



# ETHICAL CONSIDERATIONS IN THE USE OF AI IN HEALTHCARE: DISCUSSING THE ETHICAL DILEMMAS AND CONSIDERATIONS OF IMPLEMENTING AI IN PATIENT CARE AND DECISION-MAKING

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**ABSTRACT**—The major purpose of this paper is to discuss the ethical issues in AI (Artificial Intelligence) integration into healthcare. With the rapid advancements of AI technologies in healthcare delivery, it is crucial to analyze the ethical consequences that may be involved with their application. In this paper, the ethical issues will be discussed in detail particularly in areas such as bias of AI algorithms, patients' privacy and data security, accountability and liability, and the maintenance of human autonomy in decision-making [1]. Artificial intelligence (AI) is playing an important role in the rapidly changing medical field by introducing a new source of diagnostic, therapeutic and health management. Nevertheless, the integration implicates complicated ethical questions which should be pondered over for the AI to be used in morally and ethically acceptable forms. One of the main worries might be the possibility of bias in the AI algorithms which can result in unequal healthcare outcomes among different demographic groups [1,2]. Bias can be produced from various resources, including biased training data, algorithmic design, and societal discrimination that is embedded in the healthcare system. The implementation of proper strategies to detect and remove bias in AI health systems is crucial so that fairness is promoted in the delivery and use of healthcare technologies. Privacy and security of personal data are the other essential ethical issues. Machine learning algorithms usually do their training and functioning by huge human entities' health data.

**Keywords**— Artificial intelligence (AI), Healthcare, Ethical considerations, Patient care, Decision-making, Bias, Privacy, Accountability, Human autonomy, Transparency, Data security, Fairness, Healthcare disparities, Algorithmic transparency

## I. INTRODUCTION

Artificial intelligence (AI) is a rapidly progressing field, and one which is becoming increasingly pervasive in healthcare. With ever more sophisticated algorithms and data-driven tools being developed and deployed, the possibility of harnessing these tools to more accurately diagnose and treat diseases is an enticing one. For many, there is an implicit assumption that using AI in healthcare is simply cost-effective, efficient and can lead to improved treatment with better outcomes for patients. Whilst these are promising prospects, it would be a mistake to assume that good will inevitably come from any use of AI in healthcare, or that the use of these tools is a value-neutral act [2]. In this paper, I will argue that we need to be mindful of the values encoded in the AI tools being developed and deployed in healthcare, and that as part of this we need to be careful to

ensure that these tools preserve the trust which is essential to the patient-doctor relationship.

Artificial intelligence has been continuously making progress in healthcare as well as moving pretty fast. The exponential advancement of new technologies, such as powerful algorithms and data-driven software, has led to the discovery of novel approaches for precise disease diagnosis and treatment. The idea of applying such instruments to the betterment of patients' outcomes and to the enhancement of treatments' effectiveness has seen the interest of many increase significantly [2]. While the promise of AI use in healthcare is quite attractive, we should bear in mind that all applications may not be equally effective or bias-free – sometimes with negative implications. The paper will thus demonstrate the paramouncy of recognizing the values within the AI tools used in healthcare and the significance of preserving the integrity of the services offered to patients.

Healthcare is one sector intended for the mark of AI technologies with slightly prognostic statements that AI will be able to add \$150 billion dollars to the US healthcare economy by 2026 [3]. Both the aging population growth and chronic diseases outbreak will bring on a healthcare crisis without enough caregivers around the time that there are already not enough health care providers. AI can prove to be a very effective tool in meeting the above gap by providing virtual health mentors/buddies for preventive care and behavior change as well as prediction and prevention of acute and chronic diseases via personalized AI models. For example, deep learning, which is a robust machine learning technique, brings a shift from experience-based to data-driven medicine enabling the use of data to diagnose earlier as well as administer target therapy leading to greatly improved health outcomes [3,4]. A recent report by the UK government's independent review on the state of AI across the NHS points to a wide-ranging spectrum of AI use cases, which can revolutionize the health service, from screening and diagnosis to optimization of the healthcare provider operations.

This technological development promotes the expansion of public health and the optimization of the healthcare system. Conversely, there are risks such as the loss of healthcare professional jobs and greater health disparities which may be felt by either the entire country or specific countries because of unequal distribution of AI devices.

