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Medical Education in the Twenty-First Century: The Evolution from Treating Disease to the Treatment of People with Disease

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Abstract

In the dawn of the Twentieth century, medical education was a for-profit enterprise that was producing poorly trained physicians with very little knowledge in the scientific aspects of medicine. In the early part of the Twentieth century, Abraham Flexner undertook an assessment of medical education in North America. The Flexner report and the Hopkins Model of Medical Education which it proposed, erected an edifice, not of bricks and mortar, but of tradition and science, that became the system of American medical education during the Twentieth century. As a result, in less than a century, medicine progressed from believing in evil humors and ignorance of the microbial world, to sequencing the genome. In the face of these monumental strides in human knowledge. Ironically as we enter the Twenty-first century, medical education faces yet another period of self-assessment and reform. Indeed, many attribute the present state of turmoil in the delivery of healthcare to the myopic emphasis on the discovery and treatment of disease in the twentieth century which may have overshadowed the human, social, and economic aspect of medicine. In turn, the lack of emphasis on the human, social, and economic aspects of medicine may have resulted in the side-lining of physicians in the system of healthcare that has emerged in the Twenty-first Century. Furthermore, medical education has been criticized for emphasizing scientific knowledge over the development of a culture of medical education which emphasizes character, compassion and integrity in the physician, who is trained to use an understanding of human biology, clinical reasoning, and practical skills to alleviate human suffering rather than to cure disease.

The only hope for the salvation and future of medicine is a change in medical education. The model of medical education in the Twenty-first century needs to guarantee that medical students and residents become sensitive and compassionate "Healers" who are also trained in the scientific, social, and economic aspects of medicine. Only through this existential change in medical education, can physicians occupy a position of leadership and be pivotal in plotting the course of American Healthcare in the Twenty-first Century.

Keywords: Medical education; Patient-Centered Care; Healthcare

By all Accounts Medical Education and Medical Care in the 21st Century are in a State of Turmoil

Consider these Facts:

1. The trust and respect that were extended to the profession have been substantially eroded.
2. There has been a fall from grace of the "vaunted profession".
3. Physicians have lost their authenticity as trusted Healers.
4. The discontent with the Doctors' errors, Doctors' silence about problems in medicine, Doctors' experimentation, Doctors' lack of interest in their patients, and the crass monetary orientation of the profession has been unprecedented and has rivaled similar behavior which stigmatized the profession during the 19th century.
5. The profession appears to have lost its soul while its body is cloaked in a luminous garment of scientific knowledge.
6. With the loss of its soul, the profession has surrendered its Hippocratic and sacred mission of caring for the sick to business concerns such as healthcare organizations and insurance companies which are driven by financial gain and see patients and the ill as a commodity for attaining healthier bottom lines.
7. Increasingly the direction of healthcare is determined by individuals with a background in business as opposed to medicine and the healing arts.
8. "Patient First" has become an overused cliché and a meaningless logo for the "big business" in medicine.

How did this Situation Arise, and what can be Done to Save Medicine in the 21st Century?

The answer to the future success of healthcare, lies in medical education. Although some believe that medicine is beyond repair or that it needs to be saved by governmental and healthcare organizations or even the public, medicine in the 21st century can only be saved by a humanistic system of medical education where future physicians acquire a crucial set of professional values and qualities at the heart of which is the willingness to put the needs of the patient first.

In order to plan the future of medical education one has to start with an examination of the past. This communication reviews the journey of Medical Education from the Apprenticeship Model of he Nineteenth century, to the Investigational Model of the Twentieth century, and the emerging Humanistic Model of the twenty-first century.

Medical Education in the Twentieth Century; The First Part of the Story

In the early part of the 20th century, Abraham Flexner undertook an assessment of medical education in North America. His landmark 1910 report changed the face of American medical education [1-5].

