

When medicine meets civilization: from Hippocrates to robotic surgery

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Abstract

Medicine and culture are closely linked from antiquity to modern times, influencing the practice, ethics and social perception of health. The article examines the development of medicine in Europe, with an emphasis on Greece, and the role of culture in shaping knowledge, education and care practices. Historical examples demonstrate how social and cultural conditions influenced medical practice. Contemporary approaches are presented that highlight cultural differences in patient care. The importance of understanding cultural parameters for a holistic approach to health is emphasized. The study highlights the relationship between medical knowledge, social perception and ethical values. The need to integrate cultural elements in the education of health professionals is highlighted. Examples of adaptation practices highlight the importance of cultural sensitivity in everyday medical practice. Overall, the article offers a comprehensive picture of the relationship between medicine and culture, from Hippocrates to robotics. surgery.

Keywords: Medicine; Culture; Hippocrates; Robotic Surgery

1. Introduction

Medicine is not just a science; it is a cultural phenomenon. Each society shapes its perceptions of health and illness based on its philosophical, religious, and social values (Porter, 1997). Europe, and Greece in particular, has been a center for the development of medical thought, from the early theories of Hippocrates to modern robotic surgery technologies (Iatridis, 2018). Understanding this historical trajectory is essential to appreciate the relationship between medicine, culture, and society today.

The need for cultural understanding in medicine is not limited to the past. In the modern era, Europe faces a diversity of patients from different cultural and religious backgrounds. Knowledge of cultural differences is critical for effective communication, acceptance of treatment, and holistic patient care (Singer & Viens, 2008).

As recent studies on cultural entrepreneurship in Italy and Greece highlight, the concept of cultural heritage and the creative economy is linked to social development and the health of communities (Maniou et al., 2025a; Maniou et al., 2025b; Maniou et al., 2025c). Integrating cultural elements into medical education and practice can enhance understanding of the human experience of health and care.

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2. Antiquity: Medicine as a Cultural Phenomenon in Greece

Ancient Greece is considered the birthplace of Western medicine. Hippocrates (460–370 BC) established the scientific and ethical approach to medicine, laying the foundations of the theory of humors and the prevention of disease (Nutton, 2004). The Hippocratic Oath, even today, is a symbol of medical ethics and respect for the patient.

Ancient Greek medicine combined practical healing, philosophy, and social awareness. Therapeutic practices included physiotherapy, nutrition, herbs, and a healthy lifestyle. At the same time, the education of physicians had an ethical and social orientation: physicians were considered social bearers of knowledge and morality (Porter, 1997).

In Greece, medical spaces such as the Asclepia combined healing and religious experience. The concept of health was holistic, encompassing body, mind, and soul. This approach shaped the cultural character of medicine, which still influences Greek health practices today (Iatridis, 2018).

3. Roman and Byzantine Period: Preservation and Transmission of Knowledge

During the Roman era, Greek medical knowledge was not only preserved, but also developed with a practical emphasis. The Romans developed organized medical systems and founded public hospitals, the *valetudinaria*, mainly for military purposes. At the same time, there was investment in public hygiene, with the construction of water supply, sewage and bath systems, which contributed to disease prevention and wider public health (Lindberg, 2007). Military and political organization prompted the development of surgical practices and the empirical use of medicines, as the need for rapid and effective treatment was crucial for the survival of soldiers and social stability.

In the Byzantine period, Greece continued to preserve and transmit medical knowledge through monasteries, schools, and libraries. The texts of Galen, Hippocrates, and other ancient authors were translated into Latin and Arabic, and many manuscripts were preserved and used as a basis for the teaching and practice of medicine. This process of transformation and preservation of knowledge served as a bridge between ancient and modern medicine, allowing the gradual incorporation of new theories and techniques.

The cultural dimension of medicine was significantly strengthened in the Byzantine era. The care of patients was linked to ethical and religious values, while doctors often acted as spiritual guides and healers, in combination with the religious practices of the time. Hospitals of the era were not only places of treatment, but also centers of charity and social support, offering care to the poor, the elderly and patients with chronic diseases. Medical knowledge and practice, connected to cultural and spiritual life, contributed to the formation of a holistic approach to health, which recognized both the body and the spirit of man.

This historical path shows that the preservation, transmission and cultural integration of medical knowledge formed the foundation for the subsequent development of medicine in Europe and especially in Greece, creating bridges between tradition and innovation.