The healthcare personnel must ensure the security of the patient data and comply with the HIPAA (Health Insurance Portability and Accountability Act) the USA and the GDPR (General Data Protection Regulation) the EU [4]. Data integrity and consent from patients are key milestones in the ethical AI implementation in a healthcare setting. Additionally, the accuracy and ethical issues related to AI-guided healthcare interventions are the other problems that should be meticulously taken into account [4]. Who is responsible for the errors or the adverse outcomes appears to be the other controversial aspect where AI based recommendations as well developers, healthcare providers, and regulators are involved. The formulation of clear policies and procedures for accountability and redress should be given proper attention so as to overcome these challenges and protect the patients from any harm. Moreover, the loss of human control and decision-making in the health industry, where AI systems are highly relied on, cannot be overlooked as ethical questions emerge [5]. While AI can aid clinical decision-making and increase efficiency, notwithstanding, it should supplement, not supplant, the human judgment and experience. Health professionals should preserve their right to critically assess the recommendations, given by AI, and contribute to the decision-making process with a view of patients' interests.

## II. RESEARCH PROBLEM

The main problem explored in this study is to analyze the ethical issues that arise when artificial intelligence (AI) is employed to guide or make decisions in healthcare. Although the traditional fields of medical AI, clinical decision support, and expert systems are introduced, this paper gives particular attention to the direct interface between AI and patients, through web-based consumer information and clinical applications [5]. The essential difference between the new applications and the old is that the presence of a thinking/learning machine has shifted from something distant, possibly unknown to the patient, and based on population data and medical literature, to something immediate and individual. In the new incarnations, AI becomes a substitute for, or an addition to, the physician's clinical decisions. This shift prompts analysis of the new applications as to whether they provide the same or better quality guidance than their human counterparts [6]. Though it is evident that not all AI achieves this goal, we concentrate on cases where it does, since they raise the thorniest ethical issues. AI applications are expected to do no less than improve proficiency, esteemed to be the percentage of correct decisions or successful outcomes, of healthcare providers on a variety of tasks. This may occur as AI is employed to automate procedures and operations, ranging from the relatively mundane task of scheduling patient appointments to the critical task of diagnosing patients and determining the best therapies. If AI surpasses the proficiency of physicians at these tasks, it becomes difficult for a physician to justify a decision to go against AI advice. AI is now guiding patient care and when the predetermined course of action yields a suboptimal result, the physician is deemed to have made a medical error. Physician's pride and patients may prefer a lesser outcome be the result of a human decision, rather than a machine-guided one. While it is difficult to claim that using the less effective procedure is ethically justified, this brings us to an interesting comparison of the error-prone decisions, to the same decisions guided by AI [6,7]. An adverse outcome resulting from AI-guided decisions is likened to product liability and in the sense that machines are medical implements, the manufacturers (or programmers) of said machine are now responsible for an adverse outcome. This contrasts the decision to an error in judgment where a physician may escape

responsibility due to the ambiguity of medical errors and lack of malpractice litigation. In a case where AI has only achieved proficiency parity and not superiority, it is often a case of an older more costly procedure being the best-known therapy and a physician may still opt to use his judgment to go against AI advice. An entirely different argument arises in cases where AI makes decisions on behalf of the patient or in more extreme instances, as to what therapies should be denied to patients. An AI agent may be assigned power of attorney and decision for an incompetent or incapacitated patient [7].

## III. LITERATURE REVIEW

### A. ARTIFICIAL INTELLIGENCE (AI) IN HEALTHCARE

Technological innovation in healthcare is advancing at an unprecedented rate, and as such, careful consideration needs to be given in adopting such technologies in terms of ethical and social considerations. This is particularly important with the advent of artificial intelligence (AI) in healthcare. AI can be described as the science and engineering of making intelligent computer programs, and has the potential to change the face of healthcare in the future. Success in the adoption of AI in healthcare can be described as both improved health and healthcare concurrently. AI has a wide range of applications in health, but it can be said the most significant at the current time are its potential uses in knowledge management and in decision support [9]. Examples of knowledge management are the use of clinical guidelines, and best practice to improve the process of care, and to provide the patient and consumer with information on how to self-manage their health. An example of AI in decision support is the use of rule-based programs to sift through data and generate and prioritize differential diagnoses for a particular patient. AI has the potential to provide a more consistent level of quality and a better patient outcome, but these must not come at the expense of the personal aspect of care [9]. It is important to look at how the AI is best implemented into different areas of the health system and what it is actually being compared against as a replacement. AI decision support has shown to be effective in complex and ambiguous decision making, compared with simple statistical analysis or when there is too much data for the human mind, but evidence from a study to this can has been detrimental with the use of automated telephone advice in the place of GPs so cost-effectiveness and outcome must be considered.