In the dawn of the 20th century, medical education was a for-profit enterprise that was producing poorly trained physicians with very little knowledge in the scientific aspects of medicine, and even lesser interest in the humanity of their patients. By most accounts, medicine was just another business where financial gain trumped all other considerations. In preparation for his monumental task, Flexner immersed himself in the literature of medical education during the latter part of the 19th century, and specifically identified with the book *Medical Education in German Universities* written by the leading surgeon of the time, Theodore Billroth [6]. After visiting some 155 medical schools in the United States Flexner chose Johns Hopkins as the gold standard for American medical education in the new century. The Hopkins Model which became the standard for university medical education was implemented by William Welch, a pathologist, and the founding Dean of the Johns Hopkins School of Medicine. Welch had studied the German pedagogic style of medical education and was resolute in the belief that medicine

was a scientific discipline that could best be realized by a system in which physician scientists were trained in laboratory investigation as a prelude and foundation for clinical training and investigation in University Hospitals. In accordance to Welch's vision, the Hopkins Model was instituted by the first faculty of Johns Hopkins School of Medicine, "The Four Doctors", William Henry Welch, a Yale trained Connecticut Yankee and a pathologist, William Osler, a Canadian son of a frontier minister and the first chief of medicine, William Stewart Halsted, a New Yorker, a graduate of Columbia College of Physicians and Surgeons, a student of Theodore Billroth, and the first chief of surgery, and Howard Atwood Kelly, a University of Pennsylvania trained gynecologist and the first chief of gynecology. The Hopkins Model dictated that all physicians had the responsibility to generate new information and create progress in medical science. Science as the animating force in the physician's life was the overarching theme in the Hopkins Model. This concept coincided with the vision for the ideal physician in Flexner's landmark report. The Flexner report and the Hopkins Model of medical education erected an edifice, not of bricks and mortar but of tradition and science, that became the system of American medical education during the 20th century.

Without a doubt, during the 20th century, the successful reorganization of medical training had an awesome effect on the breadth and depth of understanding and discovery of disease. Flexner and the Hopkins Model were indeed responsible for creating a pathway that in a short time has taken humankind to the stars. The awe-inspiring achievements of the last century are so evident and widely appreciated as to obviate the need for enumeration. It is hard to believe that in less than a century medicine has gone from believing in evil humors and ignorance of the microbial world to sequencing the genome.

In the face of these monumental strides in human knowledge, ironically as we enter the 21st century, medical education faces yet another period of self-assessment and reform. In the past two decades more than a score of reports from professional taskforces, educational bodies, as well as governmental and non-governmental organizations have criticized medical education for emphasizing scientific knowledge over the development of a culture of medical education which emphasizes character, compassion and integrity in the physician who is trained to use an understanding of human biology, clinical reasoning, and practical skills to alleviate human suffering rather than to cure disease [7,8].

In the century since Flexner's report, the academic environment has been transformed. Ironically, in academic hospitals, research outstripped teaching in importance, and a "publish or perish culture" emerged. Research productivity became the metric by which faculty accomplishment was judged; and teaching, caring for patients, and addressing broader public health issues were viewed as less important activities [9,10]. In addition to the shift in the importance of research relative to teaching and patient care, medicine in the 20th century witnessed a transformation in the process of research on human disease from clinical investigation to the molecular aspects of disease. Whereas prior to the 1960s the distinctive feature of American medical education was the integration of investigation with teaching and patient care with each serving the other's purposes, after the 1960s patients were bypassed in most cutting-edge investigations, and immersion in the laboratory became necessary for the most prestigious scientific projects. Clinical teachers found it increasingly difficult to be first-tier researchers and fewer and fewer investigators and medical faculty could bring the depth of clinical knowledge and experience to the education of the new physicians. The education of new physicians was gradually relegated to young inexperienced faculty, or physicians outside the university who are engaged in the private practice of medicine. Many clinical teachers in universities across America no longer exemplify Flexner's model of the clinician investigator. Medical students and residents are often taught clinical medicine either by faculty who spend very limited time seeing patients and honing their clinical skills, and unfortunately see this practice of medicine as a necessary chore for the advancement of their careers as basic science investigators; or by practitioners who have little familiarity with modern biomedical science and see teaching as a distraction to their busy clinical practices.

The increasing turbulence of the healthcare environment in the past 20 years has generated a second set of conditions which have further eroded the education of new physicians. Clinical teachers have been under intensifying pressure to increase their clinical productivity and generate revenue by providing patient care. The harsh commercial atmosphere of the marketplace has permeated many academic medical centers and is characterized by new terms that have been introduced into the teaching environment: "throughput", "market share", "units of service", and "the bottom line". The emphasis on the science rather than the patient, and the culture of medical practice which has resulted from the Flexnerian 20th century medical education, has forced physicians in all aspects of medical practice and education to relinquish control to those in the business of medicine. Indeed, at this time, healthcare as a "big business" threatens the primary mission of medicine as a "calling in service of the sick and humankind".

In the twenty-first century, medical education of the 20th century is indicted for emphasizing the discovery and transmission of knowledge instead of teaching the values of the profession with an emphasis on humanism as a framework for imparting skills and transmitting knowledge to the new physicians.

