AI Ethics Perspective: Sparing the Role of Medical Physicists in the Era of Artificial Intelligence

Shriram Rajurkar[1,2,3], Rajasekar Mahalingam[1], Teerthraj Verma[2], Abdul Kalam Azad[3], Hasin Anupama Azhari[4]*

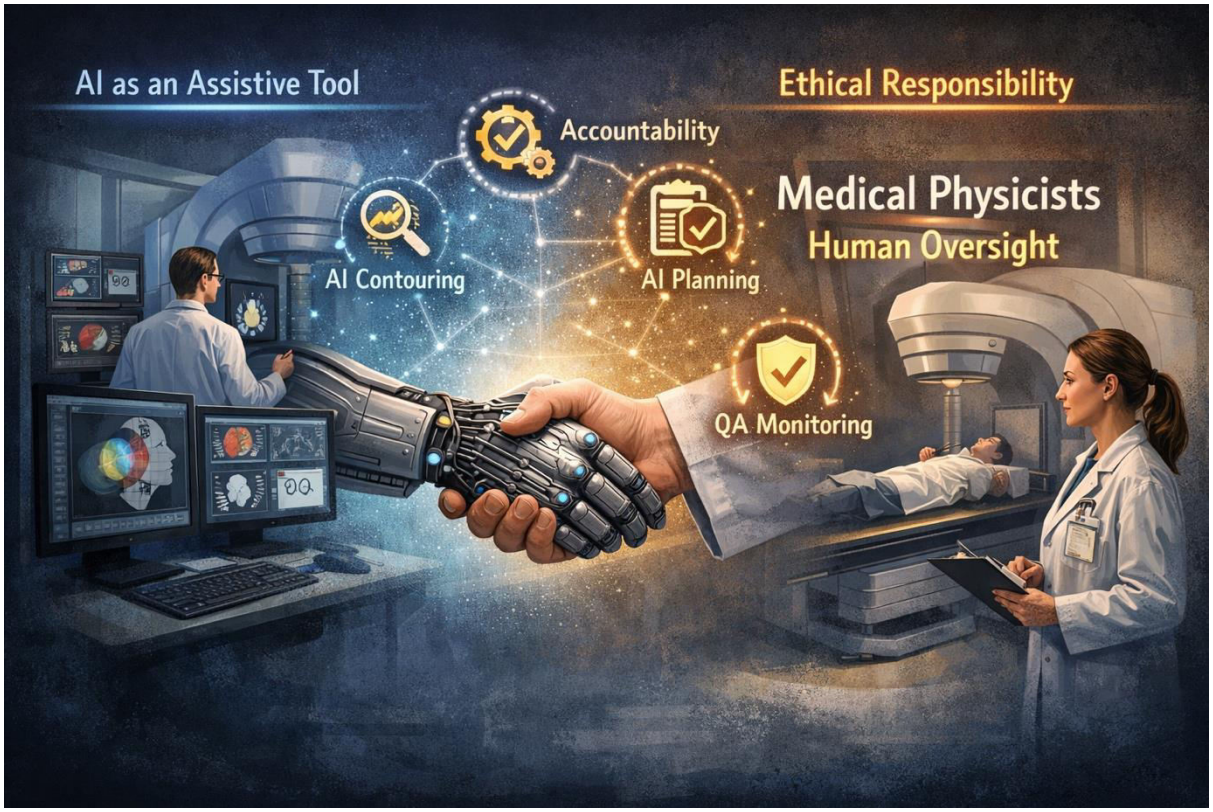
[1]NIMS University, Rajasthan, India

[2]King George's Medical University, UP, Lucknow, India

[3]Jindal School of Public Health and Human Development, Sonipat, India

[4]Institute of Natural Sciences (INS) & Centre for Biomedical Science and Engineering, United International University, Dhaka, Bangladesh.

In the past decade artificial intelligence has given us a wide spectrum of applications in the field of medical physics, including auto contouring, quality assurance, toxicity prediction, heart dose prediction, and treatment planning. Along with this advanced application, there are some risk factors, such as data privacy. If anything goes wrong, then who will be responsible? AI will replace the medical physicist? All these answers will be unfolded by AI ethics principles. In this article, we will focus on some AI ethical principles, such as accountability, fairness, and equity. The ethical principle of fairness and equity emphasizes that AI technologies in healthcare must provide equal opportunity for all populations, ensuring that innovations in radiotherapy do not remain limited to high-income countries but are accessible and beneficial to low- and middle-income countries (LMICs) as well. The principal of fairness and equity may not be successful in the case of AI technology distribution in LMIC countries, possibly due to its higher cost. So that, medical physicists will have to work as before.



The ethical principle of accountability is "Who should be blamed when AI causes harm?" Whenever any AI product comes on the market, there are several stages said to be an AI life cycle. This AI cycle includes the researcher, software engineers, manufacturer, service provider, and end user (medical physicist or radiation oncologist). All AI products used in clinical practice are essential to going through a well-defined AI life cycle. This cycle begins with researchers who design algorithms and select training data, followed by software engineers who implement models into usable systems. Manufacturers then integrate these systems into commercial platforms, often embedding them into treatment planning or imaging workflows, while service providers are responsible for installation, updates, and maintenance within clinical environments.

Finally, the end users, such as medical physicists or radiation oncologists, use these tools in radiotherapy. Accountability in this life cycle is not isolated to a single actor; rather, it is distributed across all stakeholders, each bearing responsibility appropriate to their role. Researchers must ensure scientific rigor and representative datasets, manufacturers must validate performance and communicate limitations transparently, and service providers must maintain system integrity. After this the end-user role has emerged; medical physicists hold a uniquely critical position as the final gatekeepers, who will be responsible for validating AI outputs, performing independent cross-checks, and determining whether AI-generated contours, plans, or QA results are clinically acceptable. This human-centered role will be performed by a medical physicist; they can analyze loopholes in AI-based treatment planning and automation. Ethical AI, therefore, does not remove responsibility from clinicians (medical physicist or oncologist); instead, it clarifies and reinforces their role.

Hence, healthcare is changing as a result of artificial intelligence, but medical physicists' vital role must be protected by its ethical integration; as AI systems function primarily as assistive or decision-support tools rather than autonomous decision-makers. Medical physicists provide the human judgment, contextual knowledge, and accountability that guarantee patient safety and treatment precision, even while AI can speed up data analysis and increase efficiency. AI should be used to strengthen medical physicists as stewards of trust, innovation, and equity in healthcare rather than to replace them, maintaining their crucial role in promoting ethical, patient-centered care.

Bibliography

1. *Ethics of artificial intelligence. (2026, January 19). AI | UNESCO. https://www.unesco.org/en/artificial-intelligence/recommendation-ethics.*
2. *IEEE SA. (2024, August 21). The IEEE Global Initiative 2.0 on Ethics of Autonomous and Intelligent Systems - IEEE Standards Association. IEEE Standards Association. https://standards.ieee.org/industry-connections/activities/ieee-global-initiative/.*
3. *Vandewinckele, L., Claessens, M., Dinkla, A., Brouwer, C., Crijns, W., Verellen, D., & van Elmpt, W. (2020). Overview of artificial intelligence-based applications in radiotherapy: Recommendations for implementation and quality assurance.* ***Radiotherapy and Oncology, 153****, 55–66. https://doi.org/10.1016/j.radonc.2020.09.008.*
4. *European Commission. (2024).* **Regulatory framework for artificial intelligence** *.https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai*