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# Primum non nocere.

This paper has to do with a history of medicine. It will have to do with the many triumphs as well as some of the failures. It really is a story of what has been tremendous progress in a field that concerns us all. The role of medicine in society over the centuries cannot be overestimated. Many of us would not be here if it were not for the miracle of modern medicine and surgery. The progressive improvement in our health and longevity over the centuries is nothing less than remarkable. It has been a triumph over many of the forces of disease and injury. and death. This triumph though incomplete is ongoing and progressive. It is the result of a combination of many factors; the improvement in the practice of medicine arguably, the most significant. However, much of that progress in medicine like any human endeavor, has been uneven.

The famous Canadian physician William Osler (1849-1919) once defined medical practice as art based on science. And what may be surprising is that physicians have often very late or slow to appreciate or to take advantage of science. That is one of the things I will try to address tonight.

Until about 150 years ago medicine was an art that had very little to do with science. Science then as well as now had to do with provable facts and reproducible results. Medicine then was bogged down with ancient theories having to with anything and everything but facts. Human anatomy was often confused with that of animals. Philosophic ideas were relied upon to explain bodily functions. Prayers were offered to dubious gods before dosing with fantastic concoctions of the exotic to the weird, from boiled puppies to snake vomit. Scientific method was rarely applied to medical practice. Dating from antiquity, human beings were thought to exist in delicate balance of imagined humors. Illness could result in any disruption of that presumed balance. Illness could be cured by re-establishing that balance. Humors were of different characteristics associated with particular organs and often with astrological star and planet configurations. Even today atavistic holdovers remain in our normal vocabulary. Personalities are still described as being in good humor, phlegmatic, melancholic, splenic, etc. Other holdovers include the ideas underlying modern quackery such as astrology, chiropractic, homeopathy and Christian Science.

The humoral concept of disease was so well entrenched in medicine that it was not until about 1840 that the first physician even thought of looking at blood through a microscope.The microscope had been invented by a Dutch lens grinder around 1680 but had been ignored by physicians. Diseases were classified in humoral terms and disease most of

any type was generally subject to the therapy of depletion. The theory was to get the body to get rid of some disrupting humor. Such treatment was frequently so aggressive that the patient could not survive it. George Washington was heroically bled of some three quarts of blood in a futile attempt to treat diphtheria. He succumbed not from the disease but from loss of blood. His doctor was the the prominent Philadelphia physician Benjamin Rush( 1746-1813), signer of the Declaration of Independence. For centuries bleeding or venesection had been an accepted and recommended treatment and Washington was treated by the best. The public, it seemed was not fooled. The name of a famous London Quaker physician, John Coakley Lettsom (1744-1815), friend of Benjamin Franklin, was the subject of a satyrical bitter pun:

*If to me the sick apply, I bleeds and pukes and sweats'em. If thereupon they choose to die, why verily, I lets'em!*

.Dr. William Harvey's discovery of the circulation of the blood in 1628 had absolutely no effect on the way learned physicians managed their patients. For example, the appropriate bleeding site for a particular set of symptoms continued to be seriously discussed for the next 200 years. The extensive modern market for laxatives owes a lot to the persisting depletion fallacy to relieve the body of so-called toxic substances.

For centuries plagues of one sort or another swept through Europe causing repetitive massive and widespread death and social disruption. Pits of mass graves from the 1340 Black Death are still being found.

Europe is thought to have lost half of its population by 1350. The Graben avenue in central Vienna was built over the mass graves of its plague victims. There was no effective treatment and physicians were not only helpless but doctors often tried to flee along with everyone else when plague approached. While plague left few remaining in its wake, endemic smallpox left many survivors. Their faces were typically severely scarred and they were often left permanently blind. Smallpox, highly contagious had a 30% mortality. In Tudor England the disease was responsible for the death of the 16 yr. old Edward VI, the only son of Henry VIII and in the 18th C. smallpox effectively put an end to the one hundred year old Stuart monarchy.

