

Ethical Foundations Of Ai For Future Allopathic Medical Practitioners: A Systematic Quantitative Review Of Literature

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Abstract

Introduction: Artificial Intelligence (AI) increasingly influences modern healthcare, offering advancements in diagnostics, treatment, and administrative efficiencies. However, integrating AI into allied healthcare disciplines requires foundational understanding, practical skills, and ethical awareness. In this haste evolution of AI, there arises many critical ethical questions, particularly regarding the implications of relying solely on measurable data. This study explores the ethical considerations associated with AI in medicine and how allied healthcare students can be effectively prepared for AI deployment in their work.

Aims and Objectives: This study aims to analyze how future allopathic medical practitioners perceive the ethical concerns of AI deployment in healthcare, specifically their view on AI-driven modalities like x-ray machines, CT-scan machines, 5D USG, ECG, Treadmills, etc. compared to the role of technician before and after AI integration.

Methodology: a deductive systematic literature review was conducted proceeding the gain of perspective from conference discussion of medical professionals and future practitioners in NCISRT'24. The thorough review inclusion criteria resulted in 50 papers, all mentioned in the reference list, which were used for analysis to support our perspective.

Study Analysis A thorough analysis of existing literature and expert opinions from the conference discussions revealed key themes in AI adoption in healthcare:

- The growing reliance on AI-driven diagnostic tools, such as radiological image interpretation and predictive analytics.
- The necessity of AI literacy among healthcare practitioners to ensure safe and effective AI integration.
- The importance of ethical AI governance, addressing issues such as data privacy, algorithmic bias, and transparency.
- The need for structured AI training in allied healthcare curricula to ensure a balanced approach to human-AI collaboration.

Results

- AI has significantly enhanced medical imaging, predictive analytics, and clinical decision support.
- A lack of AI literacy among allied healthcare students may hinder its ethical and effective adoption.
- Ethical concerns such as bias in AI models and accountability in AI-driven errors require structured frameworks.
- Incorporating AI ethics and practical training into medical curricula is essential for preparing future practitioners.

Conclusion AI and deep learning technologies hold immense potential to revolutionize medicine, particularly in personalized care, predictive analytics, and automated decision-making. However, their integration into healthcare must be managed with a strong ethical framework. Ensuring transparency and explain ability of AI systems, defining clear lines of responsibility, incorporating diverse datasets, and implementing continuous monitoring are crucial steps. These measures are essential to mitigate ethical risks and safeguard patient welfare, ensuring that AI advancements enhance rather than compromise the integrity of healthcare systems.

Keywords: Artificial Intelligence, Algorithms, Ethics, Allopathic medicine, Ethical Foundation

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I. Introduction

Background

As students in allied healthcare and sciences, clinical postings in hospitals play a crucial role in our education. Nowadays, many hospitals are equipped with AI-integrated systems, including radiology machines,

treadmills, and echocardiograms, which greatly improve efficiency and accuracy. However, with no established regulations or formal ethical guidelines specifically addressing AI in medicine, healthcare professionals must depend on traditional medical ethics to navigate this rapidly evolving field [1]. As a result, we find ourselves in a trial-and-error phase, raising important questions about professional responsibility when interacting with AI-driven technologies.

One of the biggest challenges in integrating AI into healthcare is learning how to interact with these systems effectively, interpret their outputs with confidence, and communicate AI-assisted decisions to patients while upholding their autonomy [4]. Since the introduction of ELISA in the 1960s, AI's role in medicine has grown tremendously [4] [6]. However, concerns about data quality, bias, and accountability remain. If AI is trained on biased datasets, it may produce skewed evaluations, leading to both technical and societal biases. Furthermore, when errors occur, responsibility becomes a gray area [2]. For instance, if patient vitals—such as age, weight, blood pressure, and oxygen levels—are entered manually while AI handles the rest of the examination, how can errors be identified? And if the AI-generated diagnosis contradicts clinical expectations, who should be held accountable? [3]

To tackle these concerns, we reviewed a range of academic papers and research studies to understand why AI ethical guidelines have been slow to develop, the risks that policymakers are wary of, and the necessary steps for seamlessly integrating AI into healthcare. Additionally, discussions with students from various healthcare disciplines offered valuable insights into the practicality of acquiring AI-related skills and their views on collaborating with AI in clinical settings. Through this study, we aim to explore these aspects, highlighting the ethical considerations and readiness of allied healthcare students as they navigate the era of AI-driven medicine.

