Pak. j. life soc. Sci. (2024), 22(2): 23670-23679 E-ISSN: 2221-7630;P-ISSN: 1727-4915

Pakistan Journal of Life and Social Sciences

www.pjlss.edu.pk

https://doi.org/10.57239/PJLSS-2024-24.2.001691

RESEARCH ARTICLE

Artificial Intelligence and Ethics in Healthcare

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ARTICLE INFO

Received: Oct 22, 2024

Accepted: Dec 29, 2024

Keywords

Artificial Intelligence (AI)
Machine Learning (ML)
Healthcare Technology
Ethical Challenges
Data Privacy
Bias Mitigation
Transparency
AI Regulation
Multidisciplinary Collaboration
Clinical Decision Support
Patient Autonomy
Resource Allocation
AI Governance Inheritance

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ABSTRACT

Artificial intelligence (AI) is poised to revolutionize healthcare, reshaping patient experiences and physician practices. By leveraging machine learning (ML) and advanced algorithms, AI enhances diagnostic accuracy, reduces medication errors, and offers decision support. However, integrating AI into healthcare raises ethical challenges such as data privacy, transparency, and bias. This paper explores the opportunities and risks of AI in healthcare, emphasizing the need for ethical implementation and multidisciplinary collaboration. Frameworks for governance, cross-disciplinary education, and policy regulation are proposed to mitigate biases and ensure equitable AI application. While AI is not a replacement for human intelligence, it complements medical expertise, promising improved healthcare delivery. Addressing these challenges will allow AI to fulfill its potential as a transformative technology, aligning innovation with ethical principles and societal values.

INTRODUCTION

Healthcare will be greatly affected by artificial intelligence (AI), changing patient experiences and physician daily routines [10]. There are no doubts about the advantages of automated computers in medicine; they process and cross-reference massive amounts of data and reduce medication errors [5].However, it is still early days for artificial intelligence in health care [10]. By applying sophisticated algorithms to huge data sets, artificial intelligence (AI) and machine learning (ML) can revolutionize health care, AI uses machine learning to teach a machine to learn without being explicitly programmed [13]. It doesn't mean robots will take over the role of doctors, but rather computers can utilize a range of techniques to accomplish tasks that would be considered intelligent if they were completed by humans [14]. AI applications could provide better diagnostic performance than experts with machine learning-based decision support systems [13]. According to a presentation at the American Psychiatric Association's annual meeting, physicians are the most likely to commit suicide [13]. In order to let specialists, focus on complex cases, they aim to develop devices

that identify patients quickly [13]. It is important to balance the opportunity and challenges of artificial intelligence, which is one of the main themes in this issue [10]. Healthcare is one industry in which AI has a great deal of potential for application [5]. It is necessary to encourage stakeholders to use AI technology as a flexible tool, but not as a substitute for a physician [10].As technology develops, there are also critical ethical issues, such as privacy, data protection, transparency, explain ability, and responsibility [1]. In addition to societal goals. Safety, cybersecurity, and intellectual property law [2]. There are some challenges in machine learning algorithms related to "black boxes" where the results are difficult to interpret, as well as ethical and legal concerns [2]. Model pipelines are a good start, but they're not enough. [3] We need to build the society we want, including ethics and beyond [1]. In society, AI is frequently used, but its meaning is in dispute, Introducing and implementing AI in an ethical manner will make it useful in achieving challenges that need to be addressed [2]. Although there have been a number of guidelines issued in recent years, it is unclear whether the guidelines have positively impacted the ethical development of artificial intelligence [1].

"Get with the Guidelines" A physician has a patient with a predicted date of death as well as clinical experience that suggests a longer life span. In clinical practice, should the physician rely entirely on the algorithm or should he/she use a "black box" algorithm? [3].

LITERATURE REVIEW

In order to address the issues raised by AI and machine learning, frameworks must be adapted to address the problems posed by these developing systems [13],by establishing appropriate ethical foundations for the use of artificial intelligence in healthcare, they provide an understanding of how it can be used safely with appropriate ethical considerations [10].