The first successful attempt to mitigate the effects of smallpox in England has an interesting history. Soon after the turn of the 18th C., the well known noble woman letter writer in London, Lady Mary Wortley Montague, was the daughter of a member of the ancestor of this club, the famous London Kit-Kat Club. Lady Mary always wore a veil to cover the smallpox scars disfiguring her once beautiful face. She, had been a "reigning beauty" and after a Kit Kat meeting was dedicated to her, her name was permanently inscribed on glass goblet. She later married the ambassador to Turkey and is remembered today as having brought back to England the oriental practice of variolation. This was the technique to immunize against smallpox by deliberately implanting infectious material to give a smallpox infection. This was typically a mild case, but not always. And it was often unsuccessful. A successful

variolation, however, conferred lifetime immunity. It was eagerly adopted by the English royal family and Catherine the Great of Russia but variolation remained controversial. Medical men were both skeptical and suspicious emphasizing its risks. Moreover, smallpox kept a lot of doctors busy futilely but profitably dosing, bleeding and purging. Pharmacists too, were also kept employed preparing useless nostrums and salves. More seriously, from the doctors' standpoint, variolation could be carried out by any reasonably competent lay person. A physician was not needed. Variolation remained underused and the ravages of smallpox continued essentially unabated going on to kill an estimated 400,000 people in the Europe alone in the18th C. It all changed in1798. In that year Dr. Edward Jenner (1749-1823), reported his observation that milkmaids were smallpox immune. Their immunity was the result of a naturally acquired cowpox infection. Jenner introduced what became the effective safe wide-spread practice of vaccination. So effective is vaccination that by 1980 smallpox virus had been totally eradicated worldwide. Jenner's work is said to have saved more lives than any other single event in history.

Although bacteria and other germs were observed in the 17th C. their connection to disease in animals and humans did not occur to the medical fraternity until the mid 1800's. Organic chemists, in Germany and in France had developed staining and culture techniques such that various types bacteria could be identified, isolated and grown in the laboratory. By infecting laboratory animals which reproduced human

disease, the connection of human illness to bacterial infection could be definitely made. In Scotland chemical techniques to clear the odor from the Carlisle municipal sewer pits were adapted by surgeon Joseph Lister (1827-1912), to prevent wound infection in his patients. He correctly connected the feted odor of both to contaminating bacteria. Controlling bacteria and preventing their growth eliminated much of the dangers that had always plagued surgery. This empirical observation led to the adoption of new surgical techniques and procedures which are commonplace today. Surgeons could now enter the body safely where they never could before. However, the new requirements: surgical gowns, rubber gloves, masks, sterile procedures, etc. forced many surgeons to end their careers when they could not adapt.

The killing of infectious bacteria led to the widespread use of antiseptic solutions in wound care however their effectiveness was limited and at times, even detrimental when they caused increased tissue damage. However, so convinced were physicians in their efficacy, antiseptics were considered standard in wound care for many years even after it was shown by the First World War that they could worsen wound infection. I can remember as a child in the 1930's I was made miserable by the useless and painful tincture of Iodine used by my physician father on my frequent cuts and scrapes.

The control of an last outbreak of cholera in London in 1848 was not the result of any medical efforts. The outbreak was stopped as the result of the statistical study of its incidence related to a contaminated water

supply. The spread of the disease was halted by simply sealing the single sewage contaminated city pump. Physicians and others had to be convinced that the disease was not due to noxious fumes inherent in that poor part of the city. Intuitively it never made sense that microscopic organisms could cause serious illness and death. Prominent personalities never were convinced. The famous Lady of the Lamp, Florence Nightingale went to her grave convinced that simple dirt was the source of disease and cleanliness was God's answer to illness.

When Winston Churchill facetiously defined the traditions of the British navy as three: rum, sodomy and the lash, he omitted a fourth: scurvy. So ubiquitous and so serious was this deficiency disease that more seamen regularly died of scurvy than from shipwrecks, storms or enemy action. It was a rare long sea voyage that did not have scurvy take much of the crew., though fresh fruit and vegetables were known from antiquity to prevent the disease. Capt. Cook's famous explorations of the Pacific in the 1700's were successful largely due to his constantly resupplying his men with fresh fruit. Heat sensitive vitamin C, unknown at the time, was destroyed in physicians' attempts to preserve vitamin containing fruits and juices on shipboard and trials at substituting sour kraut, vinegar, etc. were failures. It was not until 1912 when vitamin C was finally discovered in the laboratory that the cause of scurvy as a vitamin C deficiency was finally understood. This was long after the British ended scurvy with the requirement based on empirical evidence only, that all

seamen be regularly supplied with fresh fruit. Thus, the sobriquet of *limeys*.