II. AIM & Objective

The purpose of the review is to understand how future medical practitioners perceive AI ethical implications, particularly concerning AI-driven diagnostic and therapeutic technologies. This study aims to explore the perspectives of allopathic medical students and allied healthcare professionals on the integration of AI-powered tools such as X-ray machines, CT scanners, 5D ultrasound, ECG devices, and treadmill-based diagnostic systems. Additionally, it seeks to evaluate how AI-driven automation influences the role of medical technicians before and after its implementation.

A key focus of this study is to assess the level of AI literacy and preparedness among allied healthcare students. As AI continues to transform clinical practice, understanding how well medical students and allied health professionals are equipped to work with these technologies is crucial. This research will analyze their knowledge, awareness, and confidence in using AI-driven systems, identifying gaps that may hinder their ability to integrate AI into patient care effectively.

Furthermore, this study aims to explore how medical and allied healthcare curricula can be adapted to equip future practitioners with essential AI-related skills. The integration of AI into healthcare demands a corresponding shift in education, ensuring that students are trained in AI ethics, data management, and clinical decision support systems. By examining current curricula, this research will propose necessary modifications to better prepare future healthcare professionals for an AI-driven medical landscape.

Another critical objective is to propose guidelines for ethical AI integration in healthcare. As AI adoption increases, concerns about patient safety, data privacy, and equitable access must be addressed. This study will explore how AI can be implemented responsibly, ensuring fairness, transparency, and accountability in its applications. The ethical considerations surrounding AI-generated decisions, potential biases in algorithms, and the impact of automation on healthcare roles will be examined to develop comprehensive guidelines that support both practitioners and patients.

III. Methodology

This study is grounded in insights gained from discussions with medical professionals and future practitioners at NCISRT'2024. It adopts a systematic, deductive, and logical review approach to analyze the current landscape of AI ethics in medicine. The methodology involves a thorough evaluation of academic literature and conference proceedings to synthesize key findings.

1. Study Design: This research follows a systematic literature review framework, employing a structured approach to identify, assess, and synthesize relevant studies on AI ethics in medicine.

2. Data Sources and Study Site: The study was conducted through an extensive review of published literature obtained from multiple academic sources. Data was retrieved from reputable online databases, including EBSCO, PubMed, Scopus, and Google Scholar.

3. Data Collection Process:

- Articles were selected based on their relevance to AI ethics in medicine and predefined inclusion criteria.
- The selection process involved screening abstracts to determine their alignment with the research focus, ensuring only relevant studies were included for further analysis.

4. Inclusion and Exclusion Criteria

- **Inclusion Criteria:** Studies examining AI ethics in healthcare, as well as AI-related education in medical training, were considered. A total of 50 articles were selected for in-depth analysis, including some grey literature that contained valuable insights.
- **Exclusion Criteria:** Studies that were not peer-reviewed, published in languages other than English, or lacked sufficient data were excluded. Articles deemed irrelevant after abstract screening were also removed.
- **Reference Year Range:** The literature review encompassed research published between 2021 and 2024 to ensure the study incorporated the most recent advancements in the field.

5. Ethical Considerations:

As this study is a systematic review, it did not involve direct engagement with human or animal subjects. Therefore, no ethical approval was required.