AI in healthcare is being introduced gradually and teething

Artificial intelligence (AI) in the medical field requires strong governance and administrative mechanisms in order to be managed satisfactorily [12]. Introducing new technologies gradually across health care is vital to ensuring their safety before applying them to patients. The legal implications of these advancements will also require careful attention. There will need to be a broad discussion between the legal, medical, ethical, and computer science fields to determine how best to tackle them [5]. As AI becomes more complex, algorithm developers, supervisors, and operational staff must all take responsibility for developing algorithms [12]. When the medical profession recognizes the challenges AI poses in healthcare, it will be in a better position to adapt to the changing technological landscape and safely utilize AI [12].

To allow a machine to process specific information without ambiguity, 25 specific, data-driven steps need to be followed during data mining [5]. The machine learning program should first be tested on demonstration data or previous cases before it is allowed to learn in a real-world setting [5]. The applications of these systems must be well understood by medical professionals before they become widely used in healthcare. In light of technological advancements, AI systems need to be retrained and evaluated regularly because they are good at some tasks and bad at others [5].

A true transdisciplinary approach requires a transdisciplinary education, so medical experts and computer scientists must prioritize cross-disciplinary collaborations in the short term in order to establish the necessary connections [12]. With the introduction of these programs, ethical care will be promoted and medical errors prevented by providing biomedical institutes that train both computer science and health science students [12]. Despite the fact that there is an increasing demand for AI-guided test results and ethical dilemmas to be identified as part of the implementation

of computer algorithms into health care workflow, the authors emphasize the importance of technical expertise when interpreting AI-guided test results [10].

Healthcare implementation with AI comes with significant opportunity costs and/or social rejection [14]. There is a lack of cross-disciplinary collaboration and consideration of ethical considerations that prevents a coherent ethical framework from developing. This framework can still be developed, but time is running out [14].

Artificial Intelligence Regulation

In collaboration with the World Economic Forum, the Australian Human Rights Commission is looking into how artificial intelligence will be regulated. Ethics guidelines are currently being developed for the use of artificial intelligence in medicine [5]. This global initiative on ethical autonomy and intelligent systems is led by the Institute of Electrical and Electronic Engineers IEEE brings together stakeholders involved in designing and implementing autonomous smart systems for humanity [5].

A number of key principles have been recommended by the European Union for ethical AI, Incorporating human agency, safety features, privacy, nondiscrimination, and fairness [5]. Regulation of artificial intelligence tools is an important step toward ensuring their reliability in real-world clinical settings [5]. There are a number of safety concerns that can arise when automated system components interact unexpectedly [5]. A policy on artificial intelligence in health care was recently adopted by the American Medical Association, which requires high-quality, clinically validated, and thoughtfully designed AI [10]. A policy like this could serve as a model for the medical system in general [10].

AI in healthcare and ethical issues

However, Artificial intelligence is posing many ethical issues, such as the increased risk to patient confidentiality and privacy, changing medical practice, and the differences between a physician's and a machine's roles in patient care [10]. The purpose of this section is to discuss all of these issues in more details.

Bias

A good machine learning algorithm is dependent on the quality of the data that advisors populate and the accuracy of the data that the individual enters [6].If the data input is incorrect, machine learning can make mistakes [5]. When applied to healthcare data, ML must consider the heterogeneity, volume, complexity, and the physicians' interpretations of the data [5].

There may be legitimate issues regarding intellectual property or investment that make it difficult to have access to all of the data and algorithms [2]. It is advisable that you seek the assistance of a third-party or government auditor [2] since healthcare data are heavily influenced by long-standing social and cultural biases, perpetuating inequities if they are not addressed [1].

Transparency is an important component of AI implementation, especially for clinicians and patients, because it builds trust between stakeholders and reduce the bias [2]

Currently, machine learning is evaluated by accuracy. Despite being deemed accurate, an algorithm may not be fair if it is also evaluated for bias [1]. Studies have repeatedly demonstrated that individual patient health and disease factors should be used to predict outcomes. Despite adjusting for illness severity and other physiological factors, critical illness mortality is consistently higher in

minority-serving hospitals [1]. In spite of their best efforts, artificial intelligence remains imperfect. For instance, algorithms may be missing important variables, resulting in biases [6]. Other times, algorithms may be opaque or have other flaws that would cause concern. As such, it is crucial to have mechanisms in place for overriding or appealing decisions [6].

Some software companies will resist disclosure and claim trade secrecy [2]. By increasing data access and improving the collection of data from minorities, some of these biases can be resolved, but a variety of algorithms are complex and opaque [2]. For AI makers to minimize biases throughout the product development process, it is crucial to understand and reduce this risk [2]. Taking biases into consideration is particularly important when choosing machine learning technologies and procedures to train algorithms and selecting datasets to program (including considering the quality and diversity of datasets) [2].

