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The role and importance of ethics in the use of artificial intelligence in medical education and in the diagnosis of chronic diseases

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Keywords	Abstract
Artificial Intelligence in Medical Education Ethical Challenges in AI Data Privacy and Bias in AI AI Governance and Ethics in Medical Training	The integration of artificial intelligence (AI) into medical education presents numerous opportunities for innovation and efficiency. However, it also introduces significant ethical concerns, including data privacy, bias in algorithms, informed consent, and the protection of student data. This paper explores these challenges and emphasizes the need for ethical oversight in AI-driven medical education. The absence of dedicated ethics committees for educational AI applications complicates the establishment of ethical guidelines, leading to gaps in regulation. The study highlights potential solutions, such as creating specialized ethics committees, improving transparency in AI algorithms, and training medical educators and students in ethical AI use. Addressing these ethical concerns will be essential to harnessing the benefits of AI while minimizing risks in medical education.

1.The Importance of Ethics in the Use of Artificial Intelligence in Medical Education

In recent years, the role of artificial intelligence in various aspects of human life has become increasingly prominent and has had a wide impact on almost all areas, including daily life, games and entertainment, science and art, as well as the fields of health, medicine and hygiene.

In recent years, artificial intelligence has emerged as a promising research area in medical sciences with the potential to improve patient outcomes, increase efficiency in healthcare delivery, and reduce costs. One of the primary applications of artificial intelligence in medical sciences is in medical imaging, where machine learning algorithms can be used to detect and classify abnormalities in medical images such as X-rays, CT scans, and MRI scans.

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In addition, artificial intelligence can also be used in early diagnosis of diseases, personalized medicine, drug discovery and development, and clinical decision-making. Artificial intelligence is also used for large-scale analysis of health data, such as electronic health records, pattern recognition, public health policymaking, and medical research. In general, the integration of Artificial intelligence in clinical care has the potential to revolutionize the way we approach these processes, and is a hot research area with many opportunities for innovation and improvem.

Medical education is also one of the areas that benefits greatly from advances in artificial intelligence, and the benefits of this tool will increase in the future However, it should be noted that artificial intelligence is not a powerful tool like any previous innovation because it is evolving rapidly and new applications are added to it every day, and in addition to its beneficial and helpful effects, it can also create challenges, the prevention of which or management of these challenges is one of the important responsibilities in the field of medical education.

The role of ethics in the application of artificial intelligence in medical education has not yet been clearly defined. One of the reasons for this is that medical education centers usually have research ethics committees or clinical ethics committees but do not have an ethics committee in education, and in fact, when it comes to review boards or organizational ethics, it is assumed that this is about research and not educational procedures.

However, given that artificial intelligence can raise ethical issues in the field of medical education It is necessary to monitor these problems, as well as emphasize the beneficial use of this tool and to teach students and health system staff how to use it correctly. Among the ethical challenges in this field is the resistance to collecting too much information from students. The next challenge is to protect the anonymity and privacy of individuals.

Given that in AI-based systems, a lot of private data of students is used and it is almost impossible to keep the data anonymous, when using AI in medical education, attention should be paid to whether students are aware of and consent to the collection of data from them, and if so, to what extent their consent is voluntary or mandatory?

Another challenge is to protect the ownership of student data. In fact, medical education institutions should consider the ownership rights of students and its consequences both in relation to the data that the institution creates about students, such as grades, assessments, and in relation to data created by students themselves, such as assignments, projects. The next important challenge is the bias of the algorithm that can affect the conclusions reached with the help of AI. One example of this bias is the general stereotypes in data labeling, which can be transferred to artificial intelligence algorithms, causing them to assign inappropriate weights to specific data or find unfounded relationships between data.

For example, until recently, searching for the phrase “healthy skin” in search engines only showed images of young women with white skin and European ethnicity as search results. As a result, algorithms developed based on these images were not sufficiently accurate and efficient for people of color.

Finally, one of the most important challenges of using artificial intelligence in medical sciences is the dynamism and high speed of development and expansion of artificial intelligence, its massive data and functions, which can make traditional and closed methods of education in medicine ineffective in the face of its consequences. Therefore, it is necessary to develop dynamic, agile, and up-to-date systems in the field of medical education in such a way that they can keep pace with the progress of artificial intelligence and

respond to the side issues and challenges arising from it[1] Despite the existence of ethical challenges in the use of artificial intelligence in medical education, these challenges can be minimized by using solutions. Applying special sensitivity to the correct performance of algorithms used in education and treatment, and early and effective detection of possible biases of algorithms used in artificial intelligence are among the most important issues in this field. Proper management of mass data while maintaining privacy can overcome many of the ethical challenges in this field. Establishing a special ethics committee in education, in which, in addition to medical ethics experts, artificial intelligence experts are also used, is another effective solution in preventing and managing ethical challenges resulting from the use of artificial intelligence in medical education. In addition, continuous training of faculty members, students, and university personnel in the field of artificial intelligence and its ethical aspects can be another effective practical measure in reducing ethical challenges in this field.

