Medical Schools since the Flexnor report

E. A. Stead, Jr.

Since the Flexnor reports, the major medical schools have conformed to this paradigm of four years of college, four years of medical school. Years 1 and 2 (in the medical school) were devoted to the study of the biological sciences relevant to medical practice and years 2 and 3 to apprentice experiences in large charity hospitals.

Between 1932 and the present day, many new schools were established. Faculty for these schools were drawn from the old established schools and conformed to the patterns that were present in the parent institutions. Faculty and newly established schools frequently tried to break out of the mold -- but rarely succeeded. The students knew that they had to pass State or National examinations in order to be licensed to practice. They were against any radical changes that might lead them to fail the examinations.

In the early days, the majority of the pre-clinical faculty were graduates of medical schools. The materials they covered were descriptive and the students were expected to memorize large amounts of materials. The practicing physicians had few tools at their disposal and those that they had were not very complex.

These were the days when students and interns measured the concentrations of glucose and non-protein nitrogen in the blood. Interns did their own bacteriology. There was no understanding why any drugs produced their effects and no one thought that proteins could be enzymes.

The role of viruses was just emerging. The Electron microscope was only a gleam in someone’s eye. The courses were didactic, each subject was covered completely and the role of the student was to regurgitate the material accurately at examination time. These new biologist scientists were recruited by medical schools. They were not as expensive as the MD.’s and the turnover was less. Gradually, the MD became replaced by the non-MD (the career Ph.D. Scientist).

Usually the Ph.D. faculty had little knowledge of how the practicing doctor spent his day and what he needed to know to practice excellent medicine. The Ph.D. graduates had much more extensive training than the usual MD and was interested in continuing research in the parent discipline.

After 5 years in a white suit, I became the Chief Resident in the Thorndike and was apprenticed to Soma Weiss, who had received excellent research experience in pharmacology at Cornell Medical School. He learned clinical medicine by the usually apprentice method. I had had no research training. I inherited a research laboratory with a research technician who knew much more than I did. Faced with the day to fill and the expectation that all Thorndike appointees did well, I went to work on my own. Soma was in and out of the laboratory listening to our experiences and encouraging us to make some type of measurement on either sick or normal patients each day. He never stayed with us while we set up our smoke drums to obtain some rather primitive quantitative data. The system worked. We wanted to have something to show. Soma, appeared in the laboratory each morning and late afternoon. His invariable question: What have you learned? A brief but profitable discussion followed and our day was made. I remain ever grateful for the inspiration he gave us and the freedom to make it on our own.

I give this brief story to emphasize how primitive medical science and clinical research was in 1937. The two years of science did cover the major fields directly related to medical practice and made it possible for medical schools to produce in 4 years a MD with a working knowledge of current biological science.

In 1932, the medical graduate was prepared to enter medical practice immediately or undergo apprentice training in large charity hospitals. He could go to a few places for a more advanced medical training and hopefully join a medical school faculty. There were only a few openings and the chances were great that these persons would not find a faculty position that could pay them a living salary. They would eventually practice medicine. While the medical schools were being homogenized, biological sciences i the colleges and universities were steadily evolving.

University departments of biology had begun to explore biological systems throughout the entire animal and plant world. Bacteria and fruit flies became prime areas for research. These university biologists were in daily contact with their colleagues in physical chemistry, physics, virology, mathematics and engineering and had little or not contact with MD's. These new Ph.D. doctors largely displaced the MD components of the basic science faculties.

The new members of the medical faculty were research oriented and knew little about how a practicing doctor spent his day and what he needed to know to care for patients. They were primarily interested in the non-MD graduate student who could help them with their research and eventually join the non-MD component of the medical school. These new scientists with only a passing interest in medical students wanted to remain in the medical school because the medical school was able to build better laboratories and pay higher salaries than the parent university.

After World War Il, more moneys became, available for graduate students and the pre-clinical faculty began to spend much more time with the more responsive graduate students and less with medical students. The medical students sensed the disconnection between the pre-clinical and clinical years but knew the basic science material had to be memorized if they wished to graduate. The medical students reluctantly memorized and quickly forgot after the examination. The faculty gave the required lectures, graded the examination and rarely inspired the student's.

