


Chapter 2

A Comprehensive Review for Critical Evaluation of AI-Driven Hospital Systems: Ethical Challenges and Future Perspectives

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ABSTRACT

Artificial Intelligence (AI) has revolutionized healthcare delivery by improving patient care, diagnostics and operational efficiency in hospitals. This review assesses AI-powered hospital systems with an emphasis on how they affect patient outcomes, resource management and clinical decision-making. A crucial component of this assessment is evaluating the fairness, interpretability and accuracy of AI models to ensure objective decision-making across a range of patient populations. Additionally, a rigorous analysis is conducted on how AI might improve early disease detection and streamline hospital operations. The chapter also discusses evaluation techniques for confirming AI-driven healthcare systems, such as clinical trials, performance indicators and real-world case studies. Future developments will concentrate on strengthening AI's credibility through legal frameworks and Explainable AI (XAI). All things considered, this study emphasizes the significance of ongoing review and assessment to guarantee AI-driven healthcare systems provide ethical and safe medical services.

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INTRODUCTION

The use of AI in healthcare has caused a revolution in the way that medical services are provided. AI-driven technologies are turning hospitals into innovation hubs with everything from robotic surgery to diagnostic algorithms. The quick uptake of these technologies, however, begs serious concerns over their dependability, moral implications, and long-term effects on healthcare systems. By critically assessing AI-driven hospital systems' place in contemporary healthcare and discussing the ethical issues and potential future developments, this chapter seeks to present a comprehensive analysis of these systems (Rengaramanujam et al., 2026).

Introduction of Artificial Intelligence in hospitals has revolutionized the current system in healthcare provision, and provides a more accurate diagnosis, efficiency and predictive capabilities (Gauthaman, S. A., et al., 2026). Nevertheless, there are vital ethical and practical issues associated with these gain-like data privacy, algorithmic transparency, algorithmic accountability and bias, etc. Even though the abundance of AI tools in healthcare is increasing, the existence of a comprehensive approach to critically assessing their effects in the actual context and addressing these dilemmas is yet to be witnessed. Moreover, the further research directions are also dispersed, and the stakeholders can barely be able to engage in AI irresponsibly. Thus, it is critical to have a systematic and critical overview to summarize the development so far, indicate gaps, and make strategic suggestions on how to create ethical and resilient ecosystems powered by AI in hospitals (Muniasamy & Karunakaran, 2026).

Although Artificial Intelligence (AI) has made significant inroads into hospital systems—enhancing diagnostic capabilities, optimizing workflows, and supporting clinical decision-making—there is a noticeable lack of comprehensive reviews that critically evaluate these systems across technical, ethical, and operational dimensions (Muniasamy & Karunakaran, 2026). Existing studies tend to focus narrowly on specific applications or algorithms, often ignoring broader concerns such as patient data privacy, algorithmic bias, accountability, and regulatory compliance. Moreover, many reviews fail to connect ethical challenges with practical implementation frameworks, leaving healthcare professionals and policymakers without adequate guidance. There is also limited exploration of long-term implications and future perspectives, including policy development, ethical AI design, and strategies for sustainable integration. This fragmented understanding creates a significant gap in the literature, which this chapter aims to address by offering a holistic evaluation of AI-driven hospital systems along with actionable insights for future research and ethical practice.

The primary objective of this review is to provide a comprehensive and critical evaluation of AI-driven systems in hospital environments, with particular attention to their practical applications, ethical implications, and future development. Specifically,

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