William Osler who defined medicine as an art was famous for his art of bedside teaching and his diagnostic ability. In his practice for which he was renowned he had no X-ray or laboratory tests. When he died in 1919 medicine was still not much more than an art. That art caught up with science in the 20th C. This was the science of the laboratory where planned experiments became a reality. Often with heavy government support, chemistry laboratories became industrialized and this led to the discovery of hormones, new drugs and medicines and vaccines which radically changed the way medicine was practiced. Fatal illnesses such as diabetes were now treatable. Others if not curable were suddenly preventable. The big killers of the past: Tb, typhoid and syphilis, are just examples of diseases that we fortunately rarely need to think about these days. What chemists have produced in their laboratories have resulted in improvements to medical practice that have saved millions of lives. For example, for better or worse, the continent of Africa which had a population of about 1.5 million in 1900, will have a population of 1 billion by 2040. This is largely the result of the control of just a few diseases like typhoid, malaria, yellow fever and sleeping sickness.

In 1928 a spore of bread mold contaminated a bacterial culture in Alexander Fleming's London laboratory. Fleming (1881-1955), recognized that the mold, penicillin killed dangerous streptococcus bacteria. The discovery won him the Nobel Prize. The modern era of

therapeutics began with penicillin and the subsequent practical use of other antibiotics in medicine and surgery. For the first time, doctors now had effective safe tools to use against offending microorganisms in fighting infectious disease. As a direct result of antibiotics, World War II was the first war in history that saw fewer deaths from disease than from injury. From birth to old age and in our food chain, antibiotics now play a major role in all of our lives. A serious danger at this point is now from antibiotic overuse. Over-prescribing for humans and animals now poses a serious risk of failing effectiveness of these life-saving drugs..

Humphry Davy (1778-1829), a chemist in 1800 was the first to propose the use ether as a general anesthetic. Its effectiveness was finally demonstrated in 1846 but it took Queen Victoria to be anesthetized for the delivery of her first child before many medical and religious objections were overcome. Many physicians thought anesthesia dangerous and used the occasional anesthesia death to bolster their argument. Objecting preachers quoted the bible in theirs. However, it was effective anesthesia combined with infection control that has permitted modern surgery in all its present iterations. As a result, previously unimagined surgical interventions are now common place.

Beyond the science, the intersection of medicine, ethics and religion has always been a challenging one eliciting many questions. If illness, evil and pain are part of God's plan, what business is it of man to go against God's will? If God did not intend to subject a woman to painful labor, why does painful labor exist and why was it so ordered in the bible? Do

good and evil co-exist, each with its own reality as the Manichaeans believed? Or, is there only one benevolent God the source of all things as the Abrahamic religions teach?

Is there a religious purpose for a physician to combat the evils of disease and illness if they are simply the will of God and presumably part of His plan? Is this a test? In the book of Job, the existence of evil seems simply the result of a sort of a bet by God on Job's faithfulness. Is there such a thing as original sin which is the source of mans' suffering.; or are the evils, illnesses, etc. the result of his personal sins, known and unknown. The AIDS epidemic, now mercifully under control, recently brought these questions again to the fore. As these questions are endless, so are the answers.

What role of does the the doctor play in all this? From early on, Christian teaching had much to do with mercy and the relief of suffering. This was a carry over from the Hebrew tradition of the Old Testament: *to do justly, love mercy and walk humbly with thy God.* However, was the physician enjoined to do more than relieve suffering? The apostle Luke was a physician and Jesus himself cured the blind and lame. Surely, Jesus could not go against God. Attempts at curing the sick was thus legitimatized and justified as part of God's unknowable plan. The apparent contradiction still exists however. As an example, certain Christian monks were prohibited from attempting any medical intervention beyond the simple succor. The relief of the suffering of the unfortunate is part of God's mercy but does this include euthanasia or a

physician assisting in suicide? In San Francisco during the initial AIDS epidemic when the disease was uniformly fatal, as president of the Medical Society, I was actively attacked by activists when I insisted that it was unethical for doctors to kill patients even on request. Unfortunately today the argument continues.