Various biases exist in healthcare, and health care professionals should be aware of them as well as consider ways to mitigate them both during patient interactions and as a whole [3]. The use of biased data in training a health AI may increase rather than reduce existing health disparities. For example, an AI trained to detect melanoma on primarily white skin would not be able to detect melanoma in a black patient [3]. It is possible for AI to exhibit bias in relation to ethnicity and skin color, and it can also exhibit bias in regards to age and disabilities [2]. In a recent study by Obermeyer et al. (2019), the authors demonstrate that an algorithm that guides health decisions for large health systems and payers incorrectly assigns the same risk level to black patients as it does to white patients [4]. As a result of an algorithm that used medical costs as a proxy for medical needs rather than illness, less money was spent on black patients, consequently, the wrong conclusion was drawn about black patients' health [4]. It is possible to mitigate the problem by carefully considering the labels, but it is also necessary to develop new algorithms that are trained on unbiased models [4].As it was shown that an algorithm underestimated black patients' health needs, and when it was corrected, the results improved, but the patients were not treated equally. The provision of primary care services is racially disparate, and black patients pay less for chronic conditions as a result [1].

In “the American Heart Association's Heart Failure Risk Score”, those identifying as non-black receive three additional points without explanation [7]. As a result of this self-fulfilling prophecy, black patients suffer adverse effects from treatment when they present with identical symptoms and the algorithm predicts a higher rate of death from heart failure. [7]. The assumption that blacks will survive less because of their race may contribute to this as well. This is an example of how variables that are not necessarily related to health can be misinterpreted as indicators of health [7].

Often, the data used for training models is contaminated by historical and analytic biases, as well as omitted variable biases [7]. Due to a lack of time, clinicians may assume variables not included in a particular risk-scoring scheme are irrelevant, as a result of the analytic approach, additional biases can be introduced [7]. In many fields of science and technology, biases in data exist, and machine learning is no exception [7].There are numerous reasons for which a smartwatch might incorrectly diagnose a patient with arrhythmia, including skin color and the device's sensitivity to that individual [14]. Algorithms have uncertain outcomes (e.g., classifications) and are not always sufficient to propose a causal relationship. In addition, the individual does not have full oversight of the data used for training or testing the algorithm [14].

From an ethical perspective, fair algorithms should remain independent of key attributes such as ethnicity to avoid affect the outcome [7]. In addition to remapping samples to new features in preprocessing and postprocessing, model interpretation can also reduce bias [7].

Transparency

In order to decide whether AI or ML is ethically appropriate in medicine, several factors must be taken into account, including the risks and the type of evidence used [3]. Algorithmic decision-making should be transparent and controlled to honor procedural justice, In order to achieve procedural justice, users must also have control over the input data, and in an ideal situation, they should be able to influence the inner workings of the algorithm [6].

Using this information, healthcare providers may determine whether a therapy is appropriate for a patient [6]. However, any omissions could lead to bias in the system. They may also determine whether the treatment causes a decrease in the patient's quality of life [6]. The use of machine intelligence for ethical decisions may result in unethical outcomes. It is unlikely that machine intelligence will be able to take into account the exceptions to ethics that human ethicists can [6]. It is imperative that machine-learning algorithms do not overlook crucial parameters that arise in clinical consultations, but they can also help us better understand how human experts use each parameter [6].

It is essential to have transparency in decision-making to be able to retrace and understand how the process was conducted [9]. Physicians and patients must decide how much information they should receive from AI. Data scientists are working on opening up the "black box" of AI, but the issue of how much data physicians should have will remain with explainable AI [3].

Safety of the stakeholders

For AI to fulfill its promises, stakeholders have to ensure that datasets are reliable, valid, and transparent when it comes to granting access to them so that it can operate effectively [2]. In order for AI to perform well, training data is essential, and algorithms need to be refined to produce accurate results. "Garbage in, garbage out" also applies here [2].

A chatbot can be dangerous if it assumes that its users have a particular medical condition without communicating with a physician first. Many people are not aware of the risks involved when they use a chatbot to diagnose their symptoms and automatically prescribe medication without consulting their doctor first [3]. When chatbots are not continuously updated, checked, or regulated, they can cause serious harm to consumers. In order to ensure the safety and efficacy of medical devices, the FDA is currently developing a program that will allow pre-certified software to be used [3].

