YALE JOURNAL OF BIOLOGY AND MEDICINE 84 (2011), pp.269-276.
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HISTORICAL PERSPECTIVES IN MEDICAL EDUCATION

The Flexner Report — 100 Years Later

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The Flexner Report of 1910 transformed the nature and process of medical education in America with a resulting elimination of proprietary schools and the establishment of the biomedical model as the gold standard of medical training. This transformation occurred in the aftermath of the report, which embraced scientific knowledge and its advancement as the defining ethos of a modern physician. Such an orientation had its origins in the enchantment with German medical education that was spurred by the exposure of American educators and physicians at the turn of the century to the university medical schools of Europe. American medicine profited immeasurably from the scientific advances that this system allowed, but the hyper-rational system of German science created an imbalance in the art and science of medicine. A catching-up is under way to realign the professional commitment of the physician with a revision of medical education to achieve that purpose.

In the middle of the 17th century, an extraordinary group of scientists and natural philosophers coalesced as the Oxford Circle and created a scientific revolution in the study and understanding of the brain and consciousness. Thomas Willis, a student of William Harvey, Christopher Wren, Robert Boyle, and Robert Hooke were synergetic with one another in a shared scientific exploration. Christopher Wren's subsequent splendid achievement in the architectural design of St Paul's and other cathedrals resonated with Willis's delineation of the structure and function of the brain [1].

THE HOPKINS CIRCLE

A similar combustion of shared thought and imagination occurred at the beginning of the 20th century when a group of men who comprised what may be called the Hopkins Circle joined in a project that altered the course of medical education in

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Keywords: Abraham Flexner, William Welch, William Osler, Simon Flexner, Johns Hopkins, William Gates, William Pritchett, German Medical Training, full-time system, Carnegie Foundation, John D. Rockefeller, Theodor Billroth, medical professionalism

America. They erected an edifice, not of bricks and mortar, but an edifice that became the system of medical education that we know more than a century later. Their successful efforts resulted in the science-based foundation of medical training that has made the United States the recognized leader in medical education and medical research today. Much of the credit for this transformation has been appropriately attributed to Abraham Flexner and his critique of medical education contained in his Flexner Report of 1910 [2]. The contributions of several other members of the Hopkins Circle should not be overlooked, nor the importance of the synergy that the Circle generated underestimated.

The membership of the Circle affirms a particularly American phenomenon in which an aristocracy of excellence was not defined by one's origins or wealth, although wealth permitted the group's recommendations to be successful. The group consisted of a Connecticut Yankee and Yale graduate, William Welch, the founding dean at Hopkins, a school established from the fortune of a Quaker merchant, Johns Hopkins. Welch was in large part the mastermind creator of Hopkins and its extensive reach and influence in medical education; he was responsible for the selection of William Osler, the Canadian son of a frontier minister, as its first chief of medicine. A third member of the group was Frederick Gates, a Baptist minister and trusted adviser to John D. Rockefeller. He was galvanized to help improve the scientific and therapeutic store of medical knowledge that he had recognized as being seriously impoverished following his reading of Osler's *Textbook of Medicine*. Gates became the intermediary, the go-between, who convinced Rockefeller to provide his philanthropic resources to achieve the goals of the group [3].

ABRAHAM FLEXNER, THE EDUCATOR AND REFORMER

The final member of the Circle was Abraham Flexner, a former school teacher and expert on educational practices whose background and training made him an outlier in the Circle. He was the sixth of seven siblings in a Louisville, Kentucky, Jewish family whose father was a struggling but unsuccessful business man. Education and being well educated had become the secular faith that replaced religious orthodoxy for Abraham and most of his siblings. He was able to attend Johns Hopkins University through a gift and beneficence of his older brother, Simon, who was then a pharmacist in Louisville and later achieved great eminence as the head of the Rockefeller Institute. Abraham majored in Greek and Latin and philosophy at Hopkins, completing his college studies in only two years; the accelerated course in college was a necessary financial stratagem for the family. After college, he returned to Louisville, where he assumed the role as major support of his family by teaching high school; he reciprocated the kindness of Simon by underwriting his medical schooling and his sister's education at Bryn Mawr. His talents as a teacher generated a large following that facilitated his establishment of a private high school, where his visionary concepts of education were instituted and refined. His educational philosophy resembled that of the progressive model of John Dewey in which students learned by doing, by solving problems, rather than rote memorization that was the more common educational motif of the day. It was a philosophy that he would translate into his transformation of medical education in America [4].