4. Renaissance and Modern Medicine in Europe and Greece

The Renaissance (14th–17th centuries) marked a real revolution in the scientific study of the human body and medical practice in Europe. Artists and scientists, such as Leonardo da Vinci, highlighted anatomy with extremely detailed depictions, combining artistic skill with scientific observation. These depictions allowed physicians to better understand the structure and function of the human body, enhancing both diagnosis and surgical practices. At the same time, the revival of anatomical research influenced the teaching of medicine, making the combination of theory and practice an integral part of medical education (Lindberg, 2007).

In Greece, the Renaissance had a significant impact mainly on the Ionian Islands and Corfu, areas with strong contact with Italian and Western European medical schools. The transfer of Western knowledge was combined with Greek traditional medicine, creating a complex educational framework. The medical schools of that period developed a curriculum that integrated theoretical education, practical training and ethical training. In this way, doctors were trained not only as technicians, but also as social knowledge bearers, capable of serving society with responsibility and ethical sensitivity (Iatridis, 2018).

With the advent of the 18th and 19th centuries, scientific knowledge advanced to new heights, as the development of microbiology and pathology radically changed the understanding of infectious and chronic diseases. The study of microorganisms and the understanding of disease mechanisms allowed the application of more effective diagnostic and therapeutic methods. In Greece, the adaptation to modern medical knowledge was carried out through the universities of Athens and Thessaloniki, which became centers of education, research and innovation. The public hospitals of that era functioned simultaneously as places of treatment, education and scientific research, incorporating the new theories of microbiology and pathology, while maintaining the connection with the social and moral values of the time (Porter, 1997).

The Renaissance and modern medicine did not simply mark technical progress; they were a period in which science and society were closely linked, laying the foundations for modern anthropocentric medicine, where knowledge, practice and the cultural dimension collaborate for the comprehensive care of the human being.

5. Modern Medicine: Technology and Cultural Dimension

Modern medicine is characterized by the close interaction of technology and humane care. The use of advanced diagnostic and therapeutic tools has increased the accuracy and effectiveness of medical procedures, while requiring specialized training and experience for their safe application.

Physician experience is a critical factor in the success of the techniques, as shown in studies of the Breast Lesion Excision System (BLES). Michalopoulos, Maniou, and Zografos (2012) highlighted that the learning curve of the system requires careful training and guidance for patient safety. Subsequently, Maniou et al. (2019) emphasized that the balance between patient safety and surgeon education is critical when implementing new technologies.

The use of advanced techniques is not limited to surgical procedures. Bruyère et al. (2020) highlighted the challenge of diagnosing endometriosis via MRI for unskilled radiologists, underlining the value of experience and specialization. Similarly, the Greek experience in the use of stereotactic biopsy with radiofrequency showed a significant improvement in the quality of life of patients, while the safety of the method directly depends on the experience of the operator (Maniou et al., 2011).

Furthermore, technology supports holistic care. Zagouri and Maniou (2016) pointed out that supportive care during pregnancy, particularly in women with cancer, requires a combination of technological tools and a humanistic approach to ensure patients' quality of life.

In Greece and Europe, modern diagnostic and therapeutic medical technologies are integrated into a framework that respects the cultural differences of patients. Knowledge of cultural and social parameters contributes to better communication, acceptance of techniques and psychological support for patients, strengthening the holistic approach of modern medicine (Maniou et al., 2019).

In summary, modern medicine is not just technological progress; it is a combination of science, experience, and cultural sensitivity.

6. Cultural Sensitivity in Healthcare Practice

In modern Greek and European medicine, health is not considered simply the absence of disease, but a multidimensional concept that includes physical, psychological, social and cultural dimensions. Cultural sensitivity in health practice therefore becomes necessary for the provision of quality care, where the patient is treated as a whole human being, with respect for their values, beliefs and social environment.

This concept includes several axes of action:

- **Training doctors in cultural differences and communication**

Doctors are trained to understand and respect the cultural differences of their patients. They learn to recognize different perceptions of health and illness, adapt their communication, and avoid misunderstandings that could affect treatment.

This training strengthens the relationship of trust between doctor and patient and contributes to better understanding and compliance with treatment instructions.

- **Creating support tools for multicultural patients**

An important part of cultural sensitivity is the development of practical tools that facilitate access to healthcare. Such tools include informational materials in multiple languages, the use of translators, and the use of digital patient support applications. In this way, the communication distance between doctor and patient is reduced, ensuring safe and understandable service delivery.

- **Integrating social and psychological parameters into treatment**

Holistic care requires recognition of the patient's social and psychological context, especially in chronic and long-term illnesses. Treatment is not limited to physical therapy; it includes psychological support, adaptation to family and social circumstances, and sensitivity to the specific needs of each individual.

In the era of technological innovation and robotic surgery, cultural sensitivity becomes even more important. The integration of advanced technologies into medical practice must be done with respect for the culture, values, and needs of patients, in order to achieve truly holistic care. Technology does not replace the human dimension; on the contrary, it can enhance it, as long as it is used with knowledge, skill, and respect for the person (Singer & Viens, 2008; Maniou et al., 2019).

Cultural sensitivity, therefore, is not simply a skill; it is a principle that guides medical practice, ensuring that care is fair, accessible, and people-centered, while promoting trust, social cohesion, and the quality of life of patients.

7. Modern Medicine: Robotics and Cultural Dimension

Robotic surgery is currently one of the most prominent examples of technological advancement in medicine. Robotic systems, such as the Da Vinci Surgical System, allow surgeons to perform operations with extreme precision, reducing tissue trauma, blood loss, and postoperative pain. This leads to faster recovery, shorter hospital stays, and higher success rates, even for complex procedures (Maniou et al., 2019; Michalopoulos et al., 2012).

The application of robotic medicine is not limited to technical skill alone; it requires specific training, continuous practice, and constant updating of knowledge. In addition, respect for the cultural and personal identity of patients is essential. Physicians must understand the cultural beliefs, ethical values, and social expectations of patients so that the technology can truly serve their health, without causing social or psychological tension (Bruyère et al., 2020).

In Greece and Europe, robotic medicine is used in various surgical specialties, such as urology, gynecology, cardiac surgery and oncology surgery. Hospitals and university training centers have invested in the education of doctors and the development of specific internship programs, so that doctors acquire both theoretical knowledge and practical experience. The combined approach of technology and humanistic care enhances the overall quality of healthcare and ensures the social acceptance of innovation (Maniou et al., 2025a).

The cultural dimension of robotic medicine becomes even more evident when linked to cultural entrepreneurship and the creative economy. Investments in innovative technologies, the development of specialized educational programs, and the integration of cultural values into medical practices can contribute to social development, the dissemination of knowledge, and the promotion of Greek and European cultural heritage. Examples of this connection can be seen in initiatives that enhance medical education, combined with innovation and cultural sensitivity (Maniou et al., 2025c, 2025d, 2025e, 2025f).

Ultimately, robotic medicine is not just a technological advance; it is also a means of incorporating the cultural dimension into healthcare. It combines scientific rigor with social and ethical sensitivity, promoting a holistic approach to care that respects the patient as a whole human being – physically, psychologically, and socially.

In conclusion, we stress the importance of all digital technologies in the field of education and culture. These technologies are highly effective and productive and facilitate and improve assessment, intervention, and educational procedures through mobile devices that bring educational activities anywhere [32-34], various ICTs applications that

are the main supporters of education [35-39], and AI, STEM, and ROBOTICS [40-43] that raise educational procedures to new performance levels. Furthermore, the development and integration of ICTs with theories and models of metacognition, mindfulness, meditation, and the development of emotional intelligence [44-47], accelerates and improves educational practices and results more than those, particularly in education and culture domain.

8. Conclusions

The historical path of medicine in Greece and Europe highlights that science and culture are interconnected and mutually reinforcing. From the first observations of Hippocrates and the preservation of knowledge during the Roman and Byzantine periods, to the Renaissance discoveries in anatomy and modern microbiology, medicine is constantly evolving technologically and scientifically. At the same time, however, it remains a social and cultural phenomenon, where patient care goes beyond technical knowledge and embraces their values, beliefs and social needs.

Today, the challenge is to combine technology with cultural sensitivity. Robotic surgery and modern diagnostic methods provide high precision and efficiency, but the real quality of care depends on respect for the identity, cultural values, and personal needs of each patient. The person-centered approach does not diminish scientific rigor; on the contrary, it enhances it, as knowledge is applied in a way that respects the whole person.

Greece, with its long cultural tradition, historical heritage and advances in medical technology, has the potential to become a model for comprehensive, human-centered medicine in Europe. Integrating technological innovation with cultural sensitivity can create a model of care that combines scientific excellence, social justice and respect for human complexity.

Overall, history and modern developments show that medicine is not just a science; it is a culture in action, and its success is measured not only in technological achievements, but also in the quality of life and trust of the people it serves.

Compliance with ethical standards

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Disclosure of conflict of interest

The Authors proclaim no conflict of interest

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