Chapter 13

Contextualizing Medicine

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Medicine is one of the many areas of knowledge linked to the maintenance and restoration of health. According to the World Health Organization, health is not just the absence of disease. It consists of the physical, mental, psychological, and social well-being of the individual. It is a cumulative state, which must be promoted throughout life, to ensure that its benefits are fully enjoyed in later days [1, 2, 3]. In this context, guidelines from supranational organizations composed of eminent intellectuals from around the world related to the health area established a new paradigm of approach in medicine. [4, 5, 6, 7]

13.1 Medicine Concept

Medicine, derived from the Latin *ars medicina*, means the art of healing. The concept of traditional medicine refers to practices, approaches, and knowledge, incorporating material and mental concepts, manual techniques, and exercises, applied individually or in combination, to individuals or groups, to treat, diagnose, and prevent diseases or to maintain the well-being [8, 9, 10].

13.1.1 History of Medicine

There are two versions of the origin of medicine. According to the Shiite countries, medicine emerged in the Achaemenid Empire [11, 12, 13, 14] and, according to the Western tradition, Hippocrates is considered the father of medicine. It is considered that he lived between 460 and 377 BC and left an ethical and moral legacy valid until today. Precursor of scientific thought, he looked for details in his patients' illnesses to arrive at a diagnosis, using supernatural explanations, due to the limited knowledge at the time. Even before the Christian era, Asclepiades of Bithynia tried to reconcile the atomism of Leucipus and Democritus with medical practice. In the first century of the Christian era, Claude Galen, another Greek



Figure 13.1: The doctor treating a patient. Museum of the Louvre, Paris, France.

physician, made substantial contributions (based on animal dissections) to the development of medicine.

At Middle Ages, the religion took control of the art of healing through medicines and left it to the barber-surgeons, who already dealt with the razor, the realization of bleeding, supposedly effective in curing diseases, and also amputations on the battlefields, at a time when there was no anesthesia [15, 16, 17, 18].

In 1865, Louis Pasteur theorized that infections were caused by living things. He was the inventor of the process of pasteurization, widely used in milk. Lister, in 1865, first applied an antiseptic solution to a patient with complex fractures, with a prophylactic effect on infection. A new era has begun. In 1928, Alexander Fleming discovered penicillin by observing that bacterial colonies did not grow near the mold on some culture plates. A new era emerged: that of antibiotics, which allowed doctors to cure infections considered deadly. Evolution since then has not stopped. Man's eternal struggle against death entered a new, increasingly modern stage.

13.1.2 History of Medicine in Brazil

The first practicing physician in Rio de Janeiro was Alexis Manuel, the old man, in the middle of the 17th century. The caboclos used the medicine of the shamans and the blacks, their amulets, and herbs. The barber surgeons were responsible for prescribing drugs, bleeding, and attending to difficult deliveries. There was no medical school and those from Rio de Janeiro who wanted to take the course were forced to go to study in Coimbra. The medicine during the First Reign, although the king D. João VI had taken some good doctors to Rio de Janeiro, was of the "homemade type."

In colonial times, Rio de Janeiro was a veritable "experimental field" for medicines, such was their quantity. In addition to imitating those from Portugal, there were indigenous or

African specialties. In Vigier's Pharmacopoeia, 1766, the following notes can be found: for syphilis, powdered viper meat; for pulmonary tuberculosis, pink sugar with donkey's or goat's milk; for worms, deer antler shavings; for baldness, ointment of human fat taken from hanged men; in angina, roasted and powdered rooster neck; for witch hazel, worm paste. There were teas made from cat and dog droppings, bedbugs, urine, the flesh and skin of frogs and geckos. An emulsion known as 'of chastity' was given to priests and nuns as an anti-aphrodisiac: it contained lettuce water, roses, and poppy seeds [19].

After opening the ports of Brazil to friendly nations of Portugal, D. João VI signed on February 18, 1808, under the influence of the Chief Surgeon of the Kingdom Jose Correia Picanco, the document that ordered the creation of the Bahia School of Surgery and started the teaching of medicine in the country [20, 21, 22, 23, 24]. The Faculty of Medicine at UFRJ was created months later, by Royal Charter signed on November 5, 1808, with the name of School of Anatomy, Medicine, and Surgery and installed in the Military Hospital of Morro do Castelo [25, 26, 27, 28].

On June 30, 1929, it was founded in Rio de Janeiro the National Academy of Medicine by Joaquim Cândido Soares de Meireles, its first president. Before the institution was called the National Academy of Medicine, it had had two other names [29, 30, 31, 32, 33]. There are one hundred full members who join the institution upon presentation of scientific theses. On one of its premises, a small museum shows, for example, the first stethoscope that arrived in Brazil.

