acceptable medical education. Such was the state of medical education in the US in the latter 19th and the early 20th centuries.

Stimulus for Reform

The American Medical Association (AMA), founded in 1847 and incorporated in 1897, became concerned about the state of medical education and reached out to Andrew B. Carnegie with a request to study the problem of medical education and to make recommendations for how to correct this unsatisfactory state.

For American medical education to be corrected, unparalleled leadership was required, and it began with the impressive leadership and influence of a few daring titans of industry whose names have become synonymous with American capitalism and extraordinary financial resources. In a manner similar to their innovative contributions to business, these men recognized the necessity to exert their great influence in areas of human endeavor that included academic medicine. These leaders recognized the absolute requirement to make a thorough study of the entire educational process at the large number of schools of medicine and to recommend an entirely new medical education process.

Carnegie and John D. Rockefeller, both highly interested and motivated industrial titans, recognized the vast importance of an outstanding medical education system and obtained the advice of educators throughout the country. Once Carnegie appreciated the drastic state of medical education, Dr Henry Pritchett, president of the Carnegie Foundation Board and a major leader in higher education as president of Yale University, responded to the AMA request on Carnegie's behalf by agreeing to study the situation and recommend changes to American medical education. In a rather brief period of time, Pritchett and the Carnegie Foundation board selected a general educationalist, Abraham Flexner—a little

known educator from Louisville, Kentucky, whose educational writings were already familiar to Pritchett—to conduct the study and make the necessary recommendations.

ABRAHAM FLEXNER

In an apocryphal story, Morris Flexner, a recent immigrant (with his family of several sons and a daughter) to the US, invited his oldest son Jacob to join him on a quiet walk one day in Louisville, Kentucky. Morris informed Jacob of the family's financial difficulties and charged Jacob with the responsibility of helping to educate his brothers. Although Jacob had hoped to become a physician, he instead became a pharmacist to make and save money.

Jacob urged his younger and promising brother Abraham to obtain a college education and gave him \$1,000 to obtain whatever higher education was possible. Abraham Flexner appreciated the excellence of the relatively recent establishment of Johns Hopkins University. He applied and was accepted to the university. He was so stimulated by Hopkins that he attended as many courses as possible over the 2-year period that could be financed by his brother's gift. He graduated with a degree after his self-proscribed intensive and brief college education.

On returning to Louisville, Abraham Flexner started a private high school where he provided his own personally defined curriculum designed for the bright and well-motivated high school students whose parents applied for admission to Flexner's school. Flexner recommended each of the students who completed his high school for admission to an outstanding college (usually in the Ivy League). One point of interest is that no girls were admitted to his school until a wealthy benefactor contacted Flexner to ask him to admit his niece as his first female student. She was an excellent student, and Flexner recommended that she apply to Bryn Mawr College (which she did). Upon her graduation, she returned to Louisville to join the faculty of Flexner's school and later married Abraham Flexner. Obviously talented, she wrote a number of plays, several of which were highly successful and produced on Broadway.

During these years, while managing his own high school, Abraham Flexner published extensively on higher education subjects in various education journals. These articles became well known by important leaders of higher education, including Dr Pritchett and other major educators such as Dr Charles W. Eliot, then president of Harvard University. Flexner's writings in the general educational literature so impressed Pritchett, then serving as president of the board of the Carnegie Foundation, that he invited Abraham Flexner to meet the board, and the board

subsequently invited him to participate in the AMA's request to initiate a study of American medical school education. Supported by a small grant from the AMA to the Carnegie Foundation for income and expenses, Flexner personally visited each of the US schools of medicine. Most of his medical school visits were very brief. He interviewed the faculty (frequently only 1 physician) and visited the school's laboratory (which not infrequently involved viewing a skeleton). At the conclusion of such visits, he had no doubts about recommending that the AMA close the school. During that 1 year's time, Flexner recommended the closure of one-half of the medical schools in the country.

At the conclusion of his visits, Abraham Flexner wrote a detailed report that included his now-classic paper on American medical education. This report was published in 1910 in Bulletin No. 4 of the Carnegie Foundation for the Advancement of Teaching. Flexner's world-shaking and revolutionary report dealt in detail with his recommendations on medical education, research, and clinical practice in the United States. In his report, Flexner insisted on the need to improve conditions in all of the existing institutions, and he called for specific programs and curricula in all of the remaining and future medical schools. He further insisted in his recommendations that every medical school must have a full-time medical faculty for both the preclinical and clinical subjects, and he required a close teaching relationship between the students and their faculty. He recommended that all medical schools include full-time teaching clinics for private as well as disadvantaged patients. He insisted on the absolute necessity for all schools of medicine to establish ongoing research programs. He also stipulated that all schools of medicine must undergo continuous periodic review for renewal of their long-term accreditation following their initial approval by the AMA.