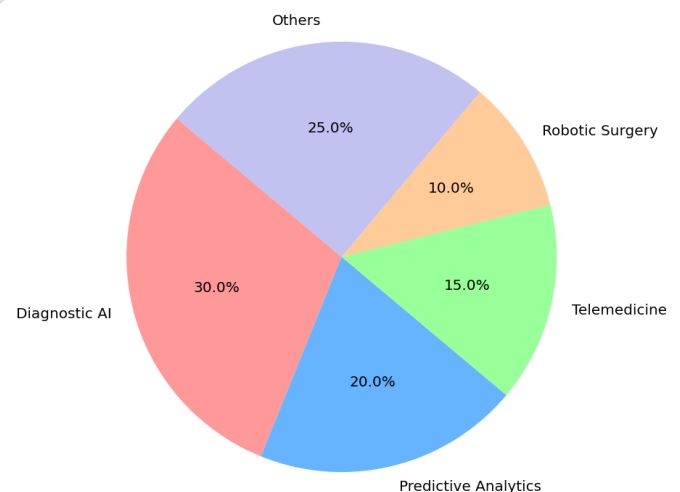


Fig. 1 Distribution of AI Applications in Healthcare

Decision fatigue is a little-discussed burden on physicians and particularly those who inhabit multiple roles. It is often the case that a busy physician has inadequate time or is mentally fatigued when making medical decisions on themselves and others. The existence of a physician's own advance directive

(certain do not resuscitate orders) may come into conflict with a different decision made by his AI alter ego and a goal set forth by a developer is to have AI make better decisions than the original. Since this is an undesirable scenario, it is important for a physician to document the presence of said agent and directive as to prevent conflict [8]. This type of AI and decision is essentially trying to imitate a patient's best decision given a situation, albeit with an ability to determine the actual best decision. Here we draw a parallel between patient and agent. If a patient would want a best therapy determination done for himself, it is likely not the same case for an agent and it would be an unacceptable scenario to try to force a patient to what is perceived as a better result for the patient

**B. ETHICAL DILEMMAS OF AI IN HEALTHCARE**

The section titled "Ethical Considerations in the Use of AI in Healthcare" opened with an overview of the ethical aspects of patient care in the health field. It highlighted the worry over patient confidentiality and informed consent, especially in light of the increasing reliance on computerized patient record systems and the development of the "virtual" health record. The part stressed that while the transfer of patients' data across a network could enhance healthcare quality, it raises several concerns regarding the security and the accessibility of that data. If this data were to become widely available to researchers and other organizations, there is an opportunity that private information could be utilized against the patient's needs [10]. More generally, if detailed medical records are widely accessible, there's a danger that employers, banks, and insurance companies could use this information to discriminate against individuals who are of higher risk or cost to the organization. The chapter concluded stressing the principle of individual autonomy, "The primary issue is not simply about the confidentiality of the record - but the conditions under which the information is used and who decides how it is used [10]. This data logically belongs to the patient because it is about the patient and hence it should be the patient who decides how and who uses the information." AI system or no, this seems to be the underlying issue in the use of any kind of patient data.



Fig. 2 Representation of Ethical Dilemmas in AI Implementation

**C. CONSIDERATIONS FOR IMPLEMENTING AI IN PATIENT CARE**

AI use in healthcare goes back to the mid-1970s and its presence has gone through many fluctuations in interest and funding but is now becoming an increasingly prevalent discussion within healthcare. Studies are now showing clinical evidence and growth within specific sectors of healthcare such as functional neurosurgery for Parkinson's disease, cardiology, sepsis, and oncology. AI can be applied to various types of medical data (structured and unstructured) [10]. In terms of patient data assessment, AI has been used to create algorithms