The internalization of medical teaching began only in 1950, when the first medical school in the interior of Brazil was founded, the Faculty of Medicine of Sorocaba [34, 35, 36].

On June 13, 1954, the director of the Brazilian Institute of History of Medicine planted in the botanical Garden from Rio a seedling coming from the multimillennial tree of Hippocrates, which still exists on the island of the Waistband, in Greece.

13.2 Medicine in Different Countries

13.2.1 Brazil

In Brazil, the medical course is offered as graduation (6 years), and high school is the only prerequisite for enrolling in the course [37, 38, 39, 40].

13.2.2 Portugal

In Portugal the medical course is offered at the level of post-graduate strict sense, being necessary as a prerequisite, before the individual has graduated from any graduation (3 to 4 years) in areas involving health such as biology, nursing, and pharmacy, among others, and after joining the master's degree in medicine (3 years) or take the integrated master's degree in medicine that allows you to enroll in a degree (3 years) that will involve basic subjects in general biology and health and after that, the master's degree (3 years) itself, which is the course enabler [41, 42, 43, 44].

13.2.3 United States and Canada

In the United States and Canada, as well as in Portugal, the medical course is also a strict sense postgraduate course, and before the individual enters postgraduate medicine (MD) or osteopathic medicine (DO), they must have completed degrees involving content in the areas of science. Most part of candidates are graduates of biology, chemical, and physical, among others, as long as they contain the minimum of equivalent biological materials required [12, 45].

13.2.4 Medical Sciences and Medical Professions in Brazil

The average time of training in medicine in Brazil is 6 years. After graduating as a doctor, one can do a specialization or a medical residency which will depend on the chosen specialty and sub-specialty. To enter a medical residency program, the doctor must be approved and classified in an international contest and, due to the large number of doctors who graduate each year, the number of professionals who manage to be approved in this contest has been increasing. These physicians end up choosing to specialize in a normal postgraduate course, which often does not have the same level of quality required for a residency program [46, 47].

Medicine has two aspects: it is an area of knowledge (science) and is an area of application of this knowledge (medical professions). In medicine, we can highlight dentistry, which in both Brazil and Portugal already constitutes an independent medical and surgical course [48, 47].



Figure 13.2: The medicine helps maintain and restore people's health.

The evidence-based medicine is an attempt to link these two aspects (science and practice) through the use of scientific methods, seeking through techniques and scientific research the best treatment for a given patient. It can sometimes be difficult to distinguish between medical science and the profession of medicine. The various specialized branches of medicine are studied by specialized basic sciences and correspondingly specialized medical professions that deal with organs, organ systems, and their diseases. The basic science of medicine is often the same as in other areas such as biology, physics, and chemical [49, 50].

There are several areas linked to health science or medical science: dentistry, social service, psychology, nursing (the care of the sick patient), pharmacy, biology, biomedicine, speech therapy, physical education, physiotherapy, occupational therapy, nutrition, prosthetics, and bioengineering [49, 50].

Several auxiliary (mid-level) professions in Brazil can also be included, among which Community Health Agents stand out, a function equivalent to barefoot doctors in China, Endemic or Zoonosis Control Agents; Sanitation Assistants and Sanitary Inspectors; Laboratory Assistants (biochemistry), Nursing Assistants, Nutrition and Dentistry Assistants or Dental Hygiene Technicians. In some regions, midwives are still trained and supervised by midwifery centers. Public Health specialists have emphasized the importance of these professions, especially for their ability to solve the most frequent problems in the population and mainly for carrying out prevention services (preventive medicine) and health promotion in the model of family health care [50].

The doctor, when in the last years of medical school, performs hospital internships in various areas such as medical clinic, general surgery, pediatrics, gynecology, and obstetrics. In some Brazilian colleges, mandatory internship has already been introduced in collective health, with internships in preventive and social medicine in family and community medicine [50].

13.3 Distribution of Doctors in Brazil

The inequality in the distribution of physicians in Brazil follows other social chasms that exist in the country. Although there is one doctor for every 549 Brazilians — a rate higher than that recommended by the World Health Organization (WHO), one for every thousand people —, seven out of 10 professionals qualified to work in the country work in the South and Southeast regions. As a result, while in Rio de Janeiro there is one professional for every 289 inhabitants, at the other extreme, the people of Maranhão have one doctor for every 1,848 people. The data are from a new balance of the Brazilian Federal Council of Medicine [51].

