

ETHICAL CHALLENGES IN THE USE OF INFORMATION TECHNOLOGY AND ARTIFICIAL INTELLIGENCE IN HEALTHCARE PRACTICE

ETIČKI IZAZOVI PRIMENE INFORMACIONIH TEHNOLOGIJA I VEŠTAČKE INTELIGENCIJE U ZDRAVSTVENOJ PRAKSI

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Abstract

The healthcare service delivery paradigm has undergone a radical shift and systemic transformation with the integration of information technology and artificial intelligence systems into clinical practice. While technological advancements in medicine are growing exponentially, critical analysis of ethical implications has yet to develop to a level that reflects their practical application. This paper aims to systematise and analyse key ethical challenges, with a particular focus on privacy, algorithmic bias, and accountability in the clinical environment. It places special emphasis on an inclusive perspective in developing assistive technologies, re-examining the “autonomy paradox” of end-users through the concept of participatory design. The study points to the need to establish a transdisciplinary dialogue and integrate user experience into the early stages of software solution development. In the concluding remarks, it is highlighted that ethical standardisation and protocol transparency are fundamental prerequisites for applying artificial intelligence in modern rehabilitation, grounded in core humanistic values.

Key words: Artificial Intelligence; Information Technology; Delivery of Health Care; Bioethics; Self-Help Devices; Rehabilitation; Persons with Disabilities

Sažetak

Paradigma pružanja usluga u zdravstvu proživela je radikalnu promenu i sistemsku transformaciju uvođenjem informacionih tehnologija i sistema veštačke inteligencije u praktičnu primenu. Dok tehnološki napredak u medicini raste eksponencijalno, kritička analiza etičkih implikacija nije dostigla nivo razvoja koji odražava stvarnu praktičnu primenu. Cilj ovog rada je sistematizacija i analiza ključnih etičkih izazova, sa posebnim fokusom na pitanja privatnosti, algoritamske pristrasnosti i odgovornosti u kliničkom okruženju. Poseban osvrt dat je inkluzivnoj perspektivi razvoja asistivnih tehnologija, gde se kroz koncept participativnog dizajna preispituje tzv. „paradoks autonomije“ krajnjih korisnika. Rad ukazuje na neophodnost uspostavljanja transdisciplinarnog dijaloga i integracije korisničkog iskustva u rane faze razvoja softverskih rešenja. U zaključnim razmatranjima ističe se da etička standardizacija i transparentnost protokola predstavljaju ključne preduslove za primenu veštačke inteligencije u savremenoj rehabilitaciji koja se zasniva na osnovnim humanističkim vrednostima.

Ključne reči: veštačka inteligencija; informacione tehnologije; pružanje zdravstvene zaštite; bioetika; uređaji za samopomoć; rehabilitacija; osobe sa invaliditetom

Introduction

In recent decades, the term “digital age”, referring to the era we live in, has become popular among the general public. We notice the effects of this epithet in the more frequent use of digital devices such as mobile phones, tablets and similar devices, and we trace its origin in the field of information technology (IT). The intensive development of this discipline has led to the creation of numerous models and systems, among which artificial intelligence systems are particularly important, allowing the “modern” person to have faster access to information, a faster process of communication, control of the environment and various other functions that facilitate daily functioning [1,2]. Cars that operate without a human driver, personal assistants that remind people to take their

medicine on time, and navigation devices with voice commands are just some practical examples of how technology improves an individual’s functioning in everyday life. A large number of these systems are under the umbrella of assistive technologies, that is, devices and means designed to improve the functioning of people with disabilities, and in recent years, the concept of the “mainstream” technology, i.e. “general” technologies for wider social use, has also gained increasing attention [3,4]. Although, in essence, means and systems of this kind were created with positive intent and for the purpose of promoting well-being, it is not negligible that, due to the interference of ethical values and principles, numerous questions begin to arise, such as: Does technology exclusively serve the well-being of the individual, or can it violate their rights, such as privacy and dignity? Is the use of

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Abbreviations

IT – information technology
 AI – artificial intelligence

personal data in digital systems always safe? Will the responsibility for a mistake be taken by humans or machines? To answer these questions, it is necessary to examine the role and perspectives of applying ethical principles developed within modern scientific thought and documented legal frameworks. By understanding ethical values in the context of IT and artificial intelligence (AI), it becomes possible to reach a consensus that ensures digital systems not only improve users' quality of life, but also respect fundamental human values and rights.