which sift through electronic health records to identify and assess patients who may be at risk for certain diseases. These algorithms are usually based on a set of features that may be clinically based, derived from lab data, or in some cases widely unrecognizable patterns within the data. The output is based on predicting a particular outcome. One specific example to mention is using AI to predict which trauma patients would develop an acute coagulopathy which was a study done by the Karolinska Institute in Sweden. This work provides the basis of using machine learning methods to optimize care for trauma patients [11]. As for the actual patient care, there are vast possibilities that AI could have a strong foothold in improving patient care, but given the complexity of the clinical environment and uneven technological advancements throughout the world, it is an area that needs to be approached with caution. The quality and types of medical care AI could be involved in are highly variable and decision making often involves subjective reasoning and predictions. One category of care that may be suited to AI is in evidence-based guidelines following diagnosis and treatment. An example would be in the prescription of statins as a preventative treatment for stroke and myocardial infarction which involves AI assessing cardiovascular risk of a patient and determining whether the potential benefit of treatment outweighs the risk of side effects [12]. This would require an algorithm based on similar comparisons of evidence and a conclusion whether the risk vs benefit ratio is worth the treatment. Stepwise this could be applied in individual cases that doctors see every day, however when comparing it to other types of care, one must not make the mistake of considering all medical decision making to be similar to protocol-based medicine.



Fig. 3 Considerations for Implementing AI in Patient Care

**D. ETHICAL IMPLICATIONS OF AI DECISION-MAKING**

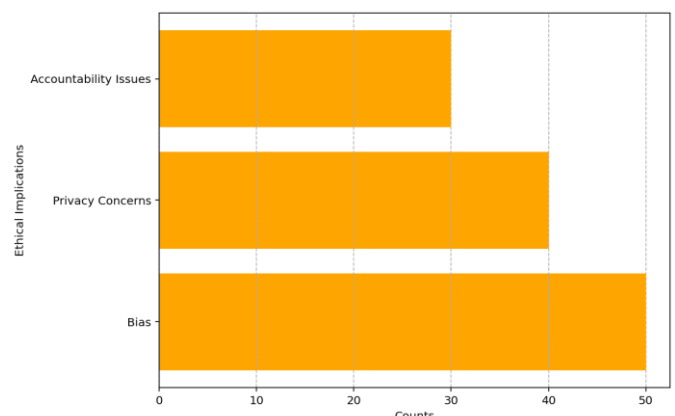


Fig. 4 Categorization of Ethical Implications in AI Decision-Making



Decision-making is central to care and has "the potential to harm or benefit the individual patient. [13] and is therefore a key area for the study of ethics in AI. AI systems are being designed to make decisions with or without a human in the loop. Decision-support AI is designed to aid human decision makers in choosing the best course of action in light of a particular problem. An example of AI supporting decision making is a system that uses a Bayesian network to advise a physician on the treatment of pneumonia patients [13]. In this case, the AI enables the physician to make a more informed decision for the patient. AI decision support has vast potential but also raises many ethical issues. On one hand, decision support should be thought of as a partner in the decision-making process, thus sharing the same ethical responsibilities as the physician [13,14]. On the other hand, if an AI can make decisions that are superior to those of a human in a particular context, there could come a point where it would be unethical to not delegate that decision-making to the AI [14]. This raises questions about whether it's right for machines to take over decisions that affect human's health, considering that machines have no moral obligation to do what is best for the patient.

#### E. IMPROVED PATIENT OUTCOMES

Because AI can process and analyze large quantities of data, it is poised to make significant strides in the ability to predict patient outcomes. Predictive models use existing data to identify patterns and compare them with new data in order to assess the likelihood of potential outcomes. Machine learning increases the effectiveness of predictive modeling by using algorithms to discover patterns in the data and by incorporating the patterns into the model. Using machine learning with AI technology can help to achieve improved patient outcomes, particularly with chronic diseases. An example of this was a Taiwanese study that used a machine learning model to predict the one-year mortality risk of patients with long-term cancers [15]. The model was reported to be more accurate at predicting death than the physicians who participated in the study. Through the model's accurate predictions, it can improve the quality of end-of-life care for these patients with advanced notice of potential outcomes from the predictions. This study is evidence that AI technology can greatly improve patient outcomes as predictive models can provide actionable information to clinical teams to improve patients' future health.

#### F. ENHANCED EFFICIENCY IN HEALTHCARE DELIVERY

The efficiency of the delivery of care in developing nations is below the standards achievable largely due to economic constraints. The effective use of AI to increase the efficiency and effectiveness of the interventions for disease, through prevention to treatment, can go a long way to relieving resource constraints by reducing the amount of resource-intensive treatment that is needed at later stages of disease. Additionally, it's possible that with preventive interventions being more effective through AI identification of high-risk individuals and tailored interventions, the cost-effectiveness of such interventions compared to treatment at later disease stages will persuade more countries to implement them [15]. Finally, developing nations made huge advances in the establishment of information technology infrastructures, and it's possible that these nations 'leapfrog' the developed world in the implementation of AI in healthcare, to their benefit.