There are about 347,000 doctors spread throughout Brazil. Were it not for the disparity in the distribution of these professionals, it could be said that the Brazilian situation is better than that of countries such as Japan (with one doctor for every 952 inhabitants), the United Kingdom (one for every 869 people) and Argentina (one for every 740). The average recommended by WHO aims to ensure that the population has medical assistance, as well as professionals, have a satisfactory number of patients. In the Brazilian ranking, Paraná occupies the 7th place, with one professional for each group of 586 inhabitants [51].

In North and Northeast states, the capitals bring together almost 90% of professionals. According to the Integrated System of Medical Entities, there were 575 qualified doctors in Acre. Of these, 427 (74%) worked in the capital, accounting for one doctor for every 716

inhabitants. The other 21 municipalities shared 119 professionals, each responsible for 3,236 inhabitants. In the interior of Roraima, the ratio goes from one doctor to 10,000 people [52].

13.4 Medical Specialties

- Anatomy is the study of the macroscopic physical structure of organisms. Study the great structures, the skeleton, the musculature, and arterial and venous blood vessels, as well as lymphatic vessels and nerves, organs, and associated structures;
- Bioethics is the study of the relationship between biology, medicine, and philosophy, especially concerning ethics and metaphysics;
- Cardiovascular surgery operates in heart surgery;
- Cytology is the study of individual cells and their internal structures;
- Embryology is the study of the development of organisms from the union of gametes, which give rise to a zygote which, in turn, develops into an embryo;
- Epidemiology is the quantitative study of disease processes in a population of humans. Includes the study of epidemics, endemics, biostatistics, and disease-related risk factors, among other topics;
- Pharmacology is the study of drugs, from their acquisition to their beneficial and harmful actions on the organism;
- Physiatrics is the area of Medicine that studies and deals with the consequences of diseases that generate physical disability;
- Physiology is the study of the normal functioning of an organism;
- Neuroscience is a term that brings together the biological disciplines that study the nervous system, especially the anatomy, and the physiology of the human brain;
- Ophthalmology is the study of ocular pathologies, with their application in clinicalsurgical diagnosis and treatment;
- Public health is the application of medical knowledge, processed by epidemiologists, to prevent the incidence of disease in populations;
- Angiology is the medical specialty that deals with the clinical treatment of diseases that affect blood vessels (arteries and veins) and lymphatic vessels. It works in conjunction with vascular surgery, which deals with the surgical treatment of said diseases.
- Pediatrics is the medical specialty dedicated to child and adolescent care, in its various aspects, whether preventive or curative;
- Urology It is a surgical specialty of medicine that treats the urinary tract of men and women and the reproductive system of men.

13.4.1 Diagnostic and Imaging Specialties

- Pathologic anatomy: It is a medical specialty responsible for diagnosing various diseases, including cancer, through the study of cell or tissue samples under a microscope. Pathologists are the professionals responsible for diagnoses, generating reports that guide treatments, establishing prognoses, guaranteeing the quality of medical care, and are indispensable to campaigns and preventive actions. In the Pathology or Pathological Anatomy Laboratory, all procedures are performed by pathologists and their assistants. These professionals have highly specialized knowledge for the diagnosis of diseases, including cancer, based on the study of materials obtained through aspirations, smears, biopsies, and surgeries. In each exam, the pathologist selects, individually, samples for microscopic study, with no possibility of automation by machines. Anatomopathological exams (biopsies, surgical specimens), immunohistochemical exams, and cytopathological exams (preventives, punctures, organic fluids) are medical procedures and must be rigorously analyzed by pathologists or cytopathologists so that they can be performed reliably;
- Biostatistics is the application of statistics to the field of biology. It is essential for planning, evaluating, and interpreting all data obtained in biological and medical research. It is fundamental to epidemiology and evidence-based medicine;
- Biochemistry is the study of chemical reactions that take place within living organisms and, taking into account the structure and function of cellular components and the cell as a whole;
- Medical Physics uses knowledge of Physics to arrive at diagnoses, as well as assists in the development of new equipment;
- Histology is the study of how cells and intercellular material come together to form tissues, like the bony, muscular, conjunctive, etc;
- Immunology is the study of cells and molecules that make up the immunity system and its functioning in the body's defense against infectious and cell carcinogenic;
- Medical informatics is the field of study related to the wide range of resources that can be applied in the management and use of biomedical information, including medical computing and the study of the nature of medical information;
- Microbiology is the study of microorganisms (protozoa, bacteria, fungus, and virus);
- Toxicology is the study of the effects of toxins and poisons from vegetables, animals, and minerals;
- Ultrasound exams study the human body through ultrasound waves, which form shadows and echoes in the structures of the human body.

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