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AI IN MODERN MEDICINE

Abstract: Artificial intelligence (AI) is becoming a key component of modern medicine, revolutionising the way we diagnose, treat and monitor patients' health. This article discusses the most important applications of AI in different areas of medicine, such as mental health support, telemedicine and chronic care. It highlights how machine learning algorithms support physicians in fast and accurate decision-making, as well as how mobile apps and smart devices help patients in their daily health management. It also addresses the ethical issues and challenges of implementing AI in medicine, including the protection of patient data and the transparency of system operations. The article points out that the development of AI in medicine not only improves the quality of healthcare, but also opens up new possibilities in the diagnosis and treatment of diseases that were previously difficult to control.

Keywords: artificial intelligence, medicine, mental health, ethics, telemedicine.

INTRODUCTION

Artificial intelligence (AI) is playing an increasingly important role in shaping modern medicine, offering innovative solutions that are revolutionising healthcare. From supporting diagnosis and treatment to improving patients' quality of life, AI's possibilities seem almost limitless, but it continues to be an unfamiliar field of endeavour and needs to be looked at heavily, especially in the medical field. Among the key applications, assistance in the area of mental health stands out, where AI

supports diagnosis and therapy, especially in times of increasing incidence of depression and anxiety disorders.

Equally important are AI solutions in telemedicine, enabling access to healthcare remotely, which is changing the way patients and doctors communicate on a daily basis. Another important area is the support of patients with chronic diseases – AI monitors their health status and helps to adapt treatment in real time. However, the development of this technology also brings major challenges, especially in the context of ethical issues such as the protection of patient data, the transparency of algorithm performance and the accountability of decisions made by AI systems.

Artificial intelligence is not only changing the way we diagnose and treat patients, it is also raising questions about the future of healthcare and the limits of technology. Thanks to AI, it is possible to analyse huge datasets faster, opening up new possibilities in precise diagnosis, creating personalised therapies or monitoring patients' health at every stage of treatment. However, like any new technology, AI in medicine also raises concerns about its impact on privacy, equity in access to medical services and the ethical aspects of medical decision-making by algorithms. Therefore, although AI has the potential to significantly improve the quality of healthcare, a responsible and thoughtful implementation that considers both benefits and risks is necessary. Those using it should be aware that it is a technology that everyone is learning and should be cautious about.

The development of AI in medicine is not only a technological innovation, but also a profound change in the approach to healthcare. AI makes it possible to create more personalised treatments, reduce waiting times for diagnosis and increase the availability of medical services, especially in regions with limited access to specialist doctors. Thanks to learning algorithms, AI is able to analyse vast amounts of medical data, drawing conclusions that may elude human experts. At the same time, such a dynamic development requires constant reflection on how to combine technological advances with the need to maintain patients' trust and respect their rights. In the following sections of this article, we will look in detail at the applications of AI in mental health, telemedicine, chronic disease management, and discuss the ethical challenges associated with these innovations.

This article will discuss these key aspects, showing both the potential and limitations of artificial intelligence in modern medicine. Can AI really be the answer to the challenges of modern healthcare, or does it pose new dilemmas?

AI IN SUPPORT OF MENTAL HEALTH

Artificial intelligence (AI) is playing an increasingly important role in supporting mental health, offering tools that help both patients and professionals. Thanks to advanced algorithms, it is possible to detect mental disorders early, create personalised treatment plans and even intervene in crisis situations.

DIAGNOSIS AND EARLY DETECTION

One of the most important applications of AI in mental health is diagnosing mental disorders at an early stage. Machine learning algorithms analyse data from a variety of sources, such as survey results, posts on online forums or the way patients speak. Natural language processing (NLP)-based technologies allow the assessment of emotional state based on text or speech, which can be particularly useful in identifying depression, anxiety or other mood disorders. Virtual therapists and chatbots, such as Woebot or Wysa, which offer therapeutic support, are growing in popularity. These AI-based tools can conduct therapeutic conversations, suggest stress management techniques or offer relaxation exercises. Their greatest advantage is their accessibility – they can be used at any time, making them particularly helpful for people who do not have the option of traditional psychotherapy. AI also supports the treatment process by creating personalised treatment plans. Analysis of data, such as the patient's treatment history or reactions to previous therapies, allows the appropriate therapeutic and pharmacological methods to be tailored. By continuously monitoring the patient's condition, AI systems can modify recommendations in real time, increasing the effectiveness of treatment. Smart devices such as smartwatches or mobile apps are increasingly being used to monitor the user's

mental health. Analysis of sleep patterns, physical activity levels or heart rate can provide valuable information about emotional state and potential risks. This data is then analysed by algorithms that can alert the user or their doctor to take action.

