

Bioethics – Roboethics: Social And Ethical Implications of Sciences Development

Nikoleta Leventi¹, Antonia Yanakieva¹, Alexandrina Vodenicharova²,
Mariela Deliverska³

¹(Department of Health Technology Assessment,)

²(Department of Health Policy and Management,)

³(Department of Medical Law and Ethics,)

Faculty of Public Health, Medical University – Sofia, Sofia, Bulgaria

Corresponding Author : Nikoleta Leventi¹

ABSTRACT: *The development of the technological environment is an indisputable factor that can influence the morale and ethics of a society. This scientific research looks at robotics as a key technological development. Attempts to rank it on the basis of roboethics, or in terms of how people design, construct, use and treat robots, but also on the basis of bioethics or the ethical implications of robotics applications in medicine. Having the focus of the attention on human, the conclusions are the same from both points of view. It is precisely robotics that has enormous potential. It facilitates the provision of care, helps in many medical areas, and also applies to human repair and enhancement. But, robots cannot replace human completely neither in the care provision, nor in the provision of the medical service.*

Keywords -robotics, care robots, medical robots, repair and enhancement applications, bioethics, roboethics

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I. INTRODUCTION

The penetration of robotics applications into healthcare is a fact. We now have many examples of successful applications that contribute to both improving medical care and increasing the quality of the medical service, but also to removing and compensating injured organs and human functions. This is the so-called human repair and enhancement. All this, however, is related to the final recipient, namely the human. This is why the boundaries between robotics and bioethics are blurred. The role of medicine is to improve the quality of human life. Regardless of what tools are used, no matter how much intelligent these tools become, the center of healthcare remains human and the associated moral and ethical constraints. The recent initiatives of the European Parliament give three concrete examples of areas of application of robotics in healthcare. These examples are dealt with in order to identify and distinguish the role of the robot from that of a person, both as a doctor and as a health care professional or, more generally, as a health care provider in the field of healthcare.

II. OBJECTIVE

The objective of this paper is to describe the role of ethics, comparing roboethics and bioethics, within the framework of the development of robotics and the applications of robotics in the field of health.

III. ETHICS – BIOETHICS – ROBOETHICS

Ethics (from the Greek word: ἠθoς – moral, temper, custom) or philosophy of morality is a part of the philosophy that deals with questions of human morality. It is part of axiology (the theory of values), one of the four main branches of philosophy, along with metaphysics, epistemology and logic. Ethics, as a set of moral perceptions that dominate a society, is subject to changes that depend on the society to which it applies. Even in the same environment, morality does not remain static but develops with society itself. In ancient times, the possession and sale of slaves was morally accepted, but in modern societies it is totally unacceptable. Thus, different factors that affect the public as a whole in different ways can also lead to changes in morality.

Indicative few factors that relate to the environment in a broad sense and can influence the ethics of a society we may say are:

- geographical environment: the location of a community affects values, that are supported by ethics. For instance, Mediterranean nations have a different ethical orientation than those in northern Europe.
- cultural environment: the cultural environment determines the ethics of a society. Ethical codes on the societies of China and Japan are diametrically opposed to those of Western societies.
- technology environment: technology also affects ethics. It is enough to reflect the technological advances of biotechnology and robotics, as in our case, to see the range of influence.

