Proceedings of ICEGEE 2025 Symposium: Sensor Technology and Multimodal Data Analysis 2025
DOI: 10.54254/2753-8818/2025.AU24490

The Application and Ethical Thinking of Artificial Intelligence in The Field of Healthcare

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Abstract. Artificial intelligence (AI) has become an integral part of modern healthcare, offering advancements in areas such as diagnostics, personalized treatment, patient management, and operational efficiency. As AI continues to be deployed in hospitals and clinical settings, critical ethical concerns have emerged. This paper investigates both the practical applications and the ethical implications of AI in the healthcare sector. Key issues explored include patient data privacy, algorithmic bias, the opacity of AI decision-making, and the shifting dynamics of responsibility among stakeholders. Drawing on academic literature and real-world regulatory developments, the study considers the roles of patients, healthcare providers, policymakers, and technology developers. Emphasis is placed on the need for transparent and fair algorithms, robust data governance, and systems of accountability to prevent harm and promote trust. The paper also highlights the necessity of establishing public policies, legal frameworks, and ethical education to ensure AI is developed and implemented responsibly. It concludes by advocating for a balanced approach that embraces technological innovation while safeguarding human values, especially in high-stakes environments like healthcare. Only through interdisciplinary cooperation, ethical awareness, and continuous oversight can AI fulfill its promise to transform healthcare in a just and equitable manner.

Keywords: Artificial Intelligence, Healthcare Ethics, Algorithmic Bias, Patient Privacy, AI Regulation

1. Introduction

Artificial intelligence (AI) is rapidly changing the landscape of modern healthcare. From diagnostic algorithms and predictive analytics to robotic surgery and personalized treatment plans, AI technologies hold the promise of improving the efficiency, accuracy, and accessibility of healthcare services. However, this rapid technological development also raises a range of pressing ethical and societal challenges. These challenges include concerns about patient privacy, algorithmic bias, accountability, and the loss of the human touch in clinical decision making. As AI systems increasingly influence critical healthcare outcomes, it is imperative to assess their ethical implications and societal impacts. This article explores the applications of AI in healthcare and the

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ethical considerations it raises, drawing on a variety of academic and policy sources to frame a balanced and informed discussion.

2. Context and relevance

The articles [1] selected in this article explore some revolutionary applications of artificial intelligence in the medical field, such as disease diagnosis, personalized treatment, and patient management. The core issues of this article are closely related to current data privacy, algorithmic fairness, and doctor-patient relationships. The rapid popularization of artificial intelligence in the medical field has also triggered controversy about the technological dependence of artificial intelligence and human responsibility and ethics. For example, the accuracy of artificial intelligence may surpass that of human doctors, but of course errors and biases may also cause all these defects to be amplified, thereby threatening the patient's diagnosis results or even threatening the patient's life. Therefore, we need to explore the ethical considerations of the application of artificial intelligence in the field of healthcare.

3. Ethical consideration

First, for the first question, from an ethical perspective, it can be divided into two points. The first point is patient privacy and autonomy. After all, AI needs to rely on a large amount of patient data to train the model. However, although all these operations require document prompts, patient privacy may still be leaked. In our daily actual operations, patients have very limited control over their own data. If such data leaks occur, patients will lose their privacy. As Price and Cohen emphasized, without a sound governance framework, medical big data may become a burden rather than an asset, and privacy leakage is one of the main concerns [2]. Some researchers suggest that federated learning is a potential way to improve models while protecting data privacy [3].

Second, due to the different patient cases in the input data, people in economically developed areas and areas with developed networks may get more cases, while people in underdeveloped areas may get fewer cases. The problem of algorithmic bias in medical artificial intelligence is not limited to data representativeness. Deep-rooted historical inequalities in the medical system may be perpetuated by artificial intelligence. For example, Obermeyer et al. found that a widely used hospital algorithm prioritized white patients over black patients in high-risk care projects because the cost data it relied on reflected the historical underinvestment in black communities [4]. This “bias in, bias out” phenomenon highlights how AI risks codifying systemic inequalities unless it undergoes an explicit fairness audit. Rajkomar et al. further advocate for fairness-aware machine learning practices to prevent such inequalities [5].

4. Stakeholder perspectives

So from a stakeholder perspective, there are four parts: healthcare providers, policymakers, and technology developers. We just discussed some of the issues for patients, but at the same time, AI can also provide patients with some very fast and personalized diagnosis and treatment methods. From the perspective of healthcare providers, AI can reduce workload, but you also have to worry about it replacing your own job. From the perspective of policymakers, the balance issue and standards are worth discussing. The "black box" nature of many AI systems complicates accountability. As Topol emphasizes in his book Deep Medicine, clinicians must retain the final decision-making power because "no algorithm can replicate the nuances of a doctor's context-based

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judgment" [6]. Regulatory frameworks like the FDA's "Action Plan on AI/ML-based Software as Medical Devices" aim to strengthen transparency, requiring developers to disclose the source of training data and performance limitations [7]. Similarly, the EU's proposed "Artificial Intelligence Act" outlines coordinated rules focusing on transparency, human supervision, and risk classification [8].

