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The Ethical Aspects of Applying Artificial Intelligence in the Healthcare System

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Abstract - Artificial intelligence is abundant nowadays, including healthcare practice. However, there are ethical aspects of applying artificial intelligence (AI) in healthcare practice. The paper aims to describe the ethical aspects of applying artificial intelligence (AI) in the healthcare system. This paper is a narrative literature review. Literature was taken from Science Direct, PubMed, and Google Scholar. Selected journals were published within 5 years. AI-based algorithms commonly work based on the provided data. Nevertheless, the variations among patients' conditions, insurance records, and diagnostic results are wide. Some data such as social determinants might not be seen by the AI system. This kind of data determines the biases in data sets and health disparities. Therefore, the algorithms should be well designed to minimize bias and align with the ethical dimensions. Predictive algorithms might be used to predict care decisions and outcomes. Incorrect diagnosis might be developed while using AI tools directly without expert opinion. In conclusion, the ethical dimensions of applying AI in the healthcare practice are minimizing bias, determining the variations of social conditions among patients, and using expert opinion other than relying on AI only.
Keywords: Artificial intelligence (AI), Ethical Aspect, Healthcare

1. INTRODUCTION

The usage of artificial intelligence is abundant nowadays, including in the healthcare practice. The integration of AI in medical health has changed the way healthcare practice is delivered. A computer program with artificial intelligence (AI) might diagnose cancer and rare genetic diseases more accurately than an expert. The AI program could make faster diagnosis than a decade of intensive medical education expertise. However, the technology has its limitations and complexities, including in ethical dimensions. Therefore, a thorough consideration of ethical and legal aspects is needed (Mennella et al., 2024; Rigby, 2019)

Artificial intelligence (AI) as transformative technology, comprises machine learning, robotics, and natural language processing. AI can be applied to almost any research, healthcare system, and medical research. The strength of AI is in the properties to integrate a wide data set of clinical data into diagnosis, decision-making, and medication. Nowadays, an algorithm based on AI is used as assistance in breast cancer detection. This condition makes the radiologists' work easier. In psychiatric cases, an avatar-based virtual human can assist conversation in seeking diagnosis and treatment. Although the powerful technology provides many practical ways in healthcare, some ethical challenges are present i.e. patient safety, privacy, and preference. The problem is the lack of ethical guidelines and policies amid the AI progression era (Mennella et al., 2024; Mohammad Amini et al., 2023; Rigby, 2019).

Some ethical challenges of AI are bias, privacy, and accountability. Bias might lead to unequal outcomes for certain groups of patients. Therefore, balancing AI development with ethical issues is critical for the alignment of AI with individual rights and social values. Clear ethical guidelines, accountability, transparency, and continuous evaluation are needed to ensure the integration of AI and ethical dimensions in healthcare practice (Ayinla et al., 2024).

This paper aims to describe the ethical dimensions of applying artificial intelligence (AI) in the healthcare practice. The benefits of this review is getting a more comprehensive view about using AI in healthcare practice, include the challenges and balancing strategies in implementing AI in the healthcare practice.

2. RESEARCH METHOD

This paper is a narrative literature review. Literature was taken from Science Direct, PubMed, and Google Scholar. Selected journals were published within 5 years. Criteria for journal selection were based on the keywords (Artificial intelligence (AI), ethical aspect, healthcare), abstract, and content. From 182 eligible articles based on keywords, it was selected further based on abstract and content. Finally, there were 22 articles.

3. RESULTS AND DISCUSSION

The ethical AI concept emphasizes beneficial and non-harmful principles. It needs a balance between ethical standards and technological advancement. Some ethical issues regarding AI usage are transparency and accountability of the decision. The algorithmic bias might occur. Sometimes, AI-driven decisions are difficult to interpret. Therefore, the integrity and professional roles of clinicians are essential to solve problems and make informed decisions. However, patients need to know when AI is used in the healthcare practice as an informed consent provider. Legal regulations are also needed to balance technology with human values, especially human rights and societal norms (Ayinla et al., 2024; Kazim & Koshiyama, 2021; Lysaght et al., 2019). Mezgár (2021) emphasized the shift from general ethical issues to the development of AI standards, i.e. Cyber-Physical Production Systems (CPPS) (Mezgar & Vancza, 2022).