As stated above, Abraham Flexner recommended that fewer than one-half of the existing medical schools remain active; all others were to be permanently closed. These findings and recommendations were so well received and accepted by Dr Pritchett's Carnegie board and the AMA that Abraham Flexner was invited soon thereafter to review and offer recommendations on the state of medical education in Great Britain and, later, on the European continent.

Abraham Flexner's recommendations thus began a new era of enlightened American medical education. The impetus for these cataclysmic changes must be attributed to the AMA's recognition of the necessity to correct the existing state of medical education in the US, its request to a handful of forward-looking champions of academic excellence in American medical education, and implementation by the out-

standing and committed board of directors of the Carnegie Foundation. This public-spirited American philanthropist, the concern of the AMA, and the remarkable consultative review and implementation by Abraham Flexner provided the necessary impetus to invigorate the conduct, practice, and growth of American medical academia that was so desperately necessary. It is truly remarkable to think that neither Andrew Carnegie nor Abraham Flexner was a physician or an individual with a higher degree in education. These outstanding leaders were characterized by their recognition that a critical medical educational problem existed, and both men were committed to correct that situation by using their respective resources during a remarkably brief time period.

Soon after the publication of his report, Abraham Flexner was invited to join the General Education Board of the Rockefeller Foundation as a full-time member. He remained on this governing board for many years until he retired to his own private educational consultative practice. However, during these long years Flexner provided the continuous overview of each American medical school and also recommended the establishment of new schools of medicine. Among his major recommendations was to establish new medical schools at the universities of Chicago, Rochester, and Vanderbilt. Flexner, through his personal knowledge and contacts, persuaded Julius Rosenwald, Nicholas Eastman, and Cornelius Vanderbilt to contribute major private donations to these institutions. These donations were supplemented by the Rockefeller Foundation with at least matched contributions to ensure the founding of these medical schools. These schools and a good number of others (including Johns Hopkins, Yale, Iowa, and Cincinnati) remain among the major medical institutions of this country.

In addition to seeing the implementation of his landmark medical education recommendations, Abraham Flexner also received an invitation to develop a new school for Columbia University—the Abraham Lincoln School of Education—that developed into the model institution for the undergraduate education of teachers.

Another lasting contribution was his work in establishing the Institute for Advanced Studies at Princeton University. For many years, Abraham Flexner had expressed an unprecedented desire to establish an innovative educational and research institution dedicated to maintaining a faculty consisting of outstanding academicians and scientists with total commitment to a singular program. The major purpose of the institution would be the close interrelation of faculty with each other in order to

provide the best of their collective sophisticated thinking. The background for the establishment of this remarkable institution occurred during Flexner's later years as an independent consultant. At the time, noted Newark, NJ, businessman Louis Bamberger contacted him to discuss founding a new school of medicine in Newark. Flexner strongly decried Bamberger's well-meaning wish, pointing out that there were already 6 medical schools across the river in New York. Instead, Flexner briefly introduced his concept of a unique American educational institution for advanced studies, an idea that Bamberger did not dismiss, and over a protracted series of meetings with Bamberger, Bamberger's sister (his codonor), and their business advisors, Abraham Flexner convinced them to establish the program he envisioned at a major nearby university in New Jersey. As a result, the Institute for Advanced Study at Princeton University was established on the Bambergers' major condition that Abraham Flexner serve as its first director. Flexner accepted the position on the condition that he would be able to bring Albert Einstein to this world-class institute as its first faculty member. To accomplish this, Flexner prevailed upon Eleanor Roosevelt to introduce Flexner to her husband, President Franklin D. Roosevelt. President Roosevelt was convinced, and he facilitated Einstein's immigration to the US immediately prior to World War II. With Einstein on board, Abraham Flexner was then able to recruit additional outstanding members to his highly respected and highly regarded faculty of scientists. The only condition for Flexner's unusual faculty and institute was that they think and interact intellectually for the benefit of the worldwide academic intellectual and scientific community. This institution continues to this date as one of the major academic science centers in the world and is another credit to Abraham Flexner's remarkable career in structurally developing institutional programs of higher education.

SIMON FLEXNER

Simon Flexner, who was Abraham Flexner's older brother, began his outstanding medical career several years after Abraham began his educational career. Simon Flexner was among the premier early American clinical investigators and scientists. His scientific contributions are important and significant milestones among the major medical educational, clinically significant, and scientifically meaningful contributions of his time.

Like his eldest brother Jacob, Simon Flexner attended pharmacy school but began his initial work at a different pharmacy. Also similar to Jacob, Simon became a physician later in life. During his early years as a pharmacist, Simon Flexner related closely with many doctors in his community. One of these

physicians gave him a microscope that stimulated his studies of bacteria and tissues. Simon studied these samples to better understand patients' medical problems. As a pharmacist, Simon later joined Jacob at his drug store and, while working with his brother, Simon continued his education at a 2-year medical school in Louisville. There, his interests in bacteriology, other infectious diseases, and pathology promoted his desire to proceed with specialized training at a more sophisticated program elsewhere. During many discussions, his brother Abraham strongly advised Simon to apply for that training at the Johns Hopkins School of Medicine's Department of Pathology, then chaired by William Henry Welch. Simon Flexner followed his brother's advice and was accepted into Welch's department, where he continued to focus on infectious diseases. Subsequently, he was invited to join the faculty of that department. At Hopkins, he discovered a bacillus and a serum for treating meningitis. His major research work prompted an invitation to lead a Johns Hopkins commission to study the epidemics of dysentery, typhoid fever, malaria, dengue, tuberculosis, and leprosy in the Philippines. Later, he was asked to study bubonic plague in San Francisco for the federal government.

