

Review Articles

Medical Care in Late Antiquity and its Influence in the Middle Ages

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In its ten-century history, Byzantium managed to preserve and systematize the ancient heritage, particularly medical knowledge. Based on it, Byzantium managed to develop a hospital model, which has two very important characteristics: firstly, the work in these establishments is carried out by trained and qualified staff, whose payment is provided by the community; secondly, the medical institution is accessible to everyone, regardless of their social status, ethnic or religious affiliation. The Byzantine hospital model is based on solid medical practice and knowledge, preserved in practice to accumulate medical expertise and experience to be systematized and recorded to serve in the training of the next generations, and some really impressive encyclopedic works have reached us in later copies among which it stands out the Alexander of Tralles's *Therapeutics* and Paul of Aegina's *Epitome medicae libri septem*.

Key words: Byzantine medicine, medieval hospital, Alexander of Tralles, Paul of Aegina

Introduction

Late Antiquity was a period of profound transformation, and the social, economic, political, demographic, and military processes that took place then were the subject of more than one or two studies. However some aspects of this transformation, such as the organization of medical care, reflecting the change towards the person as a whole as a result of the affirmation of new Christian values, have been undeservedly neglected. Various commentaries consider that during Cyprian's plague, Christians took care of the suffering, while the usual behavior of others was to hide. And although they were the main suspects in this disaster and officially accused, their way of acting reversed attitudes and was one of the many factors that led to the change of religion. This attitude

also reveals a potential to bring organized medical care in the upcoming centuries to a new level.

Medical Care in Ancient Societies

Christian communities began setting up special places to take care of the poor, the hungry and the sick. The first information about such “hospices” (in the Greek *ξενώνες*) comes from the Greek cities of the Eastern Mediterranean. The *Chronicon Paschale* (7th century) describes hostels founded by Leontius, Bishop of Antioch (344-358). The care of the poor and the foreigners was leading, but there is no evidence of specialized medical care provided by doctors [12]. The earliest evidence of such care is related to the work of St. Basil the Great, Bishop of Caesarea (370-379). A shelter for the poor, a leprosarium for lepers, an inn for foreigners, and separate buildings for the sick functioned in his complex, called *καταφύγιο*, *katagogia* (a shelter), as he described it in a letter to the Governor of Cappadocia [9]. To ensure the care for the sick, St. Basil personally selected trained staff - doctors and assistants; according to Sozomenos, the “shelter” fully performed the functions of a hospital [11]. The complex is known as *Basililiad* and is becoming a pattern for a charitable establishment. At the end of the 4th century, St. John Chrysostom established similar complexes in Constantinople. Palladius defines them as places of care for the needy and the sick, but the use of the word *nosokomeion* (from the Greek word for disease - *νόσος*) suggests that they served more for healing [12]. Additional light on the activities of the shelters of St. Basil the Great and St. John Chrysostom is shed by the metaphor used by St. Nilus of Sinai, which features the world as *nosokomeion* and Christ as a physician. Thus St. Nilus of Sinai implies that the doctors of the late 4th and early 5th centuries not only alleviated suffering until death, but sought to cure the sick. Finally, he states that the places where such care was provided were for the poor and the homeless [12]. In those first hospitals, the poor were given access to medical examinations, and the care needed for the treatment lay with the monks. The charitable initiatives of individual Christian communities led to the establishment of shelters/hospitals in several cities - in Jerusalem, founded by Emperor Anastasios (491-518) at the request of St. Sava; 5 km to the south of Jerusalem, the monk Theodore founded a dormitory for monks with three shelters for the sick, where medical care was provided; hospitals were also established in Ephesus, Bethlehem, central Syria, Alexandria [11].

To bring order to these charitable institutions, Emperor Justinian (527–565) issued certain regulations. This reform affects the specialization of the various establishments, the qualification of the medical staff, as well as the admission of patients. Each establishment is well defined according to the function it performs, and this is reflected in the terms used. Thus, in novellas, *nosocomae* or *xenones* are terms used for places where patients are treated; *Xenodochia* are inns, i.e. places of shelter for foreigners; *Ptochei* are shelters for the poor and able-bodied beggars, while *gerontokomeia* is a term referring to nursing homes. There is also talk of orphanages (*orphanotropheia*), crèches (*brepotropheia*) and leprosoria (*ptochotropheia*). In the hospitals until the time of Justinian, patients were cared for by people of good will with some medical knowledge, but they did not necessarily have to be educated doctors. After the publication of Justinian’s novellas, this role was assigned to the best practitioners of the Empire, the *archiatras*, the organization