AI-based algorithms commonly work based on the provided data. Nevertheless, the variations among patients' conditions, insurance records, and diagnostic results are wide. Some data such as social determinants might not be seen by the AI system. This kind of data determines the biases in data sets and health disparities. Therefore, the algorithms should be well designed to minimize bias and in line with the ethical dimensions. Predictive algorithms might be used to predict care decisions and outcomes. Incorrect diagnoses might be developed while using AI tools directly without expert opinion (Ayinla et al., 2024).

The need for precision medicine enhances the use of AI. Many sectors of life implement AI usage such as healthcare, business, finance, education, entertainment, transportation, and manufacturing. The strength of AI is making the tasks automated. AI can be used as a tool for diagnosis and treatment plans (Figure 1). Furthermore, AI is useful for analyzing traffic patterns and changing traffic lights to relieve traffic jams. On the other side, AI might optimize manufacturing processes and product quality. Real-time data analysis, outcome, and threat prediction are some of AI's uniqueness (Abujaber & Nashwan, 2024; Amedior, 2023; Keefe et al., 2021).

The ethical challenge of implementing AI technology into health practices is seamless integration into clinical practice. For sustainable adoption, AI systems have to undergo a

standardized approval process to ensure uniform functionality. Clinical training is also needed for better care and service. AI might mirror human emotions. However, it cannot replace human clinicians. The technology only assists and augments the clinical expertise. It would never replace the human (doctor) position in dealing with the patient. Human expertise is the main priority because the expert has some experience in making difficult decisions. AI proceeds with input and generates output without considering any reason such as human expertise. Therefore, it lacks clinical consideration. To prevent human experts from being wronged due to AI errors, standardized policies are needed. Healthcare providers must balance AI-driven insights with their expertise and experience. There are some risks of using AI. Therefore, there should be balanced innovation with the precaution of patient privacy, safety, and ethical dimension when facing the ethical crossroads of artificial intelligence (Figure 2) (Ayinla et al., 2024; Mennella et al., 2024; Zhang et al., 2024).

Figure 1. Artificial Intelligence in Healthcare (Amedior, 2023)

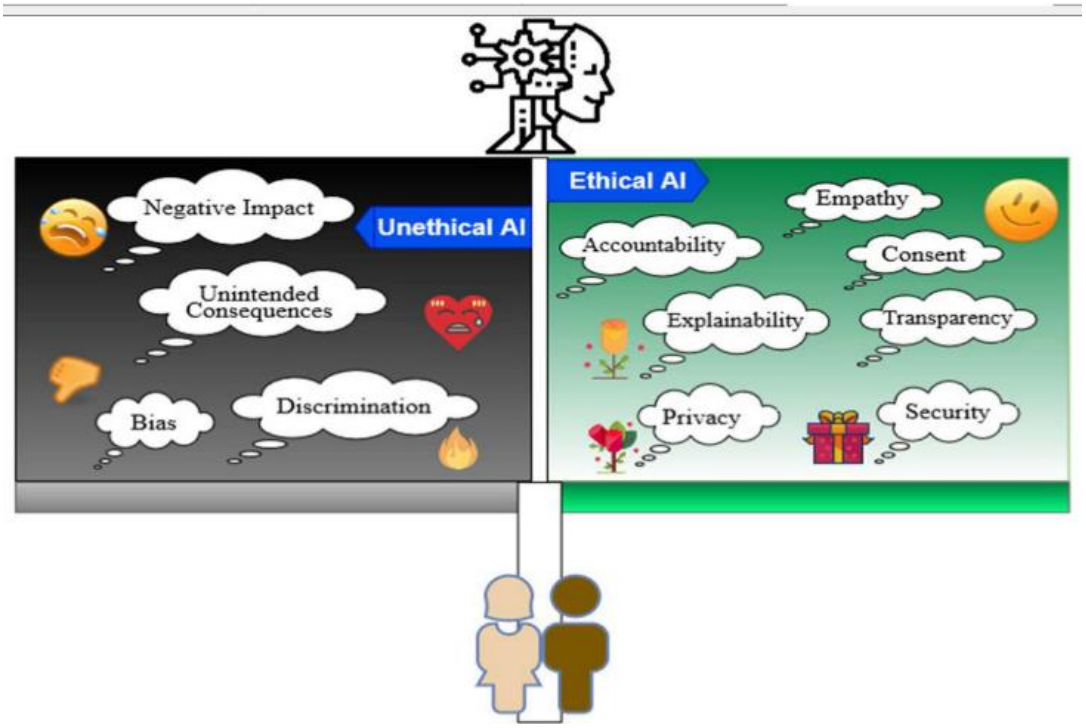

Figure 2. Ethical crossroad of artificial intelligence (Amedior, 2023)

The role of AI is related to augment, not replace physicians. However, physicians should update in technical skills to balance technology innovation. Fundamental medical values have to be preserved for better patient care. The benefits of using AI should not compromise ethical standards and privacy policies. Privacy is crucial for maintaining the trust of the patients (Jameel et al., 2020).