Did the Hopkins model take the profession dawn a pathway that threatened the loss of what should be nonnegotiable to all physicians? Did this model overlook the ethos of medicine in its blind passion for science and the advancement of medical knowledge? In truth, a first-hand examination of the Flexner report reveals the unfortunate fact that, indeed, in addition to a scientific foundation for medical education, Flexner envisioned a clinical phase of education in academically oriented hospitals, where thoughtful clinicians would pursue research stimulated by the questions that arose in the course of patient care and teach their students to do the same. Counter to widely held yet mistaken belief, to Flexner, research was not an end in its own right; research into disease was important because it led to better patient care and teaching.

Clearly during the 20th century, the way in which future physicians encountered the knowledge base of medicine was profoundly influenced by the assimilation of medical education into the investigational culture of the University. Theoretical, scientific knowledge formulated in context-free, and value-neutral terms became the primary basis for medical knowledge and reasoning. This knowledge was grounded in the basic sciences; however, by all accounts there was a less robust accommodation for the practical skills and distinct moral orientation required for the successful practice of medicine in the 21st century. It is important to note that Flexner had not intended that such knowledge should be the sole or even the predominant basis for clinical decision-making. Within 15 years after issuing his report, Flexner had come to believe that the medical curriculum placed too much weight on the scientific aspects of medicine to the exclusion of the social and humanistic aspects. In fact, in 1925 he wrote, "Scientific medicine in America- young, vigorous and positivistic- is today sadly deficient in cultural and philosophic background. It appears that medical education of the 20th century came away with only part of the Flexner vision for reforming medical education. Undoubtedly, he and the architects of the medical education of the 20th century would be greatly disappointed to see that at some point the path that they envisioned went awry.

Interestingly the predicament faced by medical education in the 21st century was foreseen by one of the "Four Doctors" William Osler. Osler who a few years after the establishment of Hopkins Model moved to Oxford, believed that the so-called "Flexnerians" had their priorities wrong in situating the advancement of knowledge as the overriding

aspiration of the academic physician. Although he had great reverence for investigation into new scientific knowledge, he considered the welfare of the patient, and the education of the student to that effect, as more important priorities.

Since Flexner's day, clearly the knowledge base for medical practice has hypertrophied. However, the education of physicians in today's vastly more complicated healthcare delivery system for a public which has much higher expectations, clearly requires a culture of humanism as the solid foundation for that knowledge. Regrettably, this is where the 20th Century system of medical education has failed. This lapse has not escaped the patient population nor the critics of the medical system, who have richly documented the poverty of professional ideals now current in medicine. Many from outside and inside of Medicine 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 [5,11-13].

Medical Education in the Twentieth Century: The Rest of the Story

In the turn of the 20th century when the future of American medical education and American medicine was being debated in Europe and institutions of higher learning in the Eastern United States, without notice by the eastern medical intelligentsia, a different seed for the path of American medicine was being planted in the barren plains of southern Minnesota.

In an ungodly cold January day in 1864 Dr. William Worrall Mayo placed an ad in the area newspapers announcing that his medical practice was open for business in downtown Rochester Minnesota, a town of 1400 people, and thus the Mayo Clinic was born. Soon Dr. William and his two sons, Will and Charlie Mayo, transformed American medicine in a different way from "Flexnerians" and the Hopkins Model, and created a mammoth enterprise of medical care which is the envy of the world in terms of patient care, undergraduate and graduate medical education, and the discovery of new knowledge. William Worrall Mayo a diminutive man in stature referred to by patients as "the little Dr.", and his surgically gifted sons, "Dr. Will" and "Dr. Charlie", emphasized the fact that the patients are what really mattered and that the education of physicians and discovery of new knowledge was to be in the service and healing of the sick. It is important to note that Doctors Mayo and Mayo Clinic entered the same period of turmoil and rapid change in healthcare as the "Flexnerians". Furthermore, the healthcare environment in the latter part of the 19th century was every bit as challenging as the issues that face medicine and medical education today. However, the success of the Mayo Model over the long term was rooted in the singular concept that the work of the physician, the education of the future generations, and the quest for new knowledge were solely for the purpose of meeting the needs of patients. This open secret of being deeply rooted in the primary value of putting "humans with an illness first", was the engine which drove education of the future generations of physicians and the discovery of new knowledge at Mayo Clinic [14]. In the same year as the Flexner report, in 1910, Dr. Will Mayo spoke at Rush Medical College in Chicago. In that speech he emphasized that "the best interest of the patient is the only interest to be considered." He went on to emphasize that with the interest of the patient and the healing of the sick as the starting point, the training of the future generations of physicians would result in a culture of medicine that better represents the ideals of the profession and assures its survival through the episodic turmoil which characterizes healthcare.