IV. Literature Review

1. The current landscape of AI in medicine, locally and internationally.

Currently, no specific codified laws, statutory rules, or regulations in India directly regulate AI. Even in other places that have enacted laws, they apply to certain states. This poses a challenge to understand why, after all this time from its discovery, it poses such a challenge. The lack of specific AI regulations in India's healthcare sector is driven by several challenges. As Morgan Lewis points out [13] AI technology is evolving so rapidly that legislation struggles to keep up, making it difficult to create comprehensive laws. Moreover, because AI is used across multiple industries, including healthcare, it becomes challenging to develop a one-size-fits-all regulatory framework. In the medical field, additional concerns, such as **data privacy, inadequate infrastructure, and the risk of bias in AI algorithms**, make it even harder to establish clear and effective guidelines.

2. Ethical Challenges in AI Deployment

Accountability in AI-driven medical decisions is a critical ethical challenge, particularly as AI systems become integral to healthcare. Norton Rose Fulbright [5], highlights the complexity of assigning liability when errors occur, raising questions about whether responsibility lies with practitioners, institutions, or developers. This issue intersects with broader legal concerns about AI's role in medical malpractice and the lack of comprehensive regulations governing its use.

The Montreal Declaration [4], emphasizes that AI must operate under human oversight to ensure ethical integrity and accountability, advocating for its role as an assistive tool rather than an autonomous decision-maker. Gerke, Minssen, and Cohen [3] propose a shared accountability model, distributing liability among stakeholders based on the level of AI autonomy and human involvement. This approach acknowledges that while AI enhances diagnostic accuracy, it introduces uncertainties requiring clear accountability structures. Ethical frameworks must address transparency, algorithmic fairness, and professional training to ensure that AI complements clinical judgment without undermining patient safety or trust.

Beyond legal and ethical considerations, the integration of AI into healthcare requires standardized protocols to assess its reliability before deployment. Topol [6] highlights AI's potential to enhance diagnostic precision, but notes that without clear guidelines, it can introduce new risks. To mitigate these risks, healthcare institutions should implement continuous auditing, incorporate bias detection mechanisms, and provide comprehensive clinician training. This approach ensures that AI systems are not only effective but also safe and responsibly implemented. The development of tools like the 30-item checklist for evaluating AI/ML research in healthcare and the Quality Assessment of Medical Artificial Intelligence (QAMAI) tool underscores the need for rigorous assessment and validation of AI-driven healthcare solutions. Additionally, robustness and reliability testing are crucial to guarantee that AI systems can handle diverse scenarios and maintain accuracy over time, ultimately enhancing patient care.

Bias and discrimination in AI are critical ethical concerns in healthcare, where fairness and equity are paramount. The European Commission [7], highlights how AI models often inherit biases from their training datasets, leading to disparities in medical decision-making, particularly when datasets fail to represent diverse patient populations. This can result in misdiagnoses or unequal treatment, exacerbating existing health inequities. To address this, the World Health Organization [10] advocates for ethical frameworks that emphasize rigorous validation, continuous monitoring, and transparency in AI development to minimize discriminatory patterns.

Mittelstadt [8], further argues that bias is not just a technical issue but a systemic challenge rooted in healthcare structures, requiring interdisciplinary collaboration among clinicians, data scientists, and ethicists to ensure AI aligns with real-world diversity. A proactive solution involves developing adaptive AI models that learn from diverse, real-time clinical data rather than static datasets.

Morley, Machado, and Taddeo [9], emphasize the importance of governance mechanisms that enforce transparency and accountability, ensuring bias mitigation is an ongoing process. By fostering inclusivity and equity in AI design and implementation, healthcare systems can harness AI's potential while safeguarding ethical principles and improving patient outcomes.

3. The Need for AI-Specific Educational Training

The **absence of formal AI training in medical education** for allied healthcare students creates a significant gap that needs to be addressed. The Beijing AI Principles [11] underscore the importance of structured training in AI ethics, particularly in ensuring that patients are fully informed and that AI is used responsibly. This aligns with broader efforts to integrate ethical AI principles into medical decision-making, enabling healthcare professionals to critically assess AI-driven recommendations and make informed choices.

Many healthcare professionals lack **basic knowledge** about AI, which poses significant risks when integrating AI into clinical practice. Without proper training, clinicians may either rely too heavily on AI outputs or dismiss them entirely due to uncertainty, potentially leading to errors in patient care. This highlights the need for comprehensive education to ensure that AI is used effectively and safely, as highlighted by Hastings Center [12].