With the ability of AI to classify data and cluster information among the numerous patients, it is possible that management of certain populations might become more efficient. Information on patients will be more easily translated to the relevant interventions. For example, the UK has been implementing a stratified medicine initiative, which has the potential to save both lives and costs by enabling the fitting of the right drug to

the right patient, first time. AI would aid the implementation of such initiatives by identifying which patients belong to which stratification categories and then identifying which treatment would be most suitable. Additionally, administrative healthcare processes are prime for automation, and AI has the potential to automate these processes [16]. For example, AI could be used to schedule doctors and operating theaters in such a way that reduces patient waiting times and improves the flow of patients through the system.

#### G. POTENTIAL COST SAVINGS

Artificial intelligence can offer significant cost saving opportunities in healthcare. A study by Accenture found that key clinical health AI applications can potentially create \$150 billion in annual savings for the United States healthcare economy by 2026 [17]. AI can simplify medical procedures and improve the utilization of resources. In the future, it may be possible to use AI to automate tasks that are fully reimbursable, which will increase efficiency. An example of this is using AI to automate documentation and administrative tasks. By doing so, physicians can save time and focus more on patient care, which is more valuable. A study by Humana found that physicians spend two-thirds of their office day doing clerical work, which is a major driver of physician burnout. Physician burnout is estimated to cost the U.S. healthcare industry \$4.6 billion a year. By using AI to automate clerical work, physician burnout can be reduced and physicians can be more productive, which will increase practice revenue [17]. Simplifying medical procedures and automating admin and clinic support are estimated to free up 20% of physicians' time. This time can be directed to higher value work since a decrease in physician work time is not proportional to their pay due to fee for service payment. This will allow cheaper access to care and increase physician job satisfaction.

#### H. INTEGRATION OF AI INTO HEALTHCARE SYSTEMS

Hospitals are a large store of medical data and information with many diagnostic and treatment processes performed regularly. If AI technologies are to be developed and applied, the most effective way for integration would be through patient management systems [18,19]. The first step should be to implement a simple set of triage tools to guide patients to appropriate care. Next, a quality of care assessment should be performed comparing the AI-guided care with the current standard of care, followed by implementing the AI guide and determining the resource savings. This approach would be extremely effective in the implementation of AI technology, and the ease of spread of information and expertise would allow the changes to have a large effect. AI technology could also be implemented in diagnostic and treatment procedures in order to improve patient outcomes and cost and resource effectiveness of a procedure. An article by [19] gives an example of how in the treatment of prostate cancer, a decision analytic model was utilized to evaluate patient preferences in order to improve the decision-making process for treatment at the patient and physician level. The model guided physicians through various strategies by predicting outcome based on data and assigning a quality of life utility to patients at each decision node. This allowed the best strategy to be determined given the value assigned to patient outcomes, create opportunities for improved health to be evaluated against expected gains in quality of life, and provide insights regarding patients with a high probability of poor treatment outcome. The model was said to be easy to use and useful, and given that the AI application is discernible and the current variation and waste in treatment of prostate cancer, it would likely have a large positive impact.

### I. ETHICAL FRAMEWORKS FOR AI IMPLEMENTATION

Transparency. Ethical principles and their translation into practical constraints for system design and use must be open to examination and revision, both within the professional community and the public at large. Rigorous specification so that they can provide a clear context for decision and policy making, and serve as a criterion for judging the conduct of involved parties. Protection of the public interest, crucial for maintaining public trust. This will mean constraining the pursuit of industry or corporate interests where these conflict with public well-being or are seen to erode values in professional practice [19]. A strong regulatory framework will be essential in achieving this. A focus on outcomes. The quality of AI systems in comparison with human practice and their impact at the level of healthcare service to patients must be continuously assessed. An ethical framework should contain mechanisms for the prevention of uses of AI which are detrimental to these.

With any new technology, careful thought must be given to the ethical frameworks in which policies are developed and AI systems are deployed. These frameworks must be clear, top-down, and fully integrated into clinical practice as well as the broader social and political context in which the goals of healthcare are met. A good ethical practice, around which governmental and institutional policy and regulatory constraints must be built, should have the following features

### IV. SIGNIFICANCE AND BENEFITS

The application of AI in healthcare has great importance and advantages for the United States at levels including medical services, operational systems, and others. One of the major pros of AI-powered diagnostic tools is that they can reduce the duration of disease detection and possibly lead to early treatment with better results [19,20]. For example, Artificial Intelligence algorithms have presented a high level of precision in detecting conditions such as diabetic retinopathy and some types of cancer from medical imaging data, strengthening early interventions and decreasing the workload of healthcare systems.