The success of the school and money obtained from its subsequent sale were Flexner's ticket out of Louisville; in the next few years, he pursued an MPhil at Harvard in philosophy and journeyed to Europe, where he visited schools in Great Britain, France, and, particularly, Germany. His continental seasoning was focused upon university medical education in these countries, paralleling the then common practice of young American physicians in completing their medical studies abroad. It was out of his practical experience as an educator in America and his exploration of pedagogical strategies in Europe that he

distilled his critiques of and correctives for American schooling in his book, *The American College*. Flexner and his expertise came to the attention of Henry Pritchett, head of the Carnegie Foundation, upon reading *The American College*. At the time, the Foundation had identified improvement of health care in America as the primary focus of its philanthropic concern. To achieve this purpose, the foundation members correctly surmised that improvement in the very sorry state of medical schooling in America was necessary; they invited Abraham Flexner to survey the quality of medical schools throughout America and Canada and provide suggestions for their improvement.

Flexner was an unorthodox and surprising candidate for the task he was asked to undertake. Flexner himself was quizzical about the summoning, suspecting that he was being confused with his brother, Simon. At the time of the job offering, the former high school teacher had never been in a medical school. This shortcoming might have seemed an insurmountable impediment for successful performance of his assigned task, but the choice of a non-physician was purposeful on the part of Pritchett and his associates. They perceived the problem of medical education as a problem of education and believed a professional educator was better qualified to address this dimension of the problem. They also had preconceived ideas concerning what changes needed to be made in medical schools to allow these ideas to be introduced. The ideas Flexner popularized were those that had already been developed within medical schools before the turn of the century. Pritchett and colleagues also were concerned that antagonisms would be generated by the report, which might be less vengeful if a non-physician were the object of the resentments. An unflattering but not necessarily inaccurate description for Flexner's assignment was that he was to be the hatchet man in sweeping clean the medical system of substandard medical schools that were flooding the nation with poorly trained physicians.

FLEXNER AND THE GERMAN SYSTEM OF MEDICAL EDUCATION

Flexner prepared for his task by immersing himself in the literature of medical education, and he specifically identified Theodore Billroth's book *Medical Education in the German Universities* [5] as his major primer. Throughout his life, he was an ardent proponent of the German pedagogic style of medical education. He was resolute in his belief that medicine was a scientific discipline that could be best realized by using the German model as the prototype in America. This was a system in which physician scientists were trained in laboratory investigation as a prelude and foundation for clinical training and investigation in university hospitals. All physicians had a responsibility to generate new information and create progress in medical science, with assignment of this task to both laboratory and clinical scientists. Science, as the animating force in the physician's life, was the overarching theme, the zeitgeist, in Flexner's conception of the ideal physician.

Flexner also sought the advice of members of the AMA Committee and the Carnegie Foundation; he particularly listened to the counsel of William Welch at Hopkins, who had now assumed a leadership role, an almost grandfatherly one in all things educational in American medicine. Flexner's enchantment with things German would have been bolstered further by Welch's counsel since the German model of medical education was already in place at Hopkins in the aftermath of Welch's earlier European visits. Hopkins' students spent their first two years in the basic laboratory sciences before progressing to their clinical training on wards in a university hospital. The quality of the student body was assured by requiring that all students had a university education prior to admission to medical school. It is no wonder that Flexner chose Hopkins as his gold standard with which all other schools were compared in his survey of American medical schools. His definition of excellence had already been conceived of and implemented by the other members of the Hopkins Circle. Welch had voiced these ideas 10 years earlier.

