Chapter 3
Comprehensive Evaluation of AI-Driven Systems in Modern Hospital Environments

Ravikumar R. N.
https://orcid.org/0009-0009-3705-1681
Marwadi University, Rajkot, India

S. Aarthi
https://orcid.org/0009-0006-9064-2091
Marwadi University, Rajkot, India

Zamira Atamuratova
Urgench State University, Urgench, Uzbekistan

Anorgul Ashirova
Mamun University, Khiva, Uzbekistan

Khusan Jurayev
Termez University of Economics and Service, Termez, Uzbekistan

Mehrigul Hayitova
Termez University of Economics and Service, Termez, Uzbekistan

ABSTRACT

Artificial Intelligence (AI) is rapidly transforming hospital care by enhancing diagnostic accuracy, optimizing treatment plans, and improving patient outcomes. However, realizing AI's potential requires rigorous evaluation frameworks that ensure safety, effectiveness, and ethical use. This chapter presents a comprehensive approach to assessing AI-driven systems in modern hospital environments, covering clinical validation, outcome-based metrics, safety and risk management, bias and fairness, workflow integration, and regulatory compliance. Emphasizing transparency, accountability, and continuous post-deployment monitoring, the chapter guides healthcare professionals, developers, and policymakers in responsibly adopting AI

DOI: 10.4018/979-8-3373-2787-7.ch003

technologies. Through multidisciplinary perspectives and real-world examples, it offers actionable insights to maximize AI benefits while safeguarding patient well-being and promoting equitable, trustworthy healthcare innovation.

INTRODUCTION

Artificial Intelligence (AI) is taking modern healthcare by storm and transforming it by leading to accurate and precise diagnosis, optimal treatment regimes, and increasing