AI-driven predictive analytics also empowers clinicians to be more action-oriented and individualized on detecting patients with elevated risk of developing particular health conditions. AI with big data analysis combined with patient data, including the electronic health records and genetic information, will empower healthcare providers to design tailored preventions and treatment plans according to the needs of the individual patients. Such a proactive approach not only ensures better health outcomes but also cuts back on the medical costs accrued from diseases which could have been prevented.

AI provides the possibility of automating administrative tasks and enhancing operational performance of healthcare systems. NLP algorithms are also able to execute tasks such as medical transcription and coding automatically, which reduces administrative load and leaves the care providers with more time for the patients [1]. AI-driven optimization algorithms, on the other hand, can improve resource allocation and scheduling, which in turn, results in better workflow management and less time spent by patients waiting. AI integration in healthcare has the opportunity not only to foster technological progress, but also to stimulate economic development in the U.S. The advent of AI technology development and deployment creates footholds for the startups, healthcare specialized on AI-driven diagnostics, and IT companies engaged in providing AI solutions for healthcare institutions.

### V. ADVANCEMENTS

The use of AI in the healthcare sector of the U.S. may bring new opportunities with the potential of radically redefining the process of healthcare delivery and patient care. One important thing that we are going to continue seeing is the use of AI in precision medicine, where treatment plans are developed according to the individual characteristics of a patient, such as genetic makeup, medical history, and their everyday habits [20]. The AI algorithms will be able to study the huge data of the patient's properties including genetic information, electronic health records, and real-time monitoring of the status. The health providers can thus provide more specific and successful treatments with fewer untoward effects and this will lead to better outcomes. Besides that, the deepening of AI-assisted telemedicine and remote monitoring systems will certainly improve healthcare access and distribution across the nation as well. The AI-driven telemedicine platforms capable of diagnostic assistance enable patients to be seen by a doctor sooner and often virtually from their homes, specifically when the access to healthcare systems is limited due to living in remote areas. AI can be employed to monitor patients via remote equipment which is seen to continuously track the patient's health metrics and alert the healthcare providers of possible issues so that early interventions and proactive management of chronic conditions are achieved. In the context of medical research and discovery of drugs, AI offers a great chance to speed up the rate of innovation and put more effective drugs on the market faster. AI algorithms (along with their anomaly-seeking skills) can examine a wide range of data sets in search of disease biomarkers, predict treatment response, and actually detect new drug targets [21]. Joint efforts of pharmaceutical companies, research institutions and AI startups will be more and more common, which is a great basis for discovering new approaches to therapy that apply to a wide variety of diseases ranging from rare to complex cases. Similarly, the introduction of AI in healthcare processes will reduce operational costs and improve healthcare institutions' efficiency levels. AI-powered predictive analytics and optimization tools would help to reallocate resources, simplify bureaucracy and increase patient care efficiency.

### VI. CONCLUSION

This paper focused on ethical considerations in patient care and decision making as related to AI use. The implementation of artificial intelligence into the healthcare system has a number of ethical decisions and options that should be looked at actively and tactfully by the participants. A multifaceted way of introducing fairness, transparency, privacy, accountability along with the respect of human agency should be the main concern in dealing with these ethical dilemmas. Strategies such as diverse and representative training data, and algorithmic transparency are indispensable in the attempt to avoid AI algorithm biases and allow healthcare equality for all patients. Additionally, reliable security and privacy arrangements such as informed consent and anonymising data need to be implemented to enable patients to trust and respect the privacy aspect in AI-based healthcare systems. It is important to create a schema and the processes for tracking the major offensive symptoms of high blood pressure that help to make more precise and trustworthy diagnosis. The stakeholders should come up with clear roles and duties among the developers, healthcare providers, and regulatory bodies to cater for the convenience through which patients can be protected from risks and have a channel through which they can report adverse events. On the other hand, AI has a good promise of increasing clinical decision-making and enhancing patient outcomes, but

it is very much important that human autonomy and expertise are preserved in a healthcare setting. Healthcare professionals must have the mental capacity to critically evaluate the ones AI generated and, in the end, decide in the best interest of the patients, while AI acting as the tool in boosting rather than replacing the cognitive ability and the emotions.

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