Bias in AI systems might be tackled by collaboration among stakeholders, interdisciplinary approach, and developers to address ethical design. Accountability in AI equals the ability to hold responsible for the decisions made by AI systems. Providing clear guidelines for decision making, ensuring safe, and transparent ethical principles. Seven important ethical principles are beneficence, autonomy, justice, maleficence, transparency, privacy, and accountability. Justice and autonomy principles are needed for integrating AI into good healthcare practice. Accountability is essential for ensuring public trust (Alzahrani et al., 2022; Ayinla et al., 2024).

The challenges in the ethical regulation of AI are the complexities in defining AI, the necessity for public participation in democratic governance, and the environmental impacts of AI systems. A holistic and multidimensional approach is needed for defining AI in the cultural context. Government should establish guidelines for the development and the use of AI in the healthcare system (Dhirani, Chowdhry, et al., 2023; Owczarczuk, 2023; Schoentgen & Wilkinson, 2021). The ethical dilemmas in applying AI are related to human aspects, technical error, privacy, transparency, and fairness (Cobianchi et al., 2023).

The principle of ethical dimension in the application of artificial intelligence in the healthcare practice is critical for sustainable technological implementation. The concept of 'Algor-ethics' was introduced by Mantini in 2022. It underscored the ethical concept of AI, technology, and algorithms. The Dynamical Techno-Algor-Ethical Composition approach was used for the interaction between ethics and technology by using a person-centered method (Mantini, 2022). The proposed ethical framework for artificial intelligence in the healthcare system is very crucial for publics and stakeholders as shown in Figure 3 (Abujaber & Nashwan, 2024).

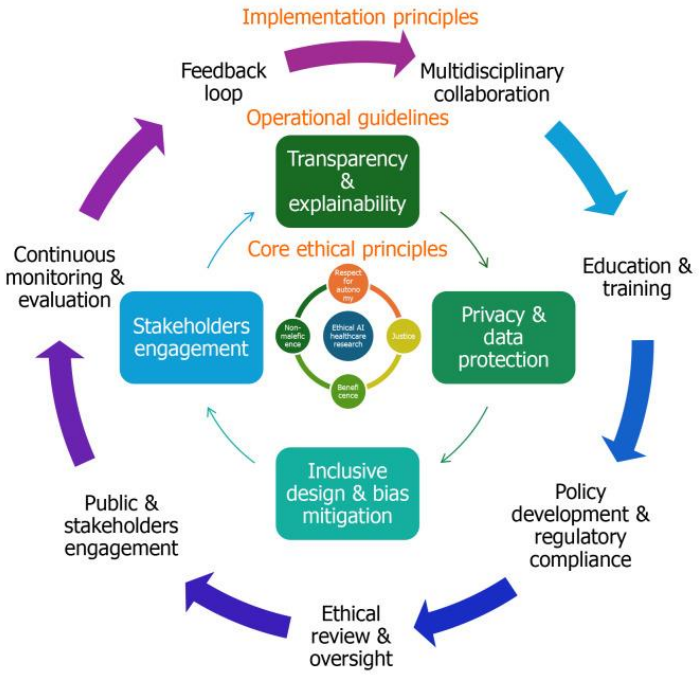

Figure 3. The proposed ethical framework for artificial intelligence in the healthcare system (Abujaber & Nashwan, 2024)

Maharani, Amin, and Taufiqoh (2022) delved into the AI development in Indonesia and offered three principles of ethical paradigm i.e. awareness, responsibility, and sustainability. These principles are critical for strategy, vision, implementation, and management the impacts of AI. The aims of those principles are to prevent the AI become a disaster in the near future (Maharani et al., 2022).