Specialization was slowly gaining ground. Paul White's Textbook of Cardiology appeared in 1931. The Harvard Medical School was not impressed. He held the rank of instructor. Hopkins moved more rapidly in psychiatry, pediatrics, all the surgical subspecialties and all the emerging medical subspecialties. The Massachusetts General Hospital joined up. The Peter Bent Brigham lagged.

In the mid to late 30's, specialty boards appeared and began to establish training programs that permitted applicants to take examinations to become board licensed specialists. The growth of specialization gained great momentum with W.W.II. The Defense Department had to expand rapidly and had to give rank to thousands of doctors. They seized on the diplomates of the various specialties and gave them top rank.

Doctors enlisting at a low rank could rise in pay and rank if they passed a Specialty Board while in the military service. The VA system continued this practice after the War. Two doctors might have equal competence but the diplomate of the Specialty Board was paid more. Academic institutions, private practice clinics and most governmental agencies favored Board diplomates. The era of specialization was upon us.

From 1939 on, it was obvious that the old pattern of practice was gone. Doctor's wives and receptionists could no longer carry the load and specialty areas in the Allied Health Professions developed rapidly. In time, most of them required students to have a college degree. The time involved in these programs varied from six- months to three years. Each program grew as a vertical spike without horizontal connections. Pharmacy, dentistry, clinical psychology, occupational therapy, physical therapy, radiology technicians

produced generalists and specialists. There were no plans for crossover between disciplines. The medical schools treated the physician's assistant who applied for admission to medical school exactly the same as a college graduate who had never seen a patient.

The medical school was the only thing that did not change. The 'doctor to-be' frequently had four years of college, four years of medical school, 3 to 6 years of residency training, two years in the Army or the National Institutes of Health and 1 to 3 years of specialty training which was required to allow him to sit for the Specialty Board examinations. The medical schools continued to assume that the science exposure in the first two years of medical school prepared the doctor to pursue with a career in biological science or a career in practice. The science courses were driven by the ever increasing amount and diversity of scientific knowledge and by the effort of the institutions to omit nothing. Memory ruled the day and the forgetting curve kept pace. The pre-clinical faculty believed that every detail must be memorized or the medical care would suffer. Students exposed to the mass of material memorized and forgot it. Most got no thrill out of the experience and the number of pre-clinical faculty members with only an MD continued to decline.

Today, a career in biological and medical science requires a full time commitment and the time constraints of clinical and scientific specializations precluded most practicing physicians from careers in science. The research dollars progressively went to the Ph.D. and not the MD.

From 1947 until 1994, the clinical facilities of the medical schools increased rapidly in size and income. The funds created supported the clinical faculty and the surplus was used to support young people and research. Without these clinical dollars, most private schools would have to downsize and give up most of their emphasis on education. The dollars previously given to the schools before the onset of managed care, went to the people managing the system and to stock-holders in the managed care companies. The faculties became distraught. How to survive became the only topic. No one worried about the learning activities of the institutions.

Duke was particularly hard hit. The medical school has little endowment. It had been a leader in generating private practice funds and sharing them with excellent doctors and the research and teaching activities that made it famous. The medical school and hospital had never been poor before. The shock was great!

The leaders of the school have a large hospital to support. The reaction of the faculty is to try to grab as much practice as possible and to support our two large hospitals at all costs. They had bought up local practices, but have as yet not devised a way to ensure that these practices come up to traditional standards of Duke of old.

The present Duke programs attempt to fight vigorously to fill the beds in Duke Hospital. The Medical Center will support any practice that sends patients to Duke. However, it will not cooperate with any practice that competes with Duke for patients; that would be a fight to the finish. This policy prevents the medical school from cooperating with the many excellent practices staffed by former Duke students, fellows, residents and faculty. It is a policy that sacrifices many things to the goal of- filling a large hospital and maintaining a large ambulatory practice.