SUPPORT IN CRISIS SITUATIONS

AI plays an important role in the immediate recognition of signals indicating mental health crises, such as suicidal thoughts. AI systems, integrated into support lines, can quickly identify those in need of help and inform the relevant services. This significantly reduces the response time to crises. Although AI offers many benefits, its implementation in the mental health field comes with challenges. One of the most important is the protection of patients' privacy and the security of their data. Systems need to be transparent in order to instil trust in users, and automation cannot replace human contact, which is a key element of psychological therapy (Topol, 2019). Developments in AI are opening up new possibilities for mental health support. In the future, we can expect to see more advanced NLP models and hybrid forms of therapy that combine traditional approaches with AI technologies. This will make psychological support more accessible and effective, especially in cases where rapid intervention can save lives. AI not only supports professionals in their work, but also enables patients to actively manage their mental health, a step towards more holistic healthcare (Naslund *et al.*, 2016; Torous *et al.*, 2020).

AI IN TELEMEDICINE

Artificial intelligence (AI) is changing the face of telemedicine, making healthcare more accessible, efficient and personalised. Through the use of AI algorithms, telemedicine is becoming not only a tool for remote consultations, but also a support for patient diagnosis, monitoring and health management. AI plays a key role in analysing medical data sent by patients. These systems can pre-diagnose diseases based on reported symptoms or test

results, allowing doctors to make faster decisions. For example, algorithms that analyse medical images, such as dermatological photos or X-ray scans, help to make an accurate diagnosis, even in a remote care model.

REAL-TIME HEALTH MONITORING

AI systems can assess the urgency of patient requests, automatically classifying cases that require immediate intervention from those that are less urgent. Such solutions not only improve doctors' workflow, but also reduce patients' waiting times for consultation, increasing the efficiency of the entire healthcare system. AI integrates with wearables, enabling the monitoring of health parameters such as blood pressure, heart rate or glucose levels. This data is sent to telemedicine platforms, where AI algorithms analyse it in real time, detecting potential risks and generating alerts for patients and doctors. This makes it possible to react quickly to changes in a patient's condition, especially in the case of chronic diseases.

MANAGEMENT OF CHRONIC DISEASES

AI plays a key role in telemedicine, especially in managing the care of patients with chronic diseases such as diabetes, asthma or hypertension. Advanced algorithms make it possible to tailor treatment plans to individual patients based on analysis of medical data, such as blood glucose levels, blood pressure values or respiratory test results. The systems are able to generate reminders for regular medication intake, minimising the risk of missed doses, and provide patients with detailed instructions on treatment recommendations. By integrating with wearable devices such as smart bands or glucometers, AI monitors health parameters in real time, automatically detecting potential risks, such as rapid drops in blood sugar. If an abnormality is detected, the system can immediately notify both the patient and their doctor, allowing for a quick response and reducing the risk of complications. In addition, AI provides doctors with detailed

reports including real-time data collected and historical analysis, making it much easier to monitor the progress of treatment and make any adjustments. This makes it possible to adapt therapies more precisely to the changing needs of patients and to better predict the course of the disease (European Commission, 2021). Through the use of AI in telemedicine, care becomes more comprehensive and personalised, and patients gain a greater sense of security and support in the daily management of their disease.

PERSONALISATION OF HEALTHCARE

By analysing medical data, AI can provide personalised health recommendations. For example, algorithms that predict the risk of developing specific diseases based on a patient's history allow early implementation of preventive measures. This approach increases the efficiency of healthcare and reduces the risk of serious complications. In regions poorly supplied with medical services, AI in telemedicine plays a special role. These tools enable remote consultations that, combined with AI diagnostic support, allow doctors to interpret test results and make decisions without the patient having to be physically present. This is particularly important in remote regions or emergency situations (Jiang *et al.*, 2017).

CHALLENGES, ETHICAL ASPECTS AND THE FUTURE OF AI IN TELEMEDICINE

The implementation of AI in telemedicine comes with some challenges, especially in the context of patient data protection. The storage and analysis of sensitive data must comply with regulations, and AI systems should operate transparently, instilling trust in patients and doctors. It is also crucial to ensure that automation does not completely replace human-to-human contact, which is still an essential part of healthcare. Developments in AI technology are opening up new opportunities in telemedicine. We can expect to see the integration of advanced predictive models to further support patient diagnosis and monitoring.

Further development of algorithms and tools, such as virtual reality in rehabilitation, will broaden the range of services offered remotely, making telemedicine more comprehensive and efficient. Artificial intelligence in telemedicine not only makes healthcare more accessible, but also allows it to be more precise and personalised, a step forward in modern medicine (American Medical Association, 2022; McKinsey & Company, 2021).