In an address delivered in 1901 at the 200th anniversary of the founding of Yale College, Welch spoke on "The Relation of Yale to Medicine" [6] and described the mutual benefit that a union of the university and medical school created. He emphasized the need for well-equipped and well-supported laboratories and a body of well-paid teachers thoroughly trained in their special departments. He was bold enough to state that there could be no nobler work for a university than the promotion of medical studies. William Osler voiced the same prescriptions for medical education in his farewell address, "L'envoie," delivered in 1905, shortly before leaving Baltimore to assume the Regius Professorship at Oxford [7]. Osler echoed Welch's message and included a salvo to German medical schools and the rigor of their scientific training. He said one of his ambitions during his tenure at Hopkins was to build up a great clinic on Teutonic lines, not on those previously followed in America and in England, but lines that had proved so successful on the continent and which had placed the scientific medicine of Germany in the forefront of the world.

Osler also made a very significant contribution to the realization of Flexner's task by helping to create the Interurban Clinical Club in 1905 [8]. The purpose of this organization was the exchanging of ideas and the nurturing of fellowship among medical professors in the leading Eastern medical schools. Its aims included several goals that Flexner's conception of medical education also incorporated; scientific investigation of disease was promoted, and methods of teaching were to be shared and improved. The club was largely responsible for the development of the scientific base of American medicine. It was the springboard to eminence for department and divisional heads of the leading medical schools in America. These were the individuals who forged institutional philosophies and standards of excellence in medical schools throughout the next century. The era of the clinical scientist in America dates from this organization; its members were academic physicians who became the vital link between the practicing physician and the basic scientist. Flexner's task was greatly facilitated by the coalescence of all of this energy invested in improving medical education in America.

THE FLEXNER REPORT

Equipped with extensive book knowledge and not a few prejudices and preconceptions, Flexner demonstrated near superhuman industry and energy in carrying out his review of American/Canadian medical education. He crisscrossed the United States and evaluated institutions from the point of view of an educator and not a medical practitioner. Questions regarding the clinical facilities available for teaching purposes were few and brief to the dean and professors of the clinical departments. Flexner was mainly interested in the extent to which the school enjoyed rights or merely courtesies in the hospitals identified in the school catalogue. Admission standards, physical facilities, especially well-equipped laboratories, and instruction by physician scientists were the other major criteria for judging the quality of the education offered. Schools were assigned to one of three categories on the basis of his evaluation: A first group consisted of those that compared favorably with Hopkins; a second tier was comprised of those schools considered substandard but which could be salvaged by supplying financial assistance to correct the deficiencies; and a third group was rated of such poor quality that closure was indicated. The latter was the fate of one-third of American medical schools in the aftermath of the report. A majority of the medical schools were rated as defective with low admission standards, poor laboratory facilities, and minimal exposure to clinical material. Medical education at the turn of the century was a for-profit enterprise that was producing a surplus of poorly trained physicians. The enactment of state licensing laws put teeth into the indictments of the report. Flexner sounded the death knell for the for-profit proprietary medical schools in America.

THE FULL TIME SYSTEM IN ACADEMIC MEDICAL SCHOOLS

The Flexner Report was embraced as the definition of the academic model that was to characterize American medical education up to the present. Its success was importantly assured by the huge financial gifts of the Rockefeller and Carnegie Foundations — this single model of medical education required large sums to support the scientific focus at its core. The powerful stimulus of philanthropy money also affected the fashion in which medical faculty would live their lives in academic medicine; this was the important introduction of the full-time system in medical schools. Medical professors were to be freed from any major responsibilities for patient care and could dedicate their lives to research and teaching. It was the example established in German universities during the 1880s, where the practice was observed by Welch, who became a major proponent of the innovation. The advancement of knowledge was to trump all other involvements in the academic physician's life. Provision of an adequate salary for the full-time faculty would guarantee that fees generated from patient care would not be pursued and distract from research. A McGhee Harvey, chairman of the Department of Medicine at Hopkins at mid-century, believed that no single event had a more profound effect upon medical education and medical practice than this movement.

But the full-time system was not without its serious critics. The most vocal challenger and naysayer was William Osler, who was subsequently seconded by Harvey Cushing. Osler believed that the focus of such physicians would be too narrow, they would live lives apart with other thoughts and other ways [9]. He was apprehensive that a generation of clinical prigs would be created, individuals who were removed from the realities and messy details of their patients' lives. Osler believed that the Flexnerians had their priorities wrong in situating the advancement of knowledge as the overriding aspiration of the academic physician. He placed the welfare of patients and the education of students to that effect as more important priorities, although he reverenced the centrality of scientific knowledge in that regard. His mentee, Harvey Cushing, voiced the same sentiments, basing his reservations on his background of several generations of practicing physicians. Their voices were hushed by the irresistible seduction of large sums of money tied to implementation of the full-time system. Osler's voice also was near silenced and no longer a force in this matter following his move to Oxford at the time this controversy was taking place. William Welch, the Carnegie and Rockefeller foundations, and Abraham Flexner were successful in the task they had set out to accomplish.