This work aims to analyse the key ethical challenges associated with applying IT and AI in health practice, with special reference to privacy, algorithmic bias, responsibility and inclusiveness in the development of assistive technologies as an important segment of modern rehabilitation approaches.

Ethical challenges and digital security

One of the key advantages of modern information technologies and AI systems is reflected in their ability to enable individualised and personalised access for users [2]. Today's technologies tend to create a unique approach to each user, bringing people into the sphere of the so-called "technological citizenship". This societal shift faces obstacles because legal frameworks governing access to and manipulation of individual information remain insufficiently regulated [1]. In a study examining the ethical challenges of using AI in university education, many respondents expressed concern about the privacy and security of personal data in these systems. More than half of the respondents believe that AI systems lack sufficient transparency [5].

Issues of bias, privacy, transparency and accountability were also identified as ethical dilemmas. AI bias implies a tendency to make decisions based solely on the data or models that were used to train it, which, ethically, violates the principle of fairness and increases the risk of errors when making decisions or generating new data. In healthcare, this kind of bias can affect diagnostic accuracy, treatment choices, health-risk assessments, and especially biomedical research. The lack of diversity in the data means algorithms generate precise results for the "dominant" population, while for less represented and/or marginalised groups, the risk of errors in diagnosis and health risk assessment increases. At the same time, highly developed and complex systems threaten the transparency of their functioning and, therefore, the responsibility they bear in the event of an error [6]. To reduce the possibility of

the aforementioned errors, researchers in the field have systematised nine ethical principles related to the application of IT and AI, which include: the principle of transparency and explainability, the principle of responsibility, the principle of privacy, the principle of security, the principle of human control of technology, the principle of promoting human values, the principle of sustainable development and the principle of professional responsibility [7]. Authors Resnik and Hosseini [8] proposed recommendations for the responsible use of AI systems, which, among other things, emphasise that researchers bear responsibility for managing AI errors and biases, and should transparently show how AI is used. In addition to the potential threats mentioned, and despite the numerous identified advantages of using AI, the "ethical risks" identified in research from 2025 are characterised as: loss of critical thinking, dependence on technology and homogenisation of ideas [9]. Generating inaccurate data and copyright infringement also present ethical challenges in AI applications [10].

Regulatory frameworks and national strategies

In recent years, a law concerning the protection of data privacy in the use of IT came into force in the Netherlands. The original form of the law posed a risk to citizens, who, after conducting referendums and protests aimed at harmonising the law with society's needs and in cooperation with responsible bodies, helped create a law that represents and protects ethical, and indeed human, rights. Gardenier et al. stated in 2024 that legal regulations should be adjusted and adaptable to modern "technological citizenship" and should meet society's needs and knowledge [1]. At the forefront of IT and AI regulations are ethical frameworks that have not yet been standardised and remain at the level of proposals and recommendations for implementation. An example is the "Ethical framework for the responsible use of generative AI", developed in 2024 [11]. Resnik and Hosseini [8] also emphasise the need for concrete guidelines and principles for using modern technologies, and for this purpose they propose a unique guide in which ethical principles are deeply integrated. In modern research on regulating the application of IT, especially AI, pedagogical, technological and legal ethical dimensions permeate the discussion. Lim et al. in their 2025 research [12] emphasised the prioritisation of explainability in the application of AI in the field of education. At the same time, the development of regulatory and ethical principles must be accompanied by the development of healthcare professionals' competencies, as the responsible use of AI requires an under-

standing of how these systems function, as well as their limitations and potential risks [13].