In time, Duke will have to accept the fact that the Flexnor paradigm has run its course and hopefully take the lead in developing a new paradigm. It can take advantage of the fact that technology have removed the need of a large component of the medical school to be located on a central campus.

In 1929, the young Dean Davison told the Duke endowment that Duke had to have a large central campus centered around a very strong library. He requested that they give him a blank check and a six month leave to travel to Europe. The trustees agreed and Duke was on it's way. (He would return with an excellent library and Duke would have the foundation to achieve national status).

Until recently, useful information from all parts of the world flowed into the library but one had to be in Durham to use it. Today, this has changed. The flow of information from the periphery still reaches Duke where it is immediately distributed. Worldwide we no longer need a central campus where scholars come to gleam the wisdom of the past and keep their research efforts up to date. In this-age, Duke no longer has a need to build more space on the central campus. We can have Duke professors and Duke learners all over the world.

In the present system, doctors, nurses, pharmacists, physical therapists, nurse practitioners, physician's associates and assistants, laboratory technicians and a variety of other occupations have separate educational programs -- each has its own requirements for admission into schools and programs. They can be illustrated by vertical spikes -- the heights representing the number of years out of high school which are required to complete the programs. There is no horizontal path connecting the vertical spikes.

A nurse practitioner with a Master's degree and 5 years experience caring for patients will have to start at the bottom of the vertical spike if he/she wants to become an MD. The same is true for all other health professionals who wish to change to another one of these vertical spikes.

When we consider the fact that all of these health workers have to interrelate at the patient interface, the separateness in the educational system seems ridiculous. We are not the first to appreciate that the separateness of the vertical spikes prevent a cooperative effort at the patient interface. Programs have been created to have all health professionals start together then after a common base diverge. They have not usually been successful.

The medical schools traditionally required a strong science base during the four years of college and a two year commitment to memorizing the many facts in the basic science curriculum. .It was obvious that the majority of persons entering the health profession would not be admitted to medical school and licensed to practice medicine. It was also clear that most of the science training in college and that in the first two years of medical school was not essential for most allied health workers. Why work as hard as those few who would be, admitted to medical school?

The science teachers became unhappy at the differences in achievement between the likely successful MD students and those who would move to less academically demanding positions in other parts of the system. Instead-of creating a warm collegial feeling across the board, the result was a more striking separateness of the MD component. While the pre-clinical and clinical portions of the medical schools were drifting apart, the clinical department developed sophisticated research programs.

The basic science faculty never appreciated the length of time between entering medical school and entering practice. They continued to base their program on lectures -- giving students many interesting facts but had no way to relate these facts to any of the "hands-on" approach to the practice of medicine.

They under estimated the force of the forgetting curve and never appreciated the fact that anything relative to clinical practice could be learned in the 5 to 11 years between the third year of medical school and the use of material learned by being apprenticed to excellent practitioners.

From 1947 on, with the aid of NIH funds, clinical departments developed laboratories as sophisticated as those in the basic science departments. One could not tell by wandering through the laboratories which belonged to the basic science departments and which belonged to the clinical departments. This meant that for all practical purposes, the school could produce excellent practicing physicians without the use of the first two years of medical school.

We urged our pre-clinical colleagues to take advantage of this freedom and tackle the problem of sending us third year students with more competent and flexible brains. The content they used to obtain this result was irrelevant because the clinical services had plenty of time to fill in any content that was relevant to clinical practice. Unfortunately, the basic science faculty never used this freedom and continued to teach lecture-memory programs that they grew up with.

In our experience, young people are limited by their facility in reading the quantitative and symbolic languages developed by biologic sciences. Instead of the usual memory oriented didactic course in freshmen chemistry we urged them to convey how chemist worked and required the student to read intelligently a few classical papers in the biochemical literature. It goes back to the old proverb -- Give a hungry man a fish and he may starve. Teach him to fish and he may not starve.