of elite doctors created by Emperor Antoninus Pius (138-161). From that moment on, the place for practicing the profession of *archiatras* was the hospital. However, they no longer depended on the municipal administration, but on the bishops, because hospitals, as charitable institutions, remained under the control of the Church. Justinian was not content only with putting the best doctors at the service of hospitalized patients but also provided them with competent staff. The *hypourgoi* (nurses) were in charge of administering the treatment; They should be able to carry out small interventions and take on duty, especially at night. *Hyperetai* or caregivers helped them in their work [11]. Thus, Justinian's large-scale reform allowed the poor, like the rich, to benefit from quality medicine. These medical institutions differed radically from the places associated with a saint-healer, where the sick were treated with prayer and chrismation, as well as from the well-known in Western Europe „houses of mercy“, in which people were only cared for in purely everyday terms until death. These were institutions for „active treatment“, in which the applied treatment fit into the great medical tradition inherited from Antiquity [2]. It was based on rational medicine, based on specific knowledge of the human body, etiology of diseases and remedies. Information about medical practice and organization of medical care is found in written sources. For example, in the work *The Miracles of St. Artemy* contains two stories that reveal some details in the organization of hospitals, patients and treatments. The first reveals the story of Stephan, a deacon in the church of *Hagia Sofia* in Constantinople. He suffered from groin pain (here I should add that St. Artemius is associated with the treatment of hernias, which gives us an indication of what deacon Stephan suffered from). After a long treatment at home, he was taken by his parents in the xenon of Samson to *Hagia Sofia*, where he was admitted. During his short stay there, Stephan was placed on a bed near the eye department. After a cold cauterization that lasted three days, he was operated on. Going through this painful therapy, Stephan was finally cured [1]. In addition to the applied treatment, this passage is interesting with two more facts – the information about Samson's xenon and the presence of an ophthalmological and surgical department in it. This hospital was founded by the physician Samson in his house at the end of the fourth century and was burned down during the Nika revolt (532). By order and with the financial support of Emperor Justinian, it was restored together with the hospital of Eubulos, located in the same area. Samson's xenon is located between the churches of *Hagia Sofia* and *Hagia Eirene* and was studied archaeologically. The seals kept in the Dumberton Oaks collection show that it functioned in the following centuries. In the following years, a number of hospitals were founded in Constantinople: at the monastery of St. Kozma and Damian outside the city walls, where surgery functioned; the hospital of Christodota near the church of St. Anastasia, where the medical teams worked every other month, etc. By order of Justinian, the hospital in Side was also built, preserved almost entirely; the hospital in Antioch, destroyed by Khuzro I (531–579) in 540, was also rebuilt; two xenons were built in Jerusalem, near the Church of the Virgin Mary [11]. In the 6th century in Thessaloniki, there was already a hospital at the church of St. Demetrios [2]. The second story in *The Miracles of St. Artemius* reveals the staff organization in Christodota's xenon. During his long stay there, the clergyman who was admitted for treatment was cared for by doctors (γιατροί), assisted by their medical assistants (ύπουργοι), who, in turn, had assistants in charge of non-medical care (ύπηρέτας), i.e. the organization of medical care strictly followed Justinian's regulations [12].