In the Republic of Serbia, the global universal standard for AI ethics proposed by UNESCO was adopted, and, from 2020 to 2025, preventive mechanisms for the ethical and safe application of AI, contained within the AI Development Strategy, were introduced. Within this universal standard, special attention is paid to the application of ethics in education, science, the economy, and state administration. In addition to the systematisation of ethical guidelines, and for the sake of standardising ethical values in this field, the national platform for AI created a questionnaire to check the fulfilment of the conditions from the mentioned ethical guidelines for the development, application and use of reliable and responsible AI [14].

Inclusive perspective of implementing AI

In addition to the above-mentioned moral dilemmas that have developed in parallel with the increasing accessibility and availability of AI systems, questions about autonomy, dignity and other humanistic values are especially complicated when the above is viewed through the prism of application in the context of working with people from sensitive social categories, which includes people with disabilities. Modern rehabilitation approaches for working with people with disabilities imply the application of assistive technologies, which can help maintain and strengthen a person's current level of functioning and increase their participation in life activities. Integrating "smart technologies" into assistive technology devices is not new; moreover, it is an essential component of high-tech assistive technology [3,4]. By pairing these two areas, numerous advantages are achieved, such as achieving an optimal level of independence, reducing the need for dependence on others, reducing the cost of therapeutic procedures and other related financial expenses, more accurate performance of diagnostic procedures and monitoring, as well as a whole range of positive clinical and functional outcomes that contribute to a holistic approach to the patient [15].

As the field of assistive technologies, and at the same time the field of AI and IT, developed intensively in recent years, the ethical aspect of the application of these tools began to gain a wider view, and many questions in this field remained unresolved. At first, it was noticed that people with disabilities, although they are the "end" users of assistive technology, are often excluded from the organisational teams that design the appearance, functionality, adaptability, and other characteristics of the particular device they develop. Such behaviour does not respect the

ethical principles that advocate inclusive access and equal participation. These principles emphasise the importance of the participation of individuals, future users of a particular service, in every phase of the process that concerns them personally. Failure to comply with ethical guidelines in this context can lead to the development of numerous devices intended for people with disabilities, which may not function as well as intended or at all, i.e. they do not respond to the real needs of people and which, as a result, are not used [15].

Another difficulty that may arise concerns the principle of autonomy. Wangmo et al., in their research from 2019, highlighted the problem of the "paradox of autonomy", thereby opening the issue of independence in decision-making. Although the primary goal of assistive technology is to ensure the highest possible level of independence, if a person uses an AI-based device such as a "smart" device, it can make decisions instead of the user (e.g., closing the door, turning off the alarm). Moreover, frequent software updates and changes that occur "in the background" in some cases do not include informed consent or present it inadequately to the person, which can potentially violate the user's essential right to self-determination and conscious control of the environment. In addition, the authors highlight the questionable status of confidentiality and data privacy [16].

A systematic literature review published in 2025 [17] indicates that, despite impressive technological progress, a "critical" gap remains between ethical principles and their practical application in rehabilitation. As stated in the research, it is necessary to focus on the psychosocial well-being of the "end" users, and also to strengthen respect for ethical principles through the introduction of protocol standardisation measures concerning the application of AI in the field of assistive technologies, especially with regard to the component of informed consent, as well as protocols for privacy protection.

Conclusion

The development of information technology and artificial intelligence brings numerous benefits to modern society, but it also poses serious ethical challenges related to privacy, transparency, fairness and responsibility. Research indicates that ethical principles and values must be integrated into all phases of development and application to ensure these systems do not threaten fundamental human rights and instead contribute to the well-being of users and society as a whole. Future development requires a transdisciplinary dialogue between engineers and

healthcare workers, with mandatory participation from technology users. Such an inclusive methodology is crucial for overcoming the gap between theoretical ethical principles and their effective application in clinical and rehabilitation practice. Existing

ethical frameworks and standards provide a strong basis for responsible, fair and reliable use of information technology and artificial intelligence in all areas of society and science.

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