During these productive years of Simon Flexner's career, the University of Pennsylvania invited Welch to head its Department of Pathology. Welch declined the invitation, indicating that he already had major academic responsibilities at Hopkins as the pathology department chair and the medical school's dean. In his response, he strongly recommended his young associate Simon Flexner for the position. Simon Flexner's reputation was already well established, and he was invited to accept the chairmanship of the pathology department on the faculty of the University of Pennsylvania. There he maintained his scientific productivity for the ensuing 4 years, when the next major opportunity presented itself.

In 1901, John D. Rockefeller and his son John D. Rockefeller, Jr. created the Rockefeller Institute for Medical Research in New York. The major administrative associate responsible for overseeing the Rockefeller Foundation was Frederick Taylor Gates, a former Lutheran church minister. Gates invited Simon Flexner, already a highly regarded and nationally known scientist and academician, to join the institute as one of the board's 7 scientific directors. At that time, Dr Welch, professor and head of the pathology department and dean of the Johns Hopkins School of Medicine, was head of the Rockefeller Institute Board. It should not come as any surprise that the board chose Simon Flexner to be the first head of pathology and bacteriology. Shortly thereafter, Simon Flexner was appointed head of the entire Rockefeller Institute

for Medical Research. As director of the institute, Simon Flexner developed a team of scientific scholars. His initial appointments of prime investigators included an outstanding and highly regarded group, including Alexis Carrel, Rufus Cole, P. A. T. Levene, Jacques Loeb, Karl Landsteiner, Hideyo Noguchi, Eugene Opie, and Peyton Rous. Each of these scientists was exceedingly well known, was highly productive, and had a stellar investigative record. Several of these scientists were awarded Nobel Prizes for their outstanding research contributions.

Subsequently, Dr Welch, recognizing the achievements and scientific reputation of his protégé Simon Flexner in building the medical research prestige of the institute, transferred editorial responsibilities for the renowned *Journal of Experimental Medicine* that had been initiated at the "The Hopkins" to "The Rockefeller" where the responsibility for this important journal still resides. Over the years, the exceptional and highly regarded productivity of the Rockefeller Institute has been confirmed over and over again. The Rockefeller Institute remained well established as a world-class institution until relatively recently when its name was changed to Rockefeller University.

CONCLUSION

How strange it must seem to select as one of my first choices of an ideal leader in American medicine a man who was not a physician, a scientist, or a recipient of a graduate degree in higher education. But, to my way of thinking, Abraham Flexner had a lasting impact—more than any other individual—on medical education, research, and healthcare delivery in this country (if not worldwide). He clearly defined the basic prerequisites for all medical schools and an entirely new concept for an ideal academic institutional and intellectual ambiance to dream and generate thinking and knowledge. Thus, Abraham Flexner created a new world of medical education that was followed by the golden age of medicine in the US and elsewhere around the world.

The term golden age is frequently used by those in academic medicine to refer to the very active and highly productive years following World War II through the years during which medical school teaching was tremendously modernized in association with the surge in basic and clinical research. From approximately 1950 through 1990, there was a marked increase in the number of people who assumed full-time teaching and investigative positions, as well as a great increase in the number of faculty. The increased number of medical school staff was associated with increased responsibilities in the care of disadvantaged patients as well as private patients in municipal and federal hospitals, including

Veterans Administration (VA) hospitals. Many of these VA hospitals were, by policy, built in proximity to the newer medical school/university hospitals where patient care, teaching, and investigative activities flourished. In addition, most medical schools and university hospitals instituted faculty practice plans that provided financial support to basic sciences and clinical faculty for their consultative and patient-related practices. In recent years, these sources of medical education support have diminished markedly in some of these institutions. Despite the decrease in funding, the vibrancy of academic medicine continues, and the 3 major areas of academic responsibility strongly sustain the ongoing excellence of American medical academia.

Like his brother Abraham, Simon Flexner used his talents—his broad scientific knowledge and academic leadership—to build a remarkable and innovative institution with a purpose that has been reproduced throughout the academic world of medicine across the globe. His productive and remarkable tenure as

the scientific director at the Rockefeller Institute spanned more than 30 years. The institute is a major center of medical education, clinical practice, and scholarly thinking and research. Hence, these brothers, Abraham Flexner and Simon Flexner, stand independently as my initial choices of the 2 premier leaders in the forefront of American medical leaders.

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