THE FLEXNER REPORT — THE PATH NOT TAKEN

The success of the reorganized medical training has been awesome in the breadth and depth of understanding and discovery. Its achievements are so evident that enumerating them is somewhat unnecessary. The Puritan ministers and their descendents would be dumbstruck by so much that has been realized; Frederick Gates would reel on learning of the uncoding of the human genome, which has become the newest secular Bible of science for many. The Hopkins Circle was responsible for creating a pathway that has taken mankind to the stars. Still, a question can be raised, needs be raised, as to the cost incurred by this journey, filled as it unquestionably is, with marvels. Did the Hopkins Circle take the profession down a pathway that threatened the loss of what should be non-negotiable for all physicians, academic or not? Did the Flexner Report overlook the ethos of medicine in its blind passion for science and education? What was the cost of our success, and who has borne that burden? Review of medical care in the last century documents that the trust and respect that were extended to the profession 50 years ago have been substantially eroded. There has been a fall from grace of our vaunted profession [10]. Physicians have lost their authenticity as

trusted healers. We have become derelict in many realms. Bioethicists are strident in drawing attention to the major moral failing of the profession in the last century; its failure to address and care for the problem of pain — this an omission by a group that has ready and singular access to the means for resolution of pain. The $14 million SUPPORT study to understand and improve care for patients at the end of life found that more than 40 percent of families were unhappy with the fashion in which their loved ones were cared for as they died [11]. The discontent with doctor's errors, doctor's silence, doctor's experimentation, and the crass monetary orientation of the profession is legion. The profession appears to be losing its soul at the same time its body is clothed in a luminous garment of scientific knowledge.

This is especially ironic because the Teutonic heritage that provided the template for Flexner's plan also contains a cautionary message for him, for his Circle, and for all of us. It is the tale of Faust and the irresistible allure of knowledge in exchange for one's soul. The Carnegie Foundation unwittingly recast Goethe's drama by selecting Flexner as the main character in their version of the play. Flexner may be in part excused for his omission of any consideration of a physician's healing role and how education should foster that art; he was an educator whose philosophy was shaped by a pathologist and their shared immersion in the German tradition and by his reading of Billroth's *Medical Education in German Universities*. This was a world of hyper-rationalized medicine that Flexner investigated during his early sabbatical years post-Louisville phase and to which he returned for a second time after his completion of the Flexner Report in 1910. Two years later, he published a European version of the report with a critique of medical education in France, Britain, and Germany [12]. His uncritical description of the German system is surprising, especially for a modern reader in retrospect. The German clinic is described as being surcharged with energy and ideas, but there is little if any mention of ideals. Oslerian wisdom regarding the primacy of patient beneficence is not evidenced. Patients were primarily viewed as serving the academic purposes of the professor. These attitudes were not of apparent concern for Flexner or his advocates. Flexner's identification of Billroth's text as his most important influence is also troubling. The book contains several anti-Semitic passages that are very offensive for all readers and especially disturbing for a Jewish reader. It was a work for which Welch also had great admiration. In his preface to a translation published in 1924, he described the book as a work of enduring value, characterized by a breadth of view as sound and as needful today as when it was first published in 1876. Flexner and Welch must have been aware that its prejudiced views had led to near riots over its depictions of Jews and the superiority of pure German racial stock. Flexner's journey from Louisville to the aristocratic Hopkins Circle may have required adaptations and moral accommodations that ultimately made their way into his prescriptions for American medical education. His apparent oversight of the service role of the profession may also have played into his fierce and critical opposition to Winternitz's Institute of Human Relations [13]. Social involvement of the physician was unimportant for the physician as envisioned by Flexner.

