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Editorial

Artificial intelligence and robotics in healthcare: The promise, the hype, and the reality

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Artificial intelligence (AI) and robotics have emerged as transformative forces in healthcare, promising to revolutionize diagnostics, treatments, and patient care. While AI-powered solutions and robotic systems have great potential, a fine line exists between realistic advancements and overhyped expectations.

Significant advancements in machine learning, data analytics, and automation have driven the integration of AI-driven robotics into healthcare. AI-based algorithms have demonstrated remarkable accuracy in medical imaging, predictive analytics, and personalized medicine. For instance, deep learning models have achieved human-level performance in diagnosing diseases such as diabetic retinopathy and detecting cancerous tumours in radiology scans.[1,2] Robotic-assisted surgeries, such as those performed by the Smart Tissue Automated Robot (STAR), have enhanced precision and reduced patient recovery times.[3] Moreover, AI-powered chatbots and virtual assistants have improved patient engagement, offering round-the-clock medical guidance and preliminary diagnosis. AI-driven robotic systems also play a crucial role in rehabilitation therapy and elder care, with robots such as PARO and Cafero providing companionship and support for patients with cognitive impairments.[4–6]

Despite the remarkable strides in AI and robotics, considerable hype has been surrounding their capabilities. Some overambitious claims suggest that AI could entirely replace human doctors, an assertion that lacks scientific backing. AI is a powerful tool for augmenting healthcare professionals but cannot replicate human practitioner's empathy, clinical intuition, and holistic decision-making.[7] Additionally, AI-driven diagnosis still requires human validation to mitigate errors and biases in medical datasets. Another area of concern is the ethical and legal implications of AI in healthcare. Issues related to patient data privacy, bias in AI algorithms, and accountability in case of system failures remain unresolved. The infamous case of IBM Watson Health, which failed to deliver on its promise of transforming oncology treatment, is a cautionary tale of the limitations of AI-driven solutions in complex medical scenarios.[8]

The reality of AI and robotics in healthcare is a blend of optimism and pragmatism. While AI has already demonstrated immense value in diagnostics and robotic-

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assisted procedures, its widespread adoption faces several challenges. The high cost of AI-powered medical devices, the lack of regulatory frameworks, and the need for extensive clinical validation slow their integration into mainstream healthcare. Future directions should focus on developing AI systems that work in synergy with healthcare professionals rather than attempting to replace them. Investments in explainable AI (XAI) can improve trust in AI-driven decision-making by offering transparency in its reasoning processes.[9,10] Governments and regulatory bodies must also establish stringent policies to ensure ethical deployment, data security, and equitable access to AI-driven healthcare solutions.

In conclusion, AI and robotics hold immense promise for transforming healthcare, but their potential must be approached with cautious optimism. While AI-powered diagnostics, robotic-assisted surgeries, and automated patient care solutions prove their value, exaggerated claims can lead to unrealistic expectations and ethical dilemmas. The future of AI in healthcare lies in collaborative human-AI partnerships, rigrous validation, and responsible implementation to ensure that technology serves as a complement rather than a replacement for medical professionals.

Conflict of Interest

None.

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