
Main Characteristics of Medieval Medical Education and Its Legacy In Contemporary Medical Education

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ABSTRACT

The Middle Ages was a period characterized by great religious influence on medical education and the practice of the medical profession. Although it marked a period of clerical intellectual hegemony and deliberate forgetting of Greco-Roman texts, it promoted the development of the systematization of medical education with the creation of the Cathedral schools, the Medical Schools, the Studium Generale, and later the universities. At the same time, the practice of medicine was regulated with the creation of the licensing system. The foundation of the first European hospitals, initially with religious foundational endorsement, and later promoted by the monarchy and patrons, organized medical assistance. Then, they were the place chosen for the development of the practices of the medical students. In conclusion, the three main inheritances received from the middle ages with respect to medical education and practice were: the creation of universities, the medical licenses requirement, and the expansion of hospitals.

Keywords: *Medical teaching, middle ages, salerno medical school, first universities, medical licenses, intellectual systematization*

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INTRODUCTION

The development of medicine was linked from its beginnings to the need for its teaching. That is, the desire to transmit existing knowledge. This binomial constitutes what we call “medical education”.

To understand how the medical teaching-learning process developed through history, it is necessary to combine the sociocultural aspects of each era, the historical and political context, the available technology, and the pedagogical and scientific needs in relation to medical science.

The Middle Ages (MA) had its own characteristics in Europe. By convention, its beginning is identified with the fall of the Western Roman Empire (year 476). Then, the feudal system emerged; the king and the nobles granted their vassals lands that were taxed in exchange for protection. The MA ended in the year 1453 or 1492 (depending on whether its end is considered: the fall of the city of Constantinople or the discovery of America).

The MA is divided into High (or Early, between 476 and 1000), and Low (or late, between 1000 and 1453 or 1492). In the High MA, society was predominantly rural, feudal, with the power in the hands of the clergy and nobility.

Lower MA was characterized for a more commercial and urban society, with money in circulation, less feudal power and greater monarchical influence. The bourgeoisie began to be part of the culture of knowledge.

During the High MA, a long period of scientific slowdown began in Europe. The superstitious and tribal customs of the dominant Germanic peoples also began to play a leading role. The knowledge of the Greco-Latin era was partially relegated. Illness is considered as an evil sent by God.

There was a circumscription of literacy and knowledge in the hands of the clerical power, which left Greek knowledge aside. Except for a few Hippocratic medical texts. The Catholic Church positioned itself as a dominant force over all aspects of medieval life, including the practice of medicine and its teaching.

MA has also been called the Age of Faith or Dark Ages. Prayer and superstition predominated in this theocratic age. However, it cannot be assumed that for ten centuries, nothing important or original has happened in the culture.

In fact, changes that have occurred in MA at the educational level persist today. In that historical time, the university was created, a medieval institution that persists. Higher education plans were developed, continuous evaluation was

included, the book was incorporated as a learning instrument, evaluation through exams was instituted to obtain the academic degree and the obtaining of academic titles for professional practice was legalized[1]. Also, in the MA, the first hospitals were created in Western Europe.

These two facts, the creation of hospitals and universities, constituted great achievements that occurred in the MA and that contributed to the development of medical education.

First hospitals

At the beginning of the MA, monasteries and religious communities were the only centers of knowledge where people studied[2] (2). That is why it was called “monastic medicine”. Knowledge was preserved in their libraries.

In monasteries and temples patients and needy were received, with the basic objective of caring for them. The creation of hospitals was related to religious institutions in the beginning. They did not only attend to the sick, but also received pilgrims and functioned as shelters, for which many were called "houses of God" (Hôtels-Dieu)[3].

Later, hospitals of the monarchy, nobility and patrons appeared. In medieval hospitals, the care of the soul was prioritized, and little attention was given to the hygiene of the body. The patients were separated only by sex; disease segregation began in Renaissance hospitals in the early sixteenth century[4].

One of the first known hospitals was founded by Bishop Masona in the year 589, in Mérida (Spain). It followed a byzantine model, architecturally and functionally. It had separate rooms for men and women.

In France, the Hôtel Dieu de Lyon (452) was created at the request of the Archbishop of Lyon, and the Hôtel Dieu de Paris (651), was founded by the bishop, which also had ophthalmological care and continues in function today.

In Italy, the Santo Spirito Hospital was founded (717) in Rome, by express order of the Pope (completely burned down in 847 and rebuilt in 1198)[5] (5). In Siena, probably in the year 898, the Hospital of Santa Maria Della Scala[6] was founded (see Figure 1). In England, the Saint Albans Hospital was founded in 794. In the thirteenth century, hospitals were founded in the cities of Valencia, Burgos and London[7].



Figure 1. Hospital “Santa Maria Della Scala”

¹H. E. Sigerist. “The history of medical licensure”.*JAMA*, 1935, 104(13), 1057.

²R. Hajar, “The air of history (part II) medicine in the middle ages”. *Heart Views*, 2012, 13 (4), 158–162.

³J. F. Moreau, “Commentary: Medicine: Where Are the Oldest Hospitals in the World?”. *The bi-monthly journal of the bww society* [Internet], Bwwsociety.org, available in: <https://www.bwwsociety.org/journal/archive/hospitals.htm>

⁴L. Cilliers and F. P. Retief, “The evolution of the hospital from antiquity to the end of the middle ages”, *Curationis*, 2002, 25(4), 60–66.

⁵M. T. Miralles Sangro, C. Gigante Pérez, M. V. Miranda Camarero, “The Great Hall of the Hospital of the Holy Spirit in Rome (Italy)”, *Index enferm*, 2004, 13(47), 66–68.

⁶J. H. Baron, “The Hospital of Santa Maria della Scala, Siena, 1090-1990”, *BMJ*, 1990, 301 (6766), 1449–1451.

⁷P. G. Barreño and E. Futuro, “Hospital evolution”, *II Hispano-American Meeting of History of Sciences*, 1990, 1-28.

Medical education

Charlemagne (742-814) was a Catholic and Germanic monarch who founded the Holy Roman Empire. With his conquests he encountered different cultures and promoted an important reform.

The king founded a new educational structure, recognized in legislation issued in the year 789, known as the "Admonitio Generalis". The goal was to reform society[8]. He determined that each cathedral be attached to a hospital, a school, and a monastery.

During his government there were two types of schools in which scholastic studies were taught (with theological and philosophical precepts of the Catholic religion)[9]:

- The monastic schools or first studies: they were free and worked in monasteries or abbeys. They provided a basic, oral and non-literate education, except for students who were going to follow a monastic life or belonging to the clergy. The people were educated in these parochial schools.
- The cathedral schools: for higher studies, being the origin of the future universities of the twelfth century. There were poor students, but with special gifts, rich or noble, and older and educated students with the aim of expanding their knowledge. There was a philosophical doctrine in two parts: the "trivium" (grammar, dialectics and rhetoric) and the "quadrivium" (arithmetic, music, geometry and astronomy). Knowledge about medicine, law and theology were added. To be a doctor you had to be ordained as a priest or a theologian.

Together with the Medical Schools, the Cathedral Schools and the Palatine Schools arose. The latter were aimed at children of royalty and nobility. It was a time of great religious influence, so empirical and non-religious healers were excommunicated for practicing without papal license.

Despite the beginning of the organization of medical education, many surgeons during the High MA were still illiterate and itinerant craftsmen or barbers. Most of the population was illiterate. The few literate doctors and students who learned did so in Latin. They were focused on more clinical than surgical medicine[10].

Then, the "studium generale" (general studies) emerged, called "universities" as time went on. The first was the "universitas magistrorum et scholarium" (community of teachers and students), then followed by the "universitas literatum" (institution that brought together all knowledge).

Universities were a real contribution to medieval Europe that spread as a form of higher education throughout the world. Medical education was transferred there from the monasteries.

The practice of medicine began to be regulated, coming to depend on civil society and not on the clergy. This was made official in the Council of Clermont (year 1130), which promulgated the prohibition to the clerics to practice medicine. It was ratified at the Councils of Reims (1131), the Lateran (1139) and the Synod of Paris (1213).

The Universities of Bologna (1088), Oxford (1096), Paris (1150), Modena (1175), Cambridge (1209), Palencia (1220), Salamanca (1218), Montpellier (1220), Padua (1222), Naples (1224), Toulouse (1229), Siena (1240), Coimbra and Lisbon (1290), and Heidelberg (1385) were founded. At the end of the MA there were 80 universities in Europe: most of them in England, France, Italy and Germany. The University of Montpellier today has the oldest functioning Faculty of Medicine in the Western world.

An institution that grants academic degrees is called a "university" (from the Latin "universitas"). This designation appeared for the first time in a document related to the University of Salamanca, by Alfonso X, in the year 1253.

Salerno Medical School

During the High MA, the organization and systematization of intellectual activity began. This was reflected in the creation of the Medical School of Salerno (MSS), founded around the year 850, and which was the first source of original European medical knowledge, as well as the first medical school in the entire West[11]. It was followed by the Law School of Bologna in the year 1088.

⁸K. Ratajczak, "Charlemagne—Emperor and Reformer. On the 1200th Death Anniversary", *Biuletyn Historii Wychowania*, 2018,38, 309-318.

⁹ J. L. Hurtado, "The university, a reading from its genesis". In: Ó. Augusto and E. Prada E, "University, Lasallism and life project", available in: <https://ciencia.lasalle.edu.co/cgi/viewcontent.cgi?article=1057&context=libros#page=19>

¹⁰ L. García-Sancho Martín, "Surgery. Concept. historical milestones". In: J. A. Montes and F. N. Fraguas, "General surgical pathology", (Ed. Ramón Areces, 2012).

¹¹A. Castiglioni, "The school of Salerno", *Bulletin of the Institute of the History of Medicine*, 1938,6(8), 883-898.

The MSS achieved its greatest prestige during the twelfth and thirteenth centuries, after collecting Arabic, Hippocrates and Galen texts. Among other writings, the translations of Hunayn ibn Ishaq al-'Ibadi (809? -873), known as "Joannitius", were used. He summarized medical wisdom into practical questions, written in a text known as "Isagoge Ioannitii ad Tegni Galieni"[12].

Original medical texts were also written. Among them, the most famous was the "Salernitan Sanitary Regime", written in Latin and organized in sections of a didactic nature and without magical-religious content. It included basic questions about hygiene, dietetics, physiotherapy, comparative anatomy and surgery. It was translated into several languages. Up to 1846, 300 editions had been printed.

A famous professor of surgery at the MSS, Rogerius Salernitanus, wrote in 1170 the "Practica Chirurgiae", the first medieval book on surgery. The text was used in the Universities of Bologna and Montpellier. Another famous physician, poet, and bishop, Alfano I, also wrote several books and introduced an important practice: uroscopy[13].

The SMM brought botany, pharmacology and alchemy to Europe. The title of Doctor was awarded there for the first time, in the year 1180.

Although the SMM was initially under the control of the clergy, by the Benedictine monks, from the tenth century it was a lay school. It was the first of its kind that trained doctors and attended pilgrims, because it was located at the crossroads of a religious pilgrimage route. During this time, the first exchanges of medical practitioners took place, with travels between Salerno, Sicily and North Africa.

The school was famous for its scientific quality and its openness on issues of religion and sex. It was lay and enabled the instruction of men and women for the practice of medicine and teaching. Among the "mulieres salernitanae", the best known was Trotula de' Ruggiero (1050-1097), considered the first gynecologist in history[14]. She wrote several works, including two books. One was known as "Trotula Minor", with the concept of prevention for the first time in history, emphasizing the importance of personal hygiene, calibrated nutrition and regular physical activity[15]. The other book, called "Trotula Maior", focused on the experience of women before, during and after childbirth. It is considered the first systematic book on gynecology and obstetrics written by a woman. It was translated into Spanish, French, and English, and used as a textbook in universities until the sixteenth century[16].

Medical education in the SMM had the following main characteristics[17,18]:

- Existence of a teaching body.
- Teaching with a program oriented towards a more scientific medicine.
- Teaching method based on three phases: "lectio" (reading a classic text); "quaestio" (formulation of questions and problems); "disputatio" (discussion)[19].
- Use of texts based on the humoral theory of Hippocrates and Galen, and Arabic texts with knowledge of herbalism and pharmacology.
- Performance of anatomical dissections for educational purposes[20].
- At the end of the studies, a professional diploma and the title of Doctor were delivered[21].

In the year 1194, the city of Salerno was sacked. This fact, added to the competitive opening of medical schools in Naples, Palermo and Montpellier, began the decline of the SMM. It continued to function until 1811, the year it was closed by Napoleon[22].

¹² M. Bifulco, E. Ciaglia, M. Marasco and G. Gangemi, "A focus on Trotula de' Ruggiero: a pioneer in women's and children's health in history of medicine", *J Matern Fetal Neonatal Med*, 2014, 27(2), 204–205.

¹³ Castiglioni, "The school of Salerno", 883-898.

¹⁴ Bifulco, "A focus on Trotula de' Ruggiero: a pioneer in women's and children's health in history of medicine", 204–205.

¹⁵ M. Bifulco, M. Marasco, S. Pisanti, "Dietary recommendations in the medieval Medical School of Salerno: a lesson from the past", *Am J Prev Med*, 2008, 35 (6), 602–603.

¹⁶ H. P. Bayon, "Trotula and the ladies of Salerno: A contribution to the knowledge of the transition between ancient and mediaeval physick (abridged)", *Proc R Soc Med*, 1940, 33(8), 471–475.

¹⁷ D. Jacquart, A. P. Bagliani and J. Ziegler, "La scuola medica Salernitana: Gli autori ei testi". *Aestimatio: Sources and Studies in the History of Science*, 2008, 5, 81-92.

¹⁸ J. E. Valdéz García, "Salerno: the first medical school", *Avances. Humanidades Médicas*, 2016, 37-39.

¹⁹ J. E. Valdez Garcia, "Brief history of medical education", *Avances. Humanidades Médicas*, 2019, 1(3), 5-38.

²⁰ M. Hirt and P. Kovac, "History of forensic medicine-the second part. The autopsy in the middle age and the renaissance", *Soudnikarstvi*, 2005, 50(3), 32-37.

²¹ Valdez Garcia, "Brief history of medical education", 5-38.

Another important fact for the development of medical education was the activity of the Toledo School of Translators[23], which began to function at the end of the twelfth century and continued for 200 years. His production was the key for the development of the SMM and for the Universities of Bologna, Paris and Montpellier.

Toledo was the first Muslim city conquered by the Catholics in the year 1085; both cultures converged there. The translation work was financially supported by the Catholic Church first, and then by the Spanish Monarchy, through Alfonso X el Sabio (1221-1284).

It was not an institutionally organized school or located in a specific physical space, but it had translators from various parts of Europe. They translated classical Greco-Latin texts from Arabic and Greek into Latin and Spanish. Among the main translators of medical works, we find the Italian Gerardode Cremona (1114-1187), who surrounded by an Arab and Jewish support group, translated 71 works from Arabic into Latin. He translated the "Canon" of Avicenna (a Persian physician named Ibn Sina).

Towards the end of the MA, during the fourteenth and fifteenth centuries, the "Consilia" appeared. These texts were teaching resources written by physicians recognized as clinical case books. They had letters in response to inquiries from imaginary patients, students, or colleagues who would require advice.

Dissections as a teaching resource in anatomy

In the twelfth century, the MSS reintroduced dissections in anatomy teaching, but in pigs. The descriptive teaching of anatomy was completed with Ali-Abbas's "Pantegui" (translated into Latin by Constantine the African), and "Anatomia porci" of Copho, a guide to dissection in the pig[24]. In 1231, emperor Frederick II (1194-1250) authorized the study of human anatomy on cadavers[25,26].

Bologna was the first university to initiate the practice of human dissections, followed by the University of Montpellier in 1336, and by the University of Padua in 1429. The first public autopsy for teaching purposes was performed in Bologna in 1315 by the Italian physician and professor Mondino de Liuzzi. He has been called "the restorer of anatomy". Not only because he was the first to introduce public cadaver dissection, but also because of his book "Anatomia corporis humanis", which was a compendium and manual of dissection techniques. Several reprints of this book were made, and it was used for more than two centuries in almost all universities, until the arrival of "De corporis fabrica" of Vesalius[27].

The practice of the autopsy was used for other purposes: the discovery of new medical knowledge and the medico-legal application. In 1286 an autopsy was carried out in the city of Cremona to obtain data on an epidemic. In 1302, the first autopsy was carried out in Bologna at the request of a judge. Pietro D'Abano (1250-1315) describes the first autopsy in Padua on the body of a pharmacist who died after taking mercury by mistake[28,29].

The teaching of anatomy in MA is divided into three periods[30]:

- 1) Salernitan (800-1200): based on the dissection of animals.
- 2) Arabic (thirteenth century): dissections were replaced by books and lectures. A representative was Ricardus Anglicus or Richard of Wendover, author of the "Anatomia Ricardi Anglice" or "Anatomia vivorum", which united the knowledge acquired between Salerno and Bologna.
- 3) The return to human dissection: with Mondino di Liuzzi in Bologna.

Illustrations as a teaching resource

Anatomy could not be studied only with cadavers. That is why illustrations for teaching emerged. Drawing was used first. Then, with the appearance of xylography in the fifteenth century, the technique progressed.

²²U. Longobardi, M. Mitarittono and G. Cervellin, "Salernitan Medical School or langobardic medical School?", *Acta Biomed*, 2021, 92(2), e2021015.

²³D. H. González, "Escuela de traductores de Toledo", *Infodiversidad*, 2007, 11, 77-88.

²⁴G. W. Corner, "The rise of medicine at Salerno in the twelfth century", *Ann Med Hist*, 1931, 3(1), 1-16.

²⁵M. Mc Vaughn M., "Surgical education in the middle ages", *Dynamis*, 2000, 20, 283-304.

²⁶L. S. Pilcher, "The Mondino myth", *Med Library Hist J*, 1906, 4(4), 311-331.

²⁷R. Gurunluoglu, A. Gurunluoglu, S. A. Williams and S. Cavdar, "The history and illustration of anatomy in the Middle Ages", *J Med Biogr*, 2013, 21(4), 219-229.

²⁸U. Koehler, O. Hildebrandt, J. Koehler and W. Hildebrandt, "Von der anatomischen Lehrsektion zum Unterricht am Krankenbett – ein geschichtliche Würdigung", *Wien Med Wochenschr*, 2021, 171(9-10), 214-220.

²⁹A. N. Espert, "Approach to the History of Autopsies: II. Middle Ages", *Revista Electrónica de Autopsia*, 2005, 2(1), 9-15.

³⁰A. N. Espert, "Approach to the History of Autopsies: III. Pre-West period. Renaissance. Vesalius. Post-Vesalian era", *Revista Electrónica de Autopsia*, 2005, 2 (1), 16-25.

The drawings were schematic and often unrealistic. Partly because anatomical knowledge was poor. Also, because the purpose was only didactic.

There was a great proliferation of drawings after the reintroduction of autopsies at the University of Bologna in the fourteenth century. One of those who used them the most was Mondino di Liuzzi. They were not in the first version of his book "Anatomia corporis humanis" (see Figures 2 and 3) but were included in reprints[31].

One of the first to use sheets in medical education was Henri of Mondeville (1270-1320), the first French surgeon to write a book on surgery. Professor of anatomy at the University of Montpellier and later at the University of Paris, he understood that teaching human anatomy based on theory and few dissections was not enough, so he used a set of anatomical images (13 or 18), with which he substituted the dissected corpse.



Figure 2. Nude woman sitting in a birthing chair, with her abdomen exposed for anatomical analysis. Author: Mondino de Liuzzi. (1326)

As an example, in some sheets, the muscle could be seen after the removal of the skin, or the viscera from the dissected back of the corpse. Henri of Mondeville believed that surgery was part of medicine. This concept is in all his work. Between 1306 and 1320 (year of his death) he completed 4 of the 5 volumes of his book "Chirurgia magna", a treatise on anatomy[32].

³¹ R. Gurunluoglu, "The history and illustration of anatomy in the Middle Ages", 219–229.

³²S. K. Ghosh, "Henri de mondeville (1260-1320): Medieval french anatomist and surgeon", *Eur j anat*, 2015, 309–314.

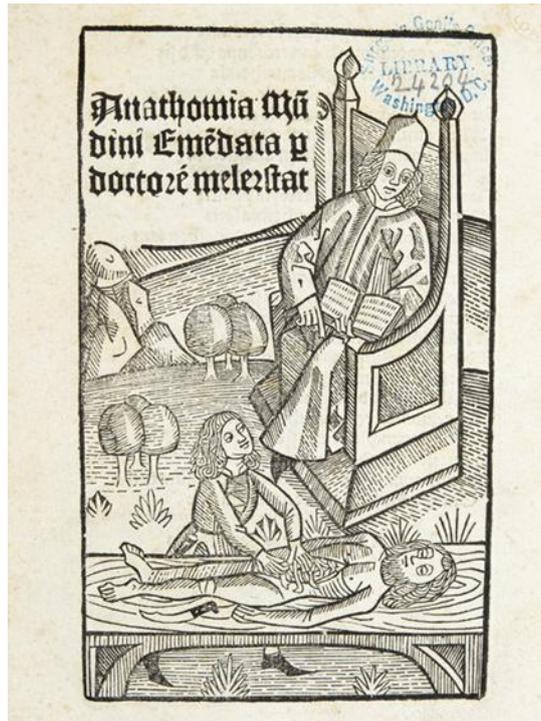


Figure 3. Anatomy lesson. Author: Mondino di Liuzzi. (1326). A man sitting in a chair instructing a young man who is in the process of dissecting a corpse lying on a bench; a large knife is on the bench next to the body.

Another important author who contributed with images was Guido di Vigevano (1280-1349), a disciple of Mondino di Liuzzi. His book "Anatomia" is illustrated by figures with subjects of dissection in a standing position (see Figure 4). They represented the dissection technique and the general distribution of the internal organs (abdomen, thorax and head). He also described for the first time the neuroanatomical structures and techniques for dissection of the head by trepanation[33].

After Mondino, several books included painted representations of dissected parts. They are called "incunabula". Over time, illustrated images of Vesalius appeared.