ETHICAL ISSUES AND AI

While the development of artificial intelligence (AI) brings enormous benefits in many fields, it also raises important ethical questions. These issues arise from the dynamic pace of implementation of new technologies and their potential impact on social, economic and cultural life. The following section discusses the key ethical challenges associated with AI. One of the most important ethical issues is that of user privacy and data security. AI often uses huge datasets that may contain sensitive information, for example medical or financial. Ensuring compliance with data protection regulations, such as RODO, and minimising the risk of leaks or unauthorised access remains an issue. The challenge for AI system designers is to simultaneously ensure the effectiveness of the algorithms and the protection of user privacy. AI often acts as a so-called 'black box' – the decision-making processes of algorithms can sometimes be difficult to understand even for their creators. In fields such as medicine or law, there is a need to ensure that decisions made by AI are transparent and verifiable. The lack of such clarification can lead to a loss of trust in AI systems and limit their social acceptance. AI algorithms learn from existing data, which may contain hidden biases and inequalities. As a result, AI can reproduce or even reinforce discrimination in areas such as recruitment, credit allocation or access to public services. The solution is to create more diverse and representative datasets and monitor the performance of algorithms for equality and fairness.

AUTONOMY AND RESPONSIBILITY

A major problem is the attribution of responsibility for AI actions, especially in situations where errors occur. In medicine, an algorithm error can lead to a misdiagnosis, and in transport, autonomous vehicles can cause accidents. The question is: who is responsible – the software developer, the user or the organisation implementing the system? Regulatory developments in this area are needed to dispel doubts and ensure consumer protection. Automation and the implementation of AI may lead to job losses in many sectors, raising concerns about the future of employment. Furthermore, in areas such as medicine or education, there is a risk that over-reliance on technology will reduce the importance of human relationships. There is a need to strike a balance between technological efficiency and maintaining a humanistic approach to services. AI is being used to create deepfakes and spread disinformation, affecting public opinion and democratic processes. The manipulation of data and digital content risks destabilising society and undermining trust in the media and public institutions. In this context, it is crucial to develop tools to detect fake content and regulations to counter its spread. AI technologies are often expensive and require sophisticated infrastructure, making access to them uneven. Developing countries may be limited in their ability to benefit from innovative solutions, exacerbating global inequalities. In order for AI to be a tool to support the development of society as a whole, strategies need to be put in place to enable equal access to these technologies. AI developers should be guided by ethical principles when designing systems, taking into account values such as fairness, user welfare and sustainability. In the long term, there is also the question of the potential awareness of AI and its legal status. Could AI in the future be recognised as an autonomous entity with its own rights?

SUMMARY

Artificial intelligence is significantly supporting the development of telemedicine, bringing innovative solutions to the management

of patient care, especially for those with chronic diseases. Thanks to advanced algorithms, AI enables the individualisation of treatment plans, real-time monitoring of health status and automatic response to potential risks, such as dangerous changes in vital signs. The integration of AI with wearable devices, such as smart wristbands or glucometers, allows the collection and analysis of medical data, which is then made available to both patients and doctors. This facilitates regular health monitoring, reminds patients to take their medication and provides doctors with detailed reports, supporting them in making sound therapeutic decisions. The use of AI in telemedicine improves the quality of healthcare, increases treatment efficiency and helps to better manage chronic diseases. Patients benefit from more personalised and safer care, and doctors have tools to support them in their work. The development of AI-based technologies in telemedicine shows great potential for further innovations to revolutionise healthcare even further around the world. AI in telemedicine also contributes to improving access to healthcare, especially in regions with limited specialists. With remote monitoring and online consultations, patients can receive regular medical support without frequent visits to facilities. This is particularly important for elderly people, who often have difficulty moving, and patients living in remote areas. In addition, artificial intelligence makes it possible to predict potential health problems based on data analysis, allowing preventive measures to be implemented. As a result, patients with chronic diseases can avoid exacerbations of their conditions and doctors are able to manage treatment more efficiently. This approach significantly reduces the burden on healthcare systems, minimising the need for hospitalisation and emergency interventions. AI-based solutions also support patient education by providing personalised recommendations on lifestyle, diet or physical activity. This facilitates a better understanding of one's disease and greater involvement in the treatment process. Furthermore, AI helps identify high-risk patients, allowing them to be referred for more intensive care before serious health complications arise. In conclusion, AI is not only revolutionising telemedicine, but also contributing to the overall efficiency of the healthcare system. However, its development poses challenges in terms

of data privacy, regulation and ensuring equal access to the technology. Nonetheless, the potential of AI in telemedicine remains extremely promising, opening up new opportunities for both patients and medical staff.

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