Wei and Zhou in 2022 studied some ethical problems in AI usage such as racial discrimination, unfair algorithms, and physical safety problems. These issues were found in autonomous driving, vision/language models, and service robots. Some concerns and solutions in ethical aspects of applying AI in the healthcare system are as follows (Dhirani, Mukhtiar, et al., 2023; Wei & Zhou, 2022; Yu et al., 2024):

1. Patient data privacy
    a. Concerns: any unauthorized data access, information misuse
    b. Solutions: data encryption, access control, compliance with the regulation of the Health Insurance Portability and Accountability Act

    Patient data privacy can be protected by applying data anonymization (removing the identity to protect the patients' privacy), data encryption, access limitation to authorized personnel, and patient consent for data usage. The user's permission must be obtained before implementing AI. Patient data privacy should be seen as the highest priority.
2. Bias and Fairness
    a. Concerns: bias might cause unequal treatment and outcome
    b. Solutions: diverse and representative data might enhance fairness and reduce the possibility of bias

    The diverse data set that represents diverse populations is useful for minimizing the possibility of bias. Regular audits are important as a bias detection tool. Fairness metrics and human oversight are essential in supporting AI-driven decisions. Fairness includes ensuring a free discrimination environment based on race, gender, caste, and religion. Based on the General Data Protection Regulation (GPDR), fair data usage is mandatory. Although AI shows some benefits such as improved patient outcome for the healthcare system, the data protection must be the priority (Mohammad Amini et al., 2023).
3. Transparency and Explainability
    a. Concerns: AI-based decision could be difficult to interpret
    b. Solutions: develop a transparent AI model to provide clear explanation and decision

    The model-agnostic explanation is used for providing a comprehensive explanation in tackling complex cases. A transparent design for AI-based algorithms is needed for a valid justification, result tracking, and human moral accordance. The final goal is a comprehensive decision-making process. Clear documentation and systems will increase the possibility of clear explanations and decisions (Dhirani, Mukhtiar, et al., 2023).
4. Accountability
    a. Concerns: determining who is responsible for any errors when using AI
    b. Solutions: establish clear regulation and responsibilities, also ensure the accountability of AI developers and healthcare providers

    Establishing clear guidelines for using AI, including defining the accountability for AI-related decisions are critical for ensuring the accountability of AI implementation in the healthcare system. Valid decision-making procedures should be auditable, especially

regarding sensitive information (including copyright law, biometrics information, and personal health medical records).

5. Informed Consent
   a. Concerns: patients might not be aware of AI's potential role in their care and management, thus this condition might undermine the patients' autonomy
   b. Solutions: provide comprehensive information about AI's roles and risks. Patients need to give informed consent before using AI in healthcare practice.

   Clear communication in patient education should be applied while giving consent forms for the patient, especially regarding AI-driven care.
6. Clinical Judgement
   a. Concerns: AI might not be used as the sole decision maker because it might lead to diminished clinical judgment.
   b. Solutions: AI systems should augment clinical judgment. AI should not replace the expertise's role in taking care of the patient.

   Augmenting clinical judgment, clinical validation, and human-AI collaboration need ongoing training on AI-driven care.
7. Regulatory Framework
   a. Concerns: lack of regulations and guidelines
   b. Solutions: the government should establish clear standardized guidelines for AI implementation in the healthcare practice

   Ensure regulatory compliance and enforcement, together with ongoing evaluation will promote the implementation of AI in the healthcare practice system. Further studies are needed to develop AI problem recognition in AI standard development as shown in Figure 4 (Mohammad Amini et al., 2023). Balancing strategies and challenges is essential for AI integration in healthcare. The challenges are liability, patient autonomy, informed consent, bias, fairness, privacy, and accountability. The strategies to manage the challenges are training healthcare and professionals, AI validation, and audit as shown in Figure 5 (Yu et al., 2024).