Thus, the model established in Late Antiquity has two very important characteristics: first, the work in these establishments is carried out by trained and qualified personnel, whose payment is provided by the community; Secondly, the medical institution is accessible to everyone, regardless of their social status, ethnic or religious affiliation. And if the first of these characteristics can be found in the ancient period, when doctors from the community were also hired for a fee, then the wide access of those in need to medical care is a new element, previously unknown. In the following centuries, these institutions underwent their development in order to receive a complete form in the famous xenon at the Pantocrator Monastery in Constantinople. The Typicon of the Monastery of Christ the Savior and Pantocrator, was issued by John II Komnenos (1118-1143) and his spouse Irene and regulates all aspects of the functioning of the huge complex. The Typikon was issued in October 1136 and consisted of two parts: one regulating life in the monastery (the liturgical cycle, the life of the monks, their diet, administrative regulations, etc.), and the second concerning the number of hospital beds, number and nomenclature of the staff, remunerations, etc. [6]. The hospital beds were fifty in total; they were divided into five wards: two male wards - one for healing fractures and injuries (ten beds) and the second ward of ophthalmology and intestinal diseases (eight beds); two mixed wards for “ordinary” (probably chronic) diseases with ten beds each; one female ward with twelve beds. One extra bed was provided for each ward, as well as six more beds (“with a hole”) for the seriously ill. The medical personnel were headed by two chief physicians (*πριμμικηριος*), who were responsible for the admission of patients, for the diagnosis, the appointment of treatment and the training of doctors (with the help of a specially appointed teacher, *διδάσκαλος*). Only they had the right to practice outside the hospital, but not in the months when they worked there. The staff worked every other month, and in their free month they did not have to leave the city (“to be available”). The scattered data in the Typikon on the organization of the work in the hospital reveal the following picture: two chief surgeons worked in the ward for healing fractures and injuries; two senior physicians (*πρωτομηνῆται*) in the ward for eye and intestinal diseases; four physicians (*γιατροί*) took care of the patients suffering from “common” diseases in the two rooms [6]. Three doctors (two men and one woman) worked in the women’s ward. Three more assistant-doctors and two trainee doctors worked in each man’s ward, and in the women’s ward there were four assistant-doctors and two trainees (all women). The duties of today’s nurses were taken over by two assistants in each ward (women in the female ward), defined by the term *ύπουργοι*. The hospital had an outpatient clinic staffed with two surgeons and two general practitioners. They reported the severe cases to the chief physicians who decided to admit them to the hospital [6]. The hospital also had a pharmacy, served by one chief pharmacist, three pharmacists and two assistant pharmacists. Five more washermen took care of the normal functioning of the hospital; two firemen in the boiler room, who constantly ensured the availability of hot water; two bakers and one miller; one groom, one waste cleaner and security guard. Upon admission to the hospital, the sick received clothes, and it was the practice to give them to the poorest when they were discharged. The hospital provided each patient with utensils (ceramic bowl, cup and plate), as well as a place-bed (straw mattress and two blankets made of goat skin). Annual change of straws and blankets was required, and the better preserved were distributed to the poor. The monastery statute also provided for a portion of food, which was controlled

by the chief physician. According to the typikon approved by the ktetor, the hospital functioned as a financially autonomous unit under the control of a council headed by the hegoumenos. The expenses were covered by a fixed percentage of the monastery's revenues, namely from its lands, markets, handicrafts [6]. The xenon at the monastery of Christ Pantokrator features the most extensive system of hospital treatment and sets a model that was followed, to one degree or another, in other similar complexes. For example, in 1152 Sebastokrator Isaac Komnenos established the monastery of the Theotokos Kosmosoteira at the city of Bera (Greece), which had a hospital with thirty-six beds. The monastery typikon ordered the hegoumenos to hire a "*competent and proven doctor*" for "*appropriate remuneration and salary*" to care for the sick [15]. The Byzantine hospital model was also basic in the establishment of the hospital of St. John of Jerusalem after the establishment of the Latin Kingdom in the Holy Land, served by the Knights Hospitallers (Ioannite Knights). Elements such as the presence of various wards in the hospital and of separate beds, the hiring of specialists were unknown in Western Europe until then. The statutes of Roger de Moulin stipulate that four "wise" physicians should be hired to prescribe the therapy and determine the actions of other specialists. A letter from Pope Lucius III mentions four physicians and four surgeons working at the hospital [7].