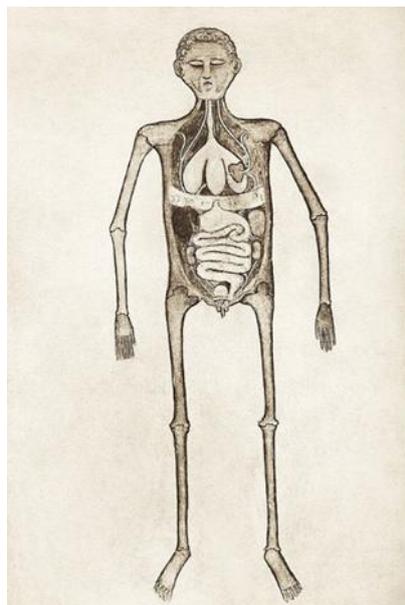


Figure 4. Illustration of the skeleton and internal organs. Anatomy by Guido da Vigevano. (1345)

³³ A. Di Leva, M. Tschabitscher, F. Prada, P. Gaetani, E. Aimar and P. Pisano, "The neuroanatomical plates of Guido da Vigevano", *Neurosurg Focus*, 2007, 23 (1), 1–4.

The regulation of the medical profession

During the Middle Ages there were five types of health practitioners[34]:

- Academic doctors with authorization to practice. They had theoretical knowledge and knew how to prepare pharmaceutical formulations.
- Surgeons or master surgeons, who wore square caps and long black clothes. They spoke and wrote in Latin. They were grouped in the year 1268 in the Brotherhood of San Cosme and San Damián in the city of Paris.
- Empirically trained barber surgeons. Laymen, generally illiterate, who dressed in shorts.
- Itinerant surgeons: also empirically trained, they passed on their knowledge from father to son. They specialized in 1 or 2 types of surgeries.
- Magical-religious healers: their training was through the transmission of knowledge absent from a theoretical framework.

In the year 1140, the Norman king Roger II of Sicily[35,36] was the first to publish an edict in non-Muslim European territories (there were already records of licensed doctors to control the exercise of the profession by the College of Doctors of the Córdoba), which prohibited practicing medicine without passing the exams that certified knowledge and being able to obtain a license[37].

In the year 1224, the registration system of persons authorized to practice medicine began under the order of the Holy Roman Emperor, Frederick II of Hohenstaufen (1194-1250). He required the public examination of future doctors, based on texts of Hippocrates, Galeno and Avicenna. Also, it was requested to have practiced a year with an experienced doctor.

In the year 1240, medical education was regulated through an ordinance that united the knowledge of anatomy and surgery. It indicated that applicants had to complete three years of preparatory studies and five years of medicine at the SMS, practice for another year with a doctor, and finally pass an exam conducted by professors from Salerno[38,39]. These were the first curricula and final evaluations with certifications of the medical profession in the Western world. In addition, medical fees were regulated.

During this time, regulations also began to be dictated to obtain the degree of Doctor of Medicine, applied in the twelfth century in the SMS by the doctor and teacher Gilles de Corbeil (1140-1224). In the ceremony, a ring, a crown of laurel and ivy, a chosen book and the kiss of peace were received, as well as the rank of Doctor of Philosophy and Medicine.

Medieval university medical titles were bachelor, licentiate and doctor. Surgery was considered a second-rate activity.

Many of the universities were controlled by religious. The recently received doctor could obtain double authorization if he was catholic: one by the Pope and another for the university. For example, at the University of Montpellier, the chancellor who granted the licenses was a clergyman. Through the 2 licenses it was allowed to practice in all the kingdoms of Christianity and in the territory of the State itself.

In the case of Jewish doctors, who could not be licensed by the Pope, the authorization was granted by another member of the teaching staff, on behalf of the university itself[40].

CONCLUSIONS

Medieval universities were organized in communities of students and teachers: “universitas magistrorum et disciporum” (association of teachers and students). They were divided into 4 faculties: Medicine, Theology, Law and Arts.

In conclusion, the characteristics of medieval university medical education were as follows:

- Universities granted a formal degree for the practice of medicine. It was obtained after studying 4 consecutive stages: Bachelor of Arts, Bachelor of Medicine, Bachelor of Medicine and Doctor of Medicine.

³⁴L. García-Sancho Martín, “Surgery. Concept. historical milestones”, 2012.