The integration of AI education into medical curricula is crucial, as argued by Weidener & Fischer [14]. They suggest that hands-on training, case-based learning, and collaboration between AI developers and healthcare educators are essential to bridge the knowledge gap. Furthermore, Kapoor & Kalathil [13] propose that regulatory bodies should implement standardized AI training modules as part of healthcare licensing requirements. This would ensure that all professionals have a foundational understanding of AI's applications and limitations, ultimately enhancing patient care and safety.

4. Practical Considerations for Responsible AI Use

The integration of AI in healthcare requires careful balancing between AI-driven recommendations and clinical judgment to ensure ethical and effective patient care. The European Commission [7] emphasizes that AI should **complement, rather than replace**, human decision-making, with healthcare professionals maintaining ultimate authority over patient outcomes. This concern aligns with the issue of **automation bias**, where over-reliance on AI can lead clinicians to overlook critical contextual information.

Similarly, the World Health Organization [10] highlights the principle of **non-maleficence**, stressing that AI must not increase patient risk, particularly in high-stakes areas like radiology and surgical planning, where errors can have severe consequences. To mitigate these risks, the WHO advocates for rigorous validation, safety assessments, and regulatory approvals before AI tools are widely adopted.

Transparency and accountability in AI development are equally important. Zuboff [15] and the AI for Good Foundation recommend logging and auditing AI-driven decisions to ensure traceability and reliability. London [16] warns that opaque "black-box" AI models can undermine trust and ethical responsibility in clinical practice if their decision-making processes are not explainable. Expanding on this, Gerke, Minssen, and Cohen [3] propose a multi-tiered regulatory framework that includes **real-time monitoring** of AI outputs to ensure compliance with ethical and medical standards. McCradden, Anderson, and Stephenson [1] further emphasize the need for clinician training in AI literacy so that healthcare professionals can critically assess and challenge AI outputs rather than passively accepting them. Together, these perspectives underline the necessity of robust governance, transparency, and education to ensure that AI enhances healthcare without compromising safety or ethical principles.

5. The Role of AI in Medical Decision-Making

The increasing autonomy of AI systems in clinical decision-making raises concerns about automation bias. Vincent [25] and Jotterand & Bosco [23] warn that excessive reliance on AI may undermine physician expertise, leading to diagnostic errors. They emphasize the importance of maintaining human oversight in AI-assisted medical decisions.

McCradden, Anderson, and Stephenson [24] propose multi-stakeholder collaborations between AI developers and healthcare professionals to create ethical AI policies. Char, Shah, and Magnus [17] highlight the necessity of embedding ethical flexibility into AI models to ensure adaptability in complex clinical scenarios.

6. Regulatory and Policy Considerations

Governance frameworks are crucial for ensuring ethical AI integration in healthcare. Nuffield Council on Bioethics [26] and the Royal Society [16] advocate for international regulatory standards to harmonize AI ethics policies across healthcare systems. Davenport and Kalakota [10] [19] recommend the formation of AI regulatory bodies to oversee compliance and ethical AI deployment.

Gerke, Minssen, and Cohen [13] [22] emphasize the importance of liability frameworks to address AI-induced medical malpractice. Rigby [14] [21] suggests the establishment of AI ethics committees within healthcare institutions to ensure continuous monitoring of AI applications.

Moreover, the World Health Organization [10] has proposed a set of global AI ethics guidelines that emphasize patient safety, equitable access, and robust governance structures. The alignment of AI ethics with public health policies will be crucial in addressing ethical dilemmas in AI-driven medicine.

V. Results & Discussions

Our research revealed that current allied healthcare curricula do not adequately align with the evolving landscape of AI integration.

Students often lack the training required to explain AI's role in diagnostics and treatment to patients, affecting informed consent. A study on AI in healthcare education warns that without proper training, future advancements in AI could be at risk [18]. The research stresses the importance of adding AI-related topics to medical and allied health programs. Without this knowledge, students may struggle to use AI tools effectively and explain their role in diagnosing and treating patients.