Respect for Patient Autonomy

Patients' capacity is usually judged on a binary basis in clinical practice: either they are deemed competent or they are not competent to make decisions [6]. A number of authors have recently emphasized the fact that patients deemed incompetent to make decisions are capable of expressing their preferences, and they have argued that these preferences should be taken into account if possible [6]. Those considered more applicable should be given greater weight by the algorithm. It is usually possible to appoint a surrogate decision-maker when a patient is unable to make their own decisions [6]. All health AI systems should consider patient privacy and autonomy, which is a long-standing principle in the medical field [3].

Data privacy

A successful healthcare AI solution requires informed consent, high data protection, cybersecurity, algorithmic fairness, transparency, and regulatory oversight [2]. A public and political discussion of AI-driven healthcare, such as its impact on humans and society as a whole, will be necessary to achieve this [2]. As well as discussing issues such as the sensitivity of patient data, it is essential to

refresh on how and with whom data is shared [3]. Health AI innovation should be defined in relation to sensitive patient data as well as the relationship between hospital systems and healthcare AI developers from third parties [3].

Considering the amount of health data that is collected every day, patient privacy is becoming increasingly important. Information collected outside of clinical settings and in everyday life may compromise patient privacy without patients even realizing it [16]. There is no doubt that health data is valuable, and there is some evidence suggesting that people do not feel comfortable with companies or the government profiting from the sale of health data [14].

A solution to this problem may be to collect fewer data than is necessary to perform the task at hand, as some technologies such as video analytics for oxygen saturation levels and resuscitation are known to collect too much data [8]. In spite of the fact that these techniques can be utilized to maintain patients' and healthcare workers' privacy, they are not completely immune to the possibility of reidentification . By establishing a rule through federal or state law or by establishing a contract that protects the worker's privacy, this could be accomplished [8].

Informed consent

Informed consent is an urgent concern when it comes to AI-driven health technologies. If a doctor uses artificial intelligence to make a decision, the patient has a right to know exactly what information the AI should have given them [3]. In order to protect patients' privacy, hospitals should be willing to educate patients about ambient intelligence technology, how it benefits them, and how they can protect themselves from privacy violations [8].

Health AIs should only be used with informed consent by the medical community depending on which AI is used and how it is used [3]. Before any more health AIs are used in clinical settings, stakeholders must discuss the ethical issue of informed consent. After this discussion, artificial intelligence (AI) can be used to develop tailored guidelines and communication plans tailored to specific health problems [17].

Patient consent for ambient intelligence should be explicit, not buried in boilerplate [8]. The ambient intelligence system may also collect information about groups other than patients and health care workers, for example, friends and family members of patients visiting them [8]. A case regarding the use of artificial intelligence technology in surgery additionally highlights the importance of informed consent and responsible use of artificial intelligence technology, according to Schiff and Borenstein [11]. Using artificial intelligence technology presents a number of potential risks that must be considered by all parties [10].For a hypothetical future AI that will determine the course of a patient's treatment autonomously, specific informed consent may be required [18].

Allocation of resources and justice

In healthcare, the allocation of resources is a persistent problem, made even more complicated by the development of health artificial intelligence [19]. Due to the great diversity of ethical theories, there is no consensus regarding which theory should guide the distribution of medical resources in society [20]. The practical operation of various health care systems differs greatly, and there is no consensus on what constitutes a fair distribution of resources among health care systems [6]. Due to this, it was not possible to incorporate the principle of justice into the algorithm without making specific assumptions that were perhaps unwarranted. The algorithm was only making judgments regarding an individual patient [6]. As an example, an algorithm allocates caregiving resources, the 2016 care plan allocated 56 hours per week to a woman with cerebral palsy [3]. However, when an algorithm was used by the state, Tammy Dobbs' hours of care were reduced to 32 hours [3]. Using

artificial intelligence, Tammy was not made aware of how the algorithm reached its decision and, therefore, was not able to obtain reimbursements, which are often unavailable to the most vulnerable members of society [3].