³⁵ Valdez García, “Brief history of medical education”, 5-38.

³⁶ O. Salaverry García, “A historical view of medical education” *An Fac Med(Lima)*, 2014,59(3), 215.

³⁷ S. N. Arroñada, “Algunas reflexiones sobre la medicina andalusí”, 2008, available from: <https://repositorio.uca.edu.ar/handle/123456789/9345>

³⁸ Valdez García, “Brief history of medical education”, 5-38.

³⁹ Salaverry García, “A historical view of medical education”, 215.

⁴⁰ M. Gallent Marco, “Royal licenses to practice medicine and surgery for Aragonese Jews” *An Univ Alicante*, 2008, 15, 47.

- Theoretical contents of Greco Latin and Arabic texts were taught. There were few practices with patients. Translated texts of Galeno were used in universities, such as the “Isagoge” of Johannitius^[41] (33). Also texts by Hippocrates, Constantino the African, Isaac Judeus, Avicenna and Al-Razi. The collection of medical treatises called “Articella” (see Figure 5) brought together works by various authors and was used by medical students between the 13th and sixteenth centuries.
- The teaching method consisted of 4 phases: a “lectio” or reading of a classic text; a “quaestio” or formulation of questions; a “disputatio” or discussion; a “determinatio” or final resolution. It was a scheme of theory above practice. Learning was by memorization.
- Education was conservative, with no freedom of teaching and thought.
- Autopsies and dissections authorized for learning were rare. Anatomical knowledge was the beginning of the advancement of surgery. Before the 13th century, dissections were isolated and had a legal purpose. They acquired scientific purposes from the 16th century. The first university with human dissections was Bologna, in the year 1315. Around the year 1350, emperor Charles IV of the Holy Roman Empire requested that students perform autopsies.
- In the Middle Ages, the specialties of obstetrics, ophthalmology, otology and dentistry began.

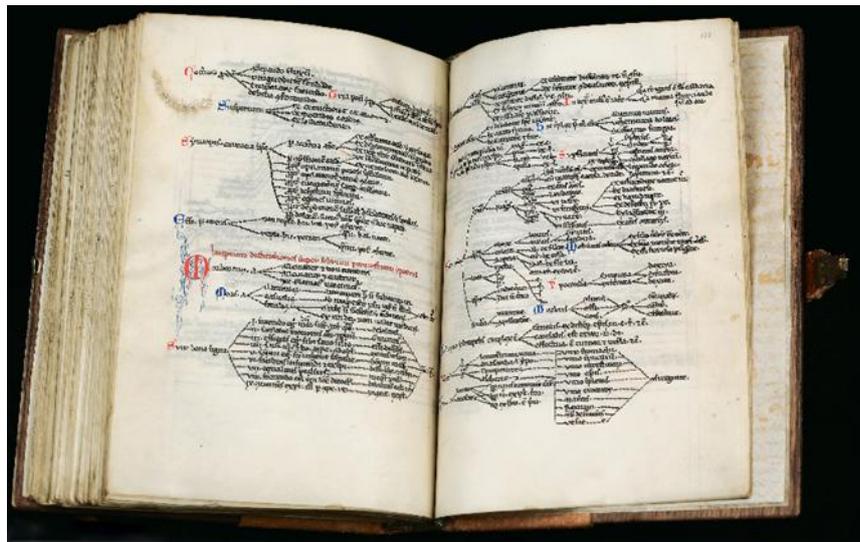


Figure 5. Pages of “Articella”.

Medieval medical education had religious influences and empirical influences, through the artisans and their informal education. The foundation of hospitals, the formalization of medical education in institutions and licenses to practice the profession were the three substantial achievements of this period.

⁴¹ M. de Asúa M, “Pedro Hispano's commentary on the Isagoge of Johannitius. Transcription of the quaestiones on the controversy between doctors and philosophers”, *Patristica et Mediaevalia*, 1996, 17, 59–66.