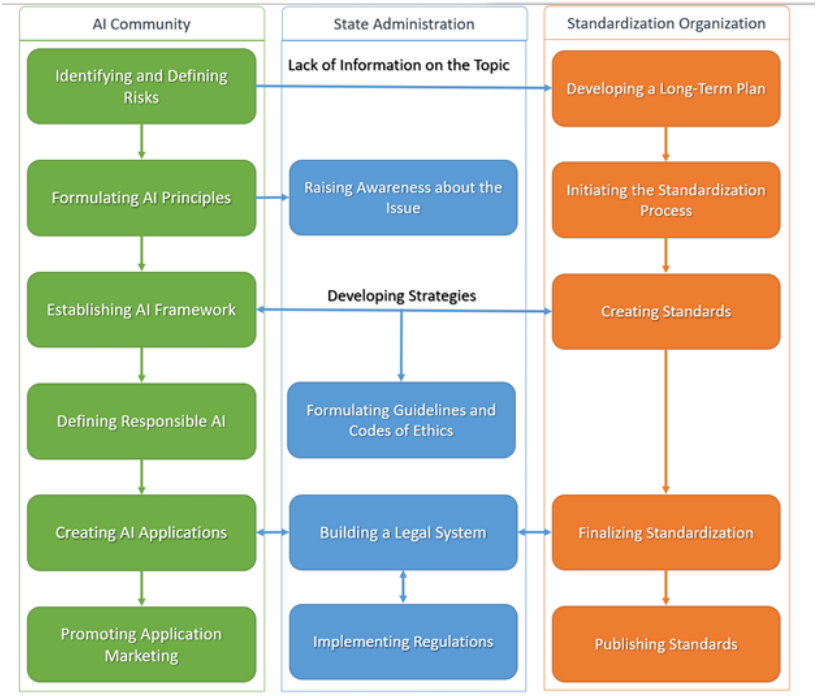

Figure 4. The flowchart of AI problem recognition in AI standard development (Mohammad Amini et al., 2023)

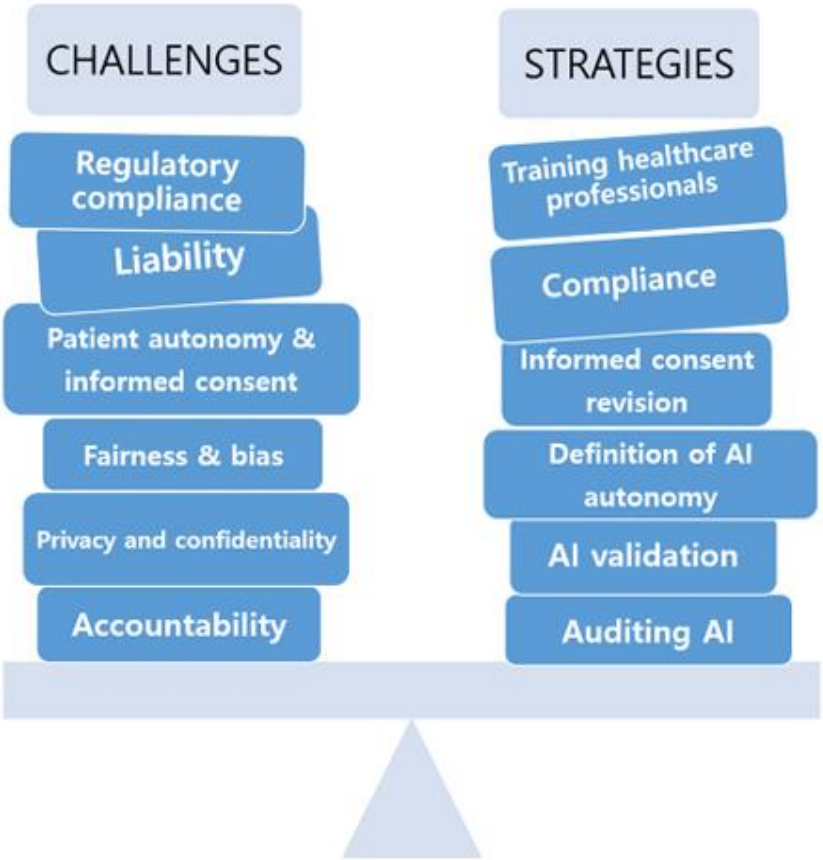

Figure 5. Balancing strategies and challenges for AI integration in healthcare (Yu et al., 2024)

4. CONCLUSION

In conclusion, the ethical dimensions of applying AI in the healthcare practice comprise minimizing bias, determining the variations of social conditions among patients, and using experienced human expertise opinion. The continuous ethical guideline improvement needs to be upgraded to keep up with the development of AI technology. In the future, the development of more explainable and transparent AI models is needed. Implementing robust data protection and security might enhance the accountability and fairness. By focusing on the ethical aspects of applying AI in the healthcare system, patient outcomes will be improved. The biggest challenge is enabling AI to think resemble human and have ethical conduct. Developing the standards regulation might control the ethical aspects of implementing AI in the healthcare system.

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