By 1937, it was obvious that the old pattern of practice -- nurses, receptionists, and doctors -- could no longer carry the load. Over the years a large supporting team has evolved. BA’s, nurse practitioners, surgical assistants, physiotherapists, dietitians, X-ray and laboratory technicians, home-based therapist, pharmacists, clinical psychologists, etc. Each of these disciplines developed as clinical vertical spikes with various educational requirements. The physician assistants, nurse practitioners, pharmacists, X-ray technicians, pulmonary support personnel, surgical pump specialists may require a college degree and two or more years of schooling in the specialty area. Medicine has usually wanted to take its students as they graduate from college. If one has spent a number of years in climbing these vertical spikes of supporting personnel, it is usually difficult to advance further in the medical profession. One must go back to ground one. No credit is given for any part of ones experience except for the college degree. The time and money are lost.

How did such a ridiculous system develop? Doctors had a tight monopoly. One could not practice medicine without a license granted by the State. The graduates of a medical school were the only one allowed to take the licensing examination -- absolute power always corrupts.

The new paradigm establishes an organization which admits students after three years of college. The curriculum inverts the Flexnor paradigm. At the end of the first year, all students have mastered the skills required to function as an emergency medical technician. They know how to splint a broken bone; how to avoid spinal cord injury from broken vertebra; how to use the Hymlick maneuver; how to perform cardiopulmonary resuscitation; how to maintain an open air way; how to distinguish an abnormal EKG; how to defibrillate a heart.

Biologic diversity is a fact of life and all persons entering the medical arena must have an understanding of the basics of biological diversity. Living systems are composed of many substances which require a constant supply of energy to maintain their integrity. If energy is not supplied --compounds degrade to a lower level and become useless for the maintenance of life. Sugar and the non-nitrogenous portions of proteins free up packets of energy as they are degraded to C02 and water. The break down of foodstuffs and the capture of energy has to be done in multiple steps because these reactions must occur without large changes in temperature. The organism uses a number of specific proteins to degrade the foods and store the energy in small packets - H.T.P. Many individually tailored proteins must be fashioned by the cells to replace glucose and other foodstuffs to C02 and water. Each protein must be assembled from individual amino acids joined together in a prescribed order and folded in a particular way for the protein to effectively catalyze its own particular reaction. Different PH and electrolyte concentrating are required for some reactions and the reactants must be placed in membrane enclosed compartments to separate them from other components of the cell. The organelle membrane is relatively but not absolutely impermeable to many substances. To keep desired concentrations within organelles, the membrane must be able to facilitate transfer of desired substances into and out of the cells. If these transfers are against gradients special pumps must be located in the cells. All of these reactions requiring specific proteins and packets of energy stored as A.T.P. or other high energy phosphate compounds.

The necessary compounds are produced in thousands and millions of cells. Errors are frequent and unless the errors kill the cell they may enter in the brew and contribute to biologic diversity. When the fertilized egg makes its first division, the’ two resulting cells. The general concept of how living things differ from non-living systems must be an important part of every persons learning. It is not important for everyone to know each enzyme and the reaction that occur in every living organism, but the complexity of the systems and the chance for error making and infinite variations must be appreciated by all.

In time Duke will have to accept the fact that the Flexnor paradigm has run its course and hopefully will take the lead in developing a new paradigm. From 1937 until the present, the practice. of medicine has changed. The allied health profession has blossomed and without their support, the MD could not function effectively. Everything has changed except the medical schools. The medical school continues to pretend that the science exposure in the first two years of medical school prepares the doctor to pursue a career in biological science or a career in practice. The science courses are still memory oriented. The diversity of scientific knowledge and desire of the faculty to encompass too much material in a short time has destroyed the need for the Flexnor paradigm. The science taught in medical school no longer prepared the MD for a career in research. The MD diploma prepared for a clinical residency not for a career that taps the research dollars. From 1940 to 1944, the cost of medical care rose rapidly. Hospitals expanded, cost of technology skyrocketed, inflation increased in all arenas but in particular in medical care. The basic science facility profited by the increase in research dollars and by the willingness of industry to invest heavily in research to solve the problems of particular diseases. The medical campus expanded rapidly but less and less more was committed to support medical education as such.