The physician is called on to heal the sick but deep gaps in our understanding persist. Even today our present knowledge of the details of healing remains incomplete. Simply put, is as true today as it was in the renaissance when the great French surgeon Ambroise Paré (1510-1590), modestly and succinctly wrote: *I dressed the wound but God healed it.*

Medical progress was and is the result of the application of brilliant ideas combined with hard and often dangerous work. Aside from the ever present risk of accidental infection, physicians have been heroic and have often used themselves as test subjects. Two doctors died in Cuba in 1900 in proving the mosquito transmission of yellow fever. In Africa today immunization teams are threatened by fatal infection while at the same time their lives are at risk from religious fanatics.

Besides following erroneous and often false leads and scientific error, physicians have for various reasons endorsed quackery. For example, through ignorance or malevolence some physicians lend their voices to hysterics and some continue to mislead and endanger the public irresponsibly and falsely attributing autism and other disease to

childhood immunization. We will never know how many desperate unfortunates have been victimized by baseless medical claims of false cures and quackery. On many occasions physicians' knowledge has been taken advantage of by the unscrupulous. In the past, doctors were paid to concoct poisons . But today, drug companies have reward programs for the prescribing of their often very expensive and/or questionably effective drugs. It is thought that through ignorance or cupidity doctors' prescribed narcotics result in at least a third of all deaths from drug overdose.

Beyond knowledge of drugs, physicians' skills can be used unethically by society to supervise torture and juridicial executions. Having completely lost moral compass certain doctors have carried out the unthinkable. Somehow, they have managed to justify dangerous often fatal experimentation on the helpless. In the infamous Tuskegee experiments in the 1930's, there was deliberate mistreatment of poor black patients by their government appointed doctors. Scandalously, ostensively for medical purposes with medical treatment available, known syphilitics were left untreated In recent memory, prisons doctors often carried out court ordered castration and eugenic sterilization procedures. Nazi doctors were involved in systematic government euthanasia programs and fully documented ghoulish human experimentation on political prisoners. The infamous concentration camp *Angel of Death*, Joseph Mengele was a medical school graduate! Until it was stopped medically

supervised torture was carried out by the CIA in the US prison at Guantanamo Bay, Cuba.

The definition Osler gave to the practice of medicine that it was an art based on science has for the most part been superseded by a new paradigm. Medicine is now science with incidental art. There is a serious risk that the patient as an individual will be lost. In the name of efficiency the patient and his particular problems as well as his particular needs, that helps define the art of medicine are often overlooked. The potential sacrifice of the the patient as well as the physician as individuals in what may be referred to as the industrialization of medicine is real. The industrialization of medicine with the loss of the art of medicine threatens the health of both.

The ascendency of science in medical practice is matched by a corresponding threat to medical ethics as mentioned. The relative ease with which the ethical practice of medicine was and continues to be easily perverted has long been recognized. Around 400 BC in classic Greece the Hippocratic Oath was formulated in an attempt to address such threats.and to provide ethical guide lines. Beside attempting to prevent ethical mistakes, the oath detailed some of the basic duties physicians owe to their patients, owe to themselves and owe to their profession.  Significantly, these aphorisms were preceded by simple but important general admonitions. These warnings to ancient Greek

physicians are famous. They are as pertinent today as they were then. We know them in latin:

Vita brevis; Ars longa; Occasio praeceps; Experientia fallax; Judicium difficile. *Life is short;* T*he Art is long; Opportunity fleeting; Experience misleading; Judgement difficult.*

A commandment which should precedes all is more than an oath. It is more of an overriding demand. It is a commandment to the physician to look at his profession through a special lens. It has to do with the inordinate power conferred by society on physicians and to remind the physicians of their duty to preserve and to safely extend the quality and length of life. It and the subject of this paper can be summarized humbly and simply:

Primum non nocere!

*First, do no harm!*

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