2. The Role and Importance of Artificial Intelligence in Diagnosing Chronic Diseases

Artificial intelligence technology has had a greater impact on people's lives in more specialized fields, including the medical field. The primary and main goal of introducing this technology in the medical field is better decision-making by doctors and reducing human errors.

The medical field, as the largest industry, is one of the main concerns of human societies that are faced with many problems. Considering the change in the structure of the population's age pyramid, from youth to old age, one of the problems of this field is the prevalence of chronic diseases and deaths caused by them throughout the world, especially in Third World countries.

At least one in three adults has multiple chronic diseases, also known as multimorbidity, which is associated with high morbidity and healthcare costs. Treatment for these diseases consumes more than 70 percent of a patient’s income.[2]

Therefore, early diagnosis of chronic diseases and optimal treatment of patients through this technology can greatly help reduce costs and prevent complications of this disease. Artificial intelligence technology can be used to predict disease risk, diagnose, prognosticate, and appropriate treatments using different types of data (demographic, laboratory, and imaging data).[3]

This technology significantly reduces human error in the diagnosis and treatment of disease and, by enabling early detection of chronic diseases, helps patients and service providers improve their skills, which can ultimately save lives. Disease prediction through smart technologies can help in taking timely preventive measures and preventing diseases and even complications arising from them.

In fact, machine learning techniques such as artificial neural networks, Bayesian, decision trees, and support vector machines (SVM) can be used with high accuracy to predict and diagnose various diseases such as Cancers and chronic diseases.[4]

[1] Meek, et al. 2016.
[2] Delpino, et al.2022
[3] Montazeri, et al. 2022.
[4] Amiri,et al.2023.

A systematic review study showed that a wide range of machine learning algorithms have been used for the diagnosis and prediction of diabetes. With support vector machines being the most successful and widely used algorithm in this field.

Another study showed that KNN (K-nearest neighbors), SVM, DT (Tree excision), GA (Genetic Algorithm), RF (Random Forest), Convolutional Neural Network (CNN), Feed forward neural network (FFNN), and MLP (Multi-layer perceptron) techniques were used with high accuracy for the diagnosis and classification of diabetes. Prediction of chronic kidney disease using machine learning algorithms such as SVM, RF,[1] and DT and image processing techniques such as CNN can be performed with high accuracy.

Various studies have used machine learning techniques to predict, diagnose, and stratify cancer. In some studies, cancer diagnosis by artificial intelligence techniques has been reported to be faster and more accurate than that of doctors.[2]

Machine learning techniques such as LR (Linear regression), RF, and MLP are capable of quickly and reliably predicting the outcomes of The future will be people with cardiovascular diseases

One of the most widely used and new methods for early diagnosis of chronic diseases is the use of artificial intelligence algorithms and machine learning techniques based on Iridology. Iridology, also known as iris diagnosis, is the science that correlates the patterns, shapes, colors, tissue damage, and other characteristics of the iris and can be used to assess the health status of the body.[3] Iridology, combined with machine vision and image processing techniques, can be used to help diagnose chronic diseases such as diabetes, hypertension, chronic kidney disease, and cardiovascular diseases, as well as to assist physicians in making highly accurate decisions.[4]

Researchers were able to diagnose diabetes with high accuracy using iris images and the PCA (Principal Component Analysis) algorithm.[5] It is also possible to diagnose chronic kidney disease with high accuracy using iris abnormalities and deep neural networks. Studies have shown that it is possible to diagnose and predict cardiovascular diseases and cancer with high accuracy using Iridiology and the CNN algorithm.

In a number of these studies, a smartphone camera has been used to capture images of individuals' irises for intelligent and early diagnosis of diabetes. Therefore, given the increasing growth of chronic diseases and the increasing use of intelligent systems in the early diagnosis of chronic diseases, it is possible to help patients by using this technology. Available technologies, such as taking pictures of individuals' irises via mobile phones and diagnosing through Iridology, can make intelligent and timely diagnosis of chronic diseases available to the general public.

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