From the perspective of technology developers, it is not enough to pursue technological breakthroughs and commercial interests alone, but also to pay attention to ethics. Floridi et al. proposed five principles for ethical AI, including benevolence, non-malice, autonomy, fairness, and explainability, to guide developers to combine innovation with social values [9].

5. Implications for society

In terms of social impact, governments must play a foundational role in shaping the development and deployment of artificial intelligence (AI) technologies in the healthcare sector. First and foremost, public policies must be established that not only ensure the safety and effectiveness of AI systems but also uphold and enforce core ethical principles, including fairness, transparency, accountability, autonomy, and justice. These policies should address every stage of AI deployment—from data collection and model training to real-world application and performance evaluation.

A particularly urgent need lies in the establishment of a cross-border AI governance framework. Healthcare is increasingly global, and AI tools are often developed in one region and deployed in another. This framework should aim to harmonize standards across countries and regions, ensuring that data governance, patient privacy protections, algorithmic fairness, and auditability are maintained regardless of geographic location. In practice, this means requiring full transparency in algorithmic logic, documentation of training data sources, and clear explanation of how decisions are made. In high-risk contexts such as diagnostics or treatment recommendation systems, regulatory bodies should implement pre-deployment risk assessments, followed by ongoing post-deployment evaluations. Equally important is the establishment of legal liability mechanisms. When AI is involved in medical decisions that result in harm, there must be clearly defined pathways for redress. Patients must be able to seek compensation, and there should be mechanisms to determine responsibility among developers, healthcare institutions, and system operators. Legal frameworks must anticipate multi-party accountability, particularly in the case of shared or outsourced AI tools. Beyond legislation, independent institutional oversight is essential. Governments or international bodies should fund and empower neutral AI audit agencies capable of conducting regular inspections of algorithmic performance, bias evaluation, and demographic impact analysis. These bodies must operate independently from both the developers and users of the AI systems to ensure objectivity and public trust. Their mandates should include publishing periodic impact assessments, issuing certifications for AI tools, and calling for product recalls or moratoriums when significant ethical or performance issues arise.

In real-world settings, AI can have profound benefits. Particularly in under-resourced or rural regions, AI-enabled technologies can extend the reach of medical services through virtual health assistants, automated triage, remote diagnostics, and telemedicine platforms. This can reduce patient wait times, alleviate the burden on overstretched health systems, and make healthcare more equitable. In the long run, such technologies may also lower national healthcare expenditures by improving efficiency and preventing misdiagnoses. However, over-reliance on automation introduces substantial risks. If clinicians begin to delegate critical thinking or clinical intuition to algorithmic outputs, their professional skills may atrophy, making them less capable of responding to rare or novel medical cases. This could have devastating consequences in situations where AI

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systems fail, encounter unexpected input, or lack training data relevant to the context at hand. As Amann et al. emphasize, one key to mitigating such risks lies in explainability—the capacity of AI systems to provide human-understandable reasoning for their decisions [10]. When healthcare providers and patients alike can understand how and why an AI system reached a particular conclusion, trust is enhanced, and informed consent becomes more meaningful. Similarly, Morley et al. argue that ethics cannot be retrofitted after technological deployment. Ethical integration must occur from the outset, requiring interdisciplinary collaboration, continuous stakeholder involvement, and long-term monitoring mechanisms [11]. Without these proactive measures, AI adoption may not only fail to reduce inequities in healthcare—but may, in fact, entrench or worsen them.

6. Conclusion and suggestion

From a societal impact perspective, there are many concerns about the use of AI in healthcare. The technology undoubtedly has great potential to improve access to care, reduce treatment time and costs, and improve the accuracy of clinical decision making. However, the imperfections and unpredictability of such systems also raise serious challenges. If AI systems make incorrect decisions that lead to medical errors, who should be held responsible - the developer, the hospital, or the AI itself. In addition, because many AI systems rely on historical data for predictions, the emergence of new diseases or atypical patient conditions may exceed the prediction range of existing models, limiting the effectiveness and safety of these tools.

Therefore, the recommendations are two-fold. First, AI technology must be continuously improved to ensure greater reliability, adaptability, and robustness, especially in novel or ambiguous clinical scenarios. This includes developing mechanisms that enable AI to recognize when it cannot provide a reliable diagnosis and defer to human experts. Second, regulatory frameworks must be strengthened and clear standards must be set for the use of AI in healthcare. These frameworks must prioritize transparency, accountability, and informed consent, and must involve a broad range of society, including patients, clinicians, ethicists, and legal experts. Ultimately, I hope that society will not only embrace the technical promise of AI in healthcare, but also actively shape its ethical direction, ensuring that human dignity, fairness, and safety remain at the core of this transformation. In addition, more public awareness campaigns and interdisciplinary education should be carried out to deepen the understanding of AI among medical professionals, patients, and the public. Ethical literacy and digital health competencies must become a core component of medical training and patient advocacy. Only by promoting this inclusive and forward-looking dialogue can we ensure that AI technologies develop in a way that is fair, responsible, and truly beneficial to all members of society.

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