Additionally, a misconception exists among students that AI in healthcare requires programming expertise, leading to knowledge diffusion and uncertainty about necessary competencies. Research by Almeida et al. [17] notes that "many clinicians remain inadequately educated about what AI entails, its limitations, and its implications," leading to misconceptions such as the belief that programming skills are necessary for working with AI systems. Some students also hold the illusion that AI automates everything, reducing the perceived need for further learning, which is incorrect.

Key Findings:

1. Foundational Understanding of AI in Healthcare:

- Understanding the basics of AI, like how machine learning and deep learning work, helps healthcare professionals use AI tools confidently.
- AI is used in many areas, including diagnosing diseases (like analyzing medical images), assisting in treatments (such as robotic surgery), and improving hospital workflows.
- It's important to consider ethical issues, like protecting patient data, avoiding bias, and ensuring that human professionals remain in control of AI-assisted decisions.

2. Practical Skills for AI Integration:

- Students should get practical experience with AI-powered diagnostic tools and medical devices.
- Learning how to interpret AI-generated results and recognize their limitations is essential.
- The focus should be on working alongside AI, using it to support clinical decisions rather than depending entirely on automation.

3. Essential Soft Skills:

- **Critical Thinking:** AI provides insights, but professionals must assess potential biases and make informed decisions.
- **Communication:** Effectively explaining AI-generated information to patients and colleagues enhances transparency and trust.
- **Adaptability:** As AI evolves, continuous learning and adaptability are essential to staying competent in the field.

Ethical Considerations in Patient Data Handling: AI relies on patient data for decision support, making data protection critical. Any use of patient data for diagnosis or research must be covered in informed consent, ensuring it serves the patient's best interest. Understanding that decision support follows the data highlights the need for stringent data privacy measures and ethical AI governance.

The findings indicate an urgent need to integrate AI literacy into medical curricula to bridge knowledge gaps and prepare future practitioners for AI-driven healthcare. Addressing misconceptions, promoting ethical considerations, and fostering critical thinking and adaptability are essential. Ethical AI deployment must emphasize transparency, accountability, and informed consent to ensure AI enhances, rather than undermines,

patient care. Ongoing education, hands-on training, and ethical oversight will be key to ensuring AI's responsible integration into medical practice.

VI. Summary & Conclusion

This study has highlighted the gap between AI's rapid integration into healthcare and the preparedness of allied healthcare students.

While AI-driven systems significantly enhance medical diagnostics, treatment planning, and administrative workflows, their adoption comes with ethical and educational challenges. The primary critique of current curricula is their lack of structured AI training, leaving students underprepared to interact with AI tools confidently, explain AI-generated outcomes to patients, and navigate the ethical concerns tied to data privacy and accountability.

A critical finding is the misunderstanding surrounding AI's complexity—some students perceive AI as requiring programming skills, while others assume complete automation removes the need for deeper knowledge. These misconceptions can hinder proper AI adoption. Additionally, the ethical dilemma of AI accountability remains unresolved, as questions persist on responsibility when AI-driven diagnoses yield errors.

To bridge this gap, medical curricula must evolve to include AI literacy, ethics, and practical applications. Key actions include:

- **Changing our mindset towards AI**, ensuring independence in evaluating AI-generated results.
- **Introducing AI ethics in medical education** to establish responsible AI integration practices.
- **Following the principle of non-maleficence** (first, do no harm) to protect patient welfare.
- **Maintaining professional responsibility**, ensuring AI complements rather than replaces human expertise.
- **Enforcing human oversight**, requiring practitioners to review, verify, and decide on AI outputs.
- **Implementing continuous surveillance and maintenance** of AI systems to uphold reliability and safety.

By taking these steps, the healthcare sector can ensure AI is an asset rather than a disruption, enhancing medical practice while safeguarding ethical principles. As Satya Nadella aptly stated, *“Ultimately, it's not going to be about man versus machine. It's going to be about man with machines.”*

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