The Byzantine hospital model is based on solid medical practice and knowledge, in which the ancient ideas about the structure of man and the nature of disease states are preserved and further developed. Here it should be noted the role of the schools in Athens and Alexandria, where medicine is studied on a par with the other sciences. St. Basil graduated from the school in Athens and is an educated doctor. His *Hexaemeron* known as *Sermons on the days of the Creation* (Genesis 1-24) reveal his extensive knowledge of the natural sciences, with his commentary on "*harmful plants*" being particularly impressive. He emphasizes that "*... nothing was created in vain and without benefit*" and that "*... with the help of medical science, it reveals itself to be fit for ourselves*". And he gives examples: "*Doctors use mandrake as a sleeping pill, and opium soothes severe pains in the body. And some with hemlock have pacified the rage of wishes, and with hellebore they have eradicated many chronic diseases*" [16]. We find the same passage almost literally translated in the John the Exarch' *Hexaemeron* from the 10th century [8]. In his sermons, St. Basil does not talk about the anatomical structure of man. This is what his brother, St. Gregory of Nyssa, who revealed anatomical knowledge in his treatise „*On the Structure of Man*“, accepted as a continuation of „*Sermons on the days of the Creation*“. There, in the last, thirtieth chapter, entitled „*A Brief, rather Medical Examination of the Structure of Our Body*“, extraordinary anatomical knowledge is revealed. The aspiration does not stop only at the topographical enumeration of the individual organs, but to arrange them hierarchically according to their function and role in the maintenance of life. The description of some details is downright stunning: the atria of the heart and its role in maintaining body temperature; the structure of the lungs; the role of the liver in blood formation; the description of the vena cava connecting the heart and liver (although it is incorrectly defined as carrying air); the skeleton and its mobility, provided with joint ligaments, tendons and muscle, as well as its importance for the preservation and protection of vital organs; and above all, the brain and spinal cord, giving „*impetus and strength to all the connections of bones and joints and the rudiments of muscles, with every movement and at every stop*“ [17].

It should be emphasized that in medieval East Mediterranean lands there was a practice for the accumulated medical knowledge and experience to be systematized and recorded to serve in the training of the next generations, and some really impressive encyclopedic works have reached us in later copies. Among them, two stand out, which I would like to briefly present. The first is the treatise of 12 books with the general title „*Therapeutics*“ by Alexander of Tralles. It includes descriptions of the etiology of a number of diseases, their exact symptoms and recommendations for treatment [13].

Alexander was born in Tralles, near Ephesus, around 525, his father was a doctor, and his eldest brother was none other than the famous architect Anthemius, who, together with Isidore of Miletus, built the majestic Basilica of Hagia Sophia in Constantinople for five years, at the request of Justinian. Alexander participated as a military doctor in almost all of Justinian’s campaigns in the Mediterranean, which allowed him to gain vast experience. In his last years, he devoted himself to training young doctors and writing his treatise. He died approx. 605 A.D. In his *Therapeutics*, Alexander of Tralles systematized his knowledge in the following books: I. Diseases of the head (including alopecia, migraine, and „lethargy“); II. Eye diseases; III. Diseases of the mouth (including ulcers); IV. Heart disorders; V. Diseases of the lungs (in particular, various types of pneumonia); VI. Pleurisy; VII. Stomach problems; VIII. Intestinal diseases; IX. Liver disease; X. Disentery and dropsy; XI. Genital and urinary problems; XII. *Podagra* or gout, with numerous treatments [13; 14]. Already in the introductory part of his work, Alexander states that he relies above all on the accumulated knowledge acquired in contact with his patients and presents himself as a practicing physician, not a compiler of medical knowledge [10].

Alexander of Tralles is above all a remarkable clinician and therapist. Its distinguishing feature is the accurate diagnosis¹, and the effort to clarify the causes of the disease. Alexander sought to achieve an etiological cure and stated that „*the doctor’s first goal is to eliminate the cause of the disease*“ [10]. For each disease he supplies descriptions, stages of development, recommendations for treatments, whether the illness was chronic or acute, whether a crisis signaled a cure or the onset of death, or if the *kritis*² was but one of many in a chronic illness (quite characteristic of fevers). Alexander had mastered a phenomenal variety of drugs, both in their “simple” forms and in the compound formulas almost always typical of his treatments for diseases. The *Therapeutics* fairly bulge with formulas, recipes, and measures for the compounding of drugs [13]. In his therapeutic approach, Alexander pays special attention to pharmacology, which for him is the most dynamic branch of therapy. For example, in his *Therapeutics* he explains that he is not enthusiastic about the use of

¹ According to Nicholaos Myrepsos (13th century), it was Alexander of Tralles who developed the uroscopic diagnostic method, which was subsequently further developed by Theophilus Protospatharios and Myrepsos himself. According to the diagram developed, urine was divided depending on color (10 different), sediment (five different solid particles discriminated), and transparency. This method was inalienably present in Byzantine treatises until the 15th century and was later adopted in Western Europe. Today, Alexander of Tralles’ authorship of the treatise dedicated to this method is a matter of dispute

² Patient condition involving unstable vital signs and a prognosis that predicts the condition could worsen; or, a patient condition that requires urgent treatment in an intensive care or critical care medical facility.

surgery: „arteriotomy, trephination, cauterization and all other drugs ... become a punishment for many and are not a cure“ [10].