Whereas the Hopkins Model of medical education prioritized investigation and discovery of new knowledge over the training of new physicians and the care of patients, the three shields which comprise the logo of Mayo Clinic exemplified the different approaches in terms of priorities in healthcare in the Mayo Model. The larger Central Shield symbolizes caring for the sick, while the two smaller shields that juxtapose and intersect the central shield symbolize the integral aspects of educating the next generations, and the discovery of new knowledge. Indeed, this concept has been responsible for the constant growth and expansion of the Mayo Clinic during its 150-year history and seems to better represent the model for health care and medical education in the twenty-first century.

Medical Education in the 21st Century

The key goal of medical education in the 21st century needs to be the creation of an inclusive, humanistic culture as the strong foundation upon which knowledge and skills are taught to the new physicians.

Starting with respect for the needs of the patient and dedication to the central mission of alleviating suffering, the manner in which knowledge is imparted and skills are attained, requires a radical departure from the past. Although the dictum" see one, do one, teach one" may have characterized the way in which clinical skills were learned in the past, it is now clear that for training in skills to be effective, learners at all levels must have the opportunity to compare their performance with the standard, and practice until an acceptable level of proficiency is attained. The appreciation of the importance of practice, and the honest admission that neophytes cannot perform high-stakes procedures at an acceptable level of proficiency, demand that we develop approaches to skills training that do not put our patients at risk in service to education. The use of increasingly sophisticated simulators and virtual reality offers physicians at all levels the opportunity to refresh skills and learn new ones in a safe practice environment. Educational methods that allow the demonstration of mastery at one level, with respect to both technique and judgment, before progression to the next level, teach an important lesson in professionalism [15-17].

At all phases of medical education, whether in medical school or in residency training, the young physician needs to be mentored by senior faculty who not only impart knowledge and skill but serve as role models and shining examples of the profession. Sociologic studies have noted the importance of socialization and implicit learning in the development of professional attitudes and behaviors. Therefore, explicit instruction in professionalism, combined with effective role modeling and attention to the hitting curriculum of the practice environment, can support the development of a comprehensive and sophisticated understanding of the profession by the new physician.

The model of medical education in the 21st century needs to emphasize that medical students and residents become sensitive and compassionate Healers as well as knowledgeable technicians and skillful practitioners. Rigorous assessment of the acquisition of the humanistic healing attributes by the new physician is even more important than the assessment of their knowledge and skills. Undoubtedly, in all areas assessment drives learning. The new model of medical education needs to rigorously assess the new physician's embodiment of the culture, the professionalism, procedural skills, judgment, and commitment to patients as human beings. Self-assessment, peer evaluations, portfolios of the learner's work, written assessments of clinical reasoning, standardized patient examinations, oral examinations, and sophisticated simulations are to be used in order to assess the acquisition of appropriate professional values as well as knowledge, reasoning, and skills. Such a rigorous program of assessments has the potential to inspire learning, influence values, reinforce competence, and reassure the public.

Arguably, the most important aspect of medical education in the 21st century is to require that the new physicians learn from outstanding experienced senior clinical teachers, side-by-side with the laboratory scientists and physician scientists who not only impart knowledge and skill but act and are seen as shining examples of professionalism, the humanity, and the morality of the profession [15].

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One hundred years ago Flexner's critique of medical education converted an evolutionary change already underway in North American medical education into a revolution. With the institution of Flexner's recommendations, Medicine has made transformative advances in the twentieth century. However, once again, our approach to medical education is inadequate to meet the needs of medicine. No one would cheer more loudly for a change in medical education than Abraham Flexner. He recognized that medical education had to reconfigure itself in response to changing scientific social and economic circumstances in order to flourish from one generation to the next. Interestingly, the same understanding for the need of medicine to change is illustrated in the quote from Charles Mayo "the only constant in medicine is change". Clearly the flexibility and freedom to change, indeed the mandate to do so, were part of the essential message delivered to American medicine by Flexner, the Hopkins Model, and the Mayo Clinic Model. The only hope for the salvation and future of medicine is a change in medical education.

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