THE FLEXNER REPORT AND THE RESTITUTION OF MEDICAL PROFESIONALISM

The Flexner Report set American medicine on a course that was fueled by the energy of scientific discovery. Those discoveries have immeasurably improved the lives of all human beings, and it is difficult to cavil in the face of such accomplishments. But the oversights of Flexner and his associates need not have occurred if these leaders had recognized the primary role of physicians as beneficent healers; the delicate balance of patient care and research could have been pursued with mutual benefits for both sides. As it was, the science of medi-

cine eclipsed the active witnessing of our patients. Edmund Pellegrino's lament was proven true that doctors had become neutered technicians with patients in the service of science rather than science in the service of patients. How else to explain the seemingly unexplainable Tuskegee experiments, the Henrietta Lacks tissue culture tragedy, the many occurrences in which the physician as scientist has taken precedence over the physician as healer. But this lesion is not restricted to situations in which patients are used as experimental subjects — it pervades the fashion in which so much of medicine was taught and practiced in the last century. This lapse has not escaped our patient population nor our critics who have richly documented the poverty of professional ideals now current in medicine. They have called for a new Flexner Report, a centennial taking stock, to address the shortcomings in medical education that have occurred in the aftermath of the original report. Dr Tom Inui, an internist and medical educator, was enlisted by the AMA to spend a year in this investigation [14]; Molly Cooke and her associates undertook the same task for the AMA and performed a mini-version of the Flexner initiative by visiting 10 medical schools throughout America [15]. Everyone is a proponent of what is now happening in many medical schools. Major emphasis is being placed upon the professional formation of students and specific core competencies. Practice-based learning, a Flexner initiative, is supplemented by courses in patient communication, medical ethics, and medical humanities. Departments of medical education are now part of medical faculties that train their members to incorporate these ideals into their courses. The coming century has received a bounteous richness of medical accomplishments thanks to Flexner; a system of education that was conceived more than a century ago still remains a vibrant system. There is in place an edifice that is the envy of the entire world, but it is a structure that has required a re-molding in light of its too-narrow focus. The original Hopkins edifice has been rebalanced in the last 10 years following the revisions in the medical curriculum that recent re-evaluations have called for.

A similar revision of Christopher Wren's cathedral occurred near the end of the 17th century. The Oxford Circle witnessed severe damage to Wren's signature edifice when the Great London fire threatened the cathedral. The distinguished gardener, diarist, architect ,and polymath John Evelyn assisted with the plans to repair the cathedral. He also made an important gift to the corpus of scientific knowledge with the later donation of the anatomical tables to the Royal Society [16]. These were micro-dissections of the arterial, venous, and neurological systems mounted on pine tables; they were the work of Padua anatomist Joann Leonius, whom Evelyn had witnessed dissecting during Evelyn's study of anatomy. Anatomists later recognized that the delicate arborizations of the three systems were virtually super imposable upon one another. Very recent studies, only doable as a result of modern molecular techniques, have identified the inter-dependence of the vascular and nerve systems. They are not only structurally related. There is constant cross-talk between them with shared growth factors, receptors, and specialized cells. During embryogenesis, the nerves and vessels impose the directions of growth that become the vascular and nervous systems that Harvey and Willis originally described; failure of coordinated interaction of these vital systems results in death or maldevelopment of the embryo [17].

CONCLUSION

There was maldevelopment in the structure of medical education in America in the aftermath of the Flexner Report. The profession's infatuation with the hyper-rational world of German medicine created an excellence in science that was not balanced by a comparable excellence in clinical caring. Flexner's corpus was all nerves without the life blood of caring. Osler's warning that the ideals of medicine would change as "teacher and student chased each other down the fas-

cinating road of research, forgetful of those wider interests to which a hospital must minister" [18] has proven prescient and wise. We have learned that scientific medicine must travel linked to a professional ethos of caring that has been in place in our oaths and aspirations. Cross-talk must occur between the two with a bi-directional bedside to bench dialogue. This creates the frisson that animates the quest for breakthroughs in a medical realm. The revisions in medical education that are now taking place are reclaiming the rightful eminence of the service component of medicine — the centerpiece of the doctor-patient relationship. The Flexner model remains in place, the foundation of the magnificent edifice that is American medicine.

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