Artificial intelligence and physicians' decision-making

Physicians must have some influence over decision-making with artificial intelligence (AI) in healthcare solutions [14]. HCPs being left out of the loop and healthcare systems relying mostly on automated decisions will exacerbate existing inequalities [14].It is possible for the health system to be overfitted to a specific set of values that are not representative of society at large when algorithms are used in decision-making situations [14]. To avoid such outcomes, the process of transforming care must carefully consider what values should be embedded in the system. The public has been involved in planning and deployment decisions [14]

Artificial intelligence and emerging risks in healthcare

It is difficult to identify and assign liability for emerging risks associated with AI in healthcare, and it could harm black and minority patients, HCPs can reflect on the output of an algorithm like any other diagnostic tool if they understand how a decision was reached and how a decision was made [14].

High risk of misdiagnosis with artificial intelligence

There is a high risk of misdiagnosis at the individual level because wearables and clinical decision support software often have bugs [14]. AI-Health algorithms are frequently untranslated and never function outside of their intended contexts. The results can be heavily value-based and based on small sample sizes, which raises significant ethical concerns [14]. It is easy for AI-health solutions to perform routine and standardized tasks, but they cannot mimic the emotions experienced by humans. Consequently, there can be an over-reliance on the "quantitative" in building relationships with patients, it explains how algorithms could lead to poor health outcomes if patients see healthcare providers as just a computer program [14].

AI-health algorithms often make public health decisions based on flawed assumptions. Poor-quality evidence may waste public funds and damage local economies if policy decisions are based on it [14]. Medical practice requires data, so AI-health solutions that can handle large amounts of data are required [14]. Data that is poorly collected and used will not be useful for medical practice. It must be transformed, and the transformation process can be flawed. This could lead to wasted funds and poorer health care [14].

Ethics-based application of artificial intelligence in healthcare

Health care has advanced significantly as a result of artificial intelligence [10]. The use of this technology contributes significantly to biomedical research, medical education, and health care delivery [10], assisting doctors in diagnosing various illnesses, predicting long-term outcomes, and providing psychological therapies [6], as well as offering physicians and patients potential solutions to their problems [10]. In the future, more apps will make health data accessible to patients, so they can learn how to maintain their health [5]. The technology will help them achieve their goal of actively participating in their health care. As AI advances, it will become increasingly difficult to ensure healthy biases don't persist within the system [5].

Using one AI system, no clinician can diagnose mild to moderate diabetic retinopathy more rapidly in adult diabetic patients [13]. AI-clinician coordination can improve diagnostic accuracy, discover new drugs, prevent epidemics, and customize treatments. Automating healthcare services of this nature could improve human clinical capabilities [14]. Despite its design to detect wrist fractures,

Osteo-Detect cannot be used independently by clinicians, so its "assists" them in arriving at a final diagnosis [13]. In 2015, a machine learning-based decision support system predicted the likelihood of death for 14,199 pneumonia patients. According to the model, patients with concomitant pneumonia and asthma were categorized as low-risk, while those with pneumonia alone were categorized as high-risk [13]. It is possible to use AI and machine learning for genome sequencing to identify patterns and predict the genome [5]. Because 19 gene editing techniques have been used, AI can be used to make predictions as well as guide the changes that should be implemented. Using artificial intelligence (AI), clinical professionals could be able to identify appropriate and safe targets for treatment as well as provide information first-hand to the general public through an online service [5].

CONCLUSION

Healthcare is rapidly being transformed by artificial intelligence, changing our way of working and learning dramatically, and even how we live together. As big data becomes increasingly sophisticated, there has been an exponential increase in the use of artificial intelligence (AI) in this industry, with new developments emerging.

Artificial intelligence is not intended to replace human intelligence or become independent. The ethical dilemmas discussed in this report must be addressed and resolved so that this technology can be developed and used in conjunction with medical treatments, based on a humane approach to artificial intelligence based on values and human rights, preserving data privacy and confidentiality, and allowing for individual choice. Furthermore, artificial intelligence programs should avoid incorporating social bias.

To ensure that artificial intelligence fulfills its role correctly and efficiently, doctors also need to be taught how it works. All stakeholders affected by artificial intelligence should be aware of its use in a transparent manner.

It is important to note that artificial intelligence is currently in its infancy in the healthcare industry, and a long but rapid road lies ahead. But when it is implemented in a manner that incorporates all legal, ethical, and technological aspects side by side, it will prove successful and a detonating technology. In order to preserve the efforts of specialist to operate and manage complex health conditions.

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