The second major work is the emblematic medical encyclopedia *Epitomes iatrikes biblia hepta* (*Epitome medicae libri septem*) – the work of one of the most respected and revered Byzantine encyclopedists Paul of Aegina. His work consists of as many as 7 volumes. They are precious to historians and medics alike, as they summarize the best of two ancient medical systems – the ancient Greek and the Roman. His work was highly appreciated and became a cornerstone in Arabic medicine. In the 11th century, through the Arab tradition, it entered Western Europe, where future medics were trained in *Epitome medicae* until the dawn of the Renaissance. During the Renaissance, the University of Paris recommended that surgery be taught only from his books. Paul studied all sections of surgery, trauma, primarily such as sprains and fractures, amputations, cavity surgery, etc [1].

Information about Paul’s life is scarce. It is certain that he was born on the island of Aegina, around 625 and died around 690. In an epigram reproduced in many manuscripts, he is defined as *περιοδευτής*, i.e. a traveling doctor. He became famous as a particularly good surgeon. *Epitomes iatrikes biblia hepta* includes the following seven books: I. Hygiene and dietetics; II. The different varieties of fever; III. Diseases are classified according to their location from head to toe; IV. Skin diseases and intestinal pathologies; V. Poisons; VI. Surgery; VII. Combination drugs.

His work provides original descriptions of procedures including lithotomy, trepanation, herniotomy, paracentesis, breast amputation, and tracheostomy. The doctor also participates in other surgical procedures, including eye surgeries, removal of nasal polyps, tooth extraction, tonsillectomy, removal of bladder stones. Again, according to experts, the most significant contribution from the work of Paul of Aegina is in the field of surgery [19]. It gives very clear and precise instructions for some interventions, such as the removal of tonsils, for example. The patient should sit in front of the sun, his mouth should be wide open, and his tongue should be pressed with a spatula. With a quick movement, the lymphatic organ is pulled forward (through a hook), and with a curved scalpel, the surgeon excises the tissue at the base of the tonsil. The patient, if he is still conscious, should gargle with cold water (according to the doctor’s writing) after the procedure [18; 3]. One of the best surgical descriptions of Paul of Aegina is that of tracheostomy [19]. Today it is routine, but in the past, it was used as a last resort in saving the patient’s life. Turning to the historical aspects of tracheostomy, Paul of Aegina provides a detailed description of the operation in his *Epitome*. It is very similar to the modern procedure just described: “... *but in inflammations about the mouth and palate, and in cases of indurated tonsils which obstruct the mouth of the windpipe as the trachea is unaffected, it will be proper to have recourse to pharyngotomy, to avoid the risk of suffocation. When, therefore, we engage in the operation we slit open a part of the arteria aspera (for it is dangerous to divide the whole) below the top of the windpipe, about the third or fourth ring. This is a convenient situation, as being free of flesh, and because the vessels are placed at a distance from the part which is divided. Wherefore, bending the patient’s head backward, to bring the windpipe better into view, we are to make a transverse incision between two of the rings, so as that it may not be the cartilage that is divided, but the membrane connecting the cartilage. If one be more timid in operating, one may first stretch the skin with a hook and divide it, and then, removing the vessels aside, if they come in the way, make the incision.*” [14]. By

comparison, the first evidence of a successful tracheostomy in Western Europe was not officially published until 1546 by Antonio Brazavola, and the refusal to perform this „radical“ manipulation on George Washington in 1799 by the two senior physicians in the trio of physicians caring for him led to his death.

In its ten-century history, Byzantium managed to preserve and systematize the ancient heritage, and medical knowledge in particular. Based on it, the Byzantine Empire managed to develop a hospital model, the modern analog of which can be found in the clinical medicine of revolutionary France which recentered medical research and instruction in the hospitals of Paris. In the early nineteenth century, this clinical movement made great progress in improving hospital care, in describing accurately the symptoms of diseases, in compiling statistical records of these symptoms, and in the outcome of similar cases. Careful consideration of Byzantine medical science is only beginning, and the study of medieval treatises will surely reveal more clearly the achievements and failings of Byzantine medicine and the contribution of hospitals to its development [12]. But in the history of science, the legacy of Byzantium is not the property of only one country - its vast territory and influence also covers the lands of today's Bulgaria, from where it spread to the rest of the Slavic world.

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