Applied ethics is intended for practitioners and professionals in a given profession equivalent to professional philosophers. It is the philosophical study, from a moral point of view, of certain questions in private and public life, which are subject to moral judgment. Applied ethics refers to the broad principles of professional conduct that must be recognized by specialists in a given field. Of course the main reason it is the development of technology on the one hand, but also as moral theorists, on the other hand become more interested in applied problems and applied ethics, the sub-disciplines of robotics and bioethics also arise and attract more and more interest from all participants. Bioethics is the discipline that deals with the ethical implications of biological research and applications, especially in medicine. It is a study of ethical issues arising from advances in human biology and medicine, of course dealing with human. It is also moral recognition as it relates to the development and application of health policy and medical practice. Bioethicists deal with ethical issues that arise in the relationship between life sciences, biotechnology, medicine, politics, law and philosophy [1,2,3]. Roboethics is a short expression for ethics of robotics. It is often used in the sense that it is concerned with the behavior of humans, how humans design, construct, use and treat robots and other artificially intelligent beings, whereas machine ethics is concerned with the behavior of robots themselves, whether or not they are considered artificial moral agents (AMAs). While the issue is as old as the word robot, the short word roboethics was put forward in 2001/2002, and publicly discussed in 2004 during the First International Symposium on Roboethics by roboticist Gianmarco Veruggio [4,8].

IV. FROM ETHICS TO CIVIL LAW RULES

Many institutions are studying, assessing and analyzing, both form legal and ethical point of view eventual changes to future law rules and the development of civil law in the direction of covering, giving answer to these challenges and changes. Thus, following a study on the 16th of February 2017, the European Parliament adopted a resolution containing recommendations to the Commission on robotic civil law [7]. The main objective of this initiative focuses on ways to open up a broad discussion and propose specific measures in the direction of solving a number of legal and ethical issues. In the same direction is moving also the resolution of the Legal Affairs Committee, by addressing issues such as: human safety, privacy, integrity, human dignity, autonomy, intellectual property rights, ownership of data, employment and responsibility, and also the ethical principles on the development of robotics applications and Artificial Intelligence (AI) for civil use [6]. But, the boundaries between the disciplines of roboethics and bioethics dissolve when it comes to robotics applications focused on the field of health and healthcare, like care robots, medical robots, and human repair and enhancement applications. The Legal Affairs Committee has identified those three main groups of robotics applications in the medical field that are considered here in this research as individual cases, due to their specificity. They are namely the care robots, the medical robots, and the so-called human repair and enhancement applications, that help in repairing injured people and enhancing people abilities. The first concerns directly the work of people caring for elderly people as well as for people with disabilities. The second are instruments mainly for use or to support the work of medical doctors like the case of surgeons. And the third ones are applications that can be worn on the human body or even implanted in it and are therefore we may say are directly related to the end user. As we see they are all advanced applications of robotics in health.

We will look at these three groups of applications in medicine to identify their strengths and comment on whether they contribute to improving the quality of human life. It is crucial, exactly now, before the wider penetration of those applications, that we develop a clear understanding of the ethical and moral changes that will come sooner or later. We need to comments on the eventual limitations or restrictions that would eventually help us to both further develop the technology, but also do it for the good of human.

By commenting on the same questions first from the point of view of the person who designs, constructs, uses and treats the robot, the conclusions come within the frame of roboethics, whereas second if we are looking from the point of view of human-user-related applications in medicine, the conclusions come within the frame of bioethics. In any case it is crucial to understand that, regardless of the point of view, the overall ethical and moral frame must be one and must serve in the direction to improve the health and the quality of human life.

V. CARE ROBOTS

On the one side, we have the undeniable fact, that robots caring for elderly people, as well as people with disabilities are constantly improving and evolving. We already see standardized systems that are now accessible to a wider user base. This is due to their new and expanded functionality and of course the gradual approval and acceptance by end-users. These systems are already used in prevention, assistance, monitoring, but also in the stimulation and escort of elderly people and people with disabilities. We have many successful examples of systems that can even help people with cognitive disorders and memory loss. On the other hand, however, we have to solve a number of problems and issues that arise with the introduction of these systems into everyday life. The most basic problem or ethical issue is related to human contact. Would you leave your elderly parent to the care of a robot? How valuable is communication and human contact in providing care? Is human care with the care of the machine, meaning of the robot, the same? Robots could be even better in many cases than humans, for instance when it comes to identically repeated, and automated tasks and activities that are needed to the provision of care. But, it would only be good if they were used as an instrument aiming namely to facilitate the work of the humans providing care. In this way, the human care could be increased and processes such as for example the rehabilitation process could be more targeted. Thus, medical staff and caregivers could spend more time on more crucial tasks and activities such as more precise diagnosis or better planned treatment. In other words, robotics applications as we described undoubtedly have a huge potential in medical care. Also further developments should also contribute to increasing mobility and facilitating the integration of both elderly people and of people with disabilities. But, the robots will never succeed in completely replacing the people who care, and work for the medical care provision. The main reason, and key argument for that is that medical care represents at the same time also a key social interaction between people, and as such is not moral and can not be allowed to be done by a robot.

VI. MEDICAL ROBOTS

The development of medical robots is largely the same as that of the providing of care robots. Medical robots take an even more crucial role in precision surgery as well as in the case of automated, repetitive procedures. Robots like these of course can improve the efficiency of hospitals and reduce the cost of providing health services as well as improving their quality. Saving resources by healthcare professionals in providing the medical service could provide more opportunities the same resources to be used in order to enhance prevention and even to invest in the direction of improving the qualifications of these healthcare professionals [5]. Even more the very use of these medical robots requires additional training and preparation for medical professionals. Only in this way the level of patient protection can be guaranteed, namely, the professional competence of doctors and medical professionals, be guaranteed. In other words, for instance the minimum professional requirements for a surgeon who will operate a surgical robot must be guaranteed. The master / slave model or the so-called principle of observed robot autonomy must be mandatory complied with medical robots. In other words, tasks like the initial planning of the treatment, as well as the final decision to conduct it, should always remain at the discretion of the surgeon [9].

The users of the medical service themselves also need training. There is a growing trend of medical professionals resolving problems, deriving by self-diagnosis with the use of robots directly by end-users. In both cases discussed until now, both the care robots and the medical robots, we recognize a tremendous potential. The directions in which they are extremely useful are both in reducing the risk of human error and in improving the quality of the medical service. What we see in the case of medical robots as indispensable of robots is the relationship between the doctor and the patient. Therefore, the role of medical robots as well as care robots is determined not as substitutes for doctors (or human care providers) but rather as a means of facilitating better diagnosis and better treatment.

Human repair and enhancement

Robotics also develops in the field of human repairing and compensating for damaged organs and human functions. Robotics also has tremendous potential in terms of systems and applications related to the provision of opportunities for people to enhance their abilities, the so-called cyber physical systems (CPS). Especially CFP as a way of use and implementation can be worn on the human body or even implanted in it. This could drastically alter our perception of a healthy human body.

Robotic dentures for instance are one of the most vital examples of medical device. But, when it comes to such an application, we need to make sure that there may not be any outstanding questions about maintaining, improving, or updating the software. Troubleshooting or correction of vulnerabilities cannot be related to the performance of the system on which the human, end-user depends. What would happen if a CPS integrated into a human body becomes subject to a hacker attack. Can we leave even the slightest possibility of such an action endangering human health or, in extreme cases, human life? Again, the training and preparation of medical

professionals is key issue. Again, the master / slave model or the so-called principle of robot observed autonomy must be mandatory complied with.

VII. CONCLUSION

We defined the frame of the discussion by giving short definitions of the concepts of ethics, applied ethics, bioethics and roboethics. Many institutions try to meet the challenges, updating the legislative framework based on the development of ethical norms. We have briefly seen the initiatives of the European Union in the implementation of civil-law norms on robotics. Three examples of areas where the boundaries between bioethics and roboethics are blurred were presented. What can be said as a general conclusion from the three examples is that robotics has tremendous potential. It can facilitate the provision of care, can also help in many different medical areas, it can also be helpful for repairing and enhancing people abilities. But, what can not be expected from robotics is to replace the role of human in care provision and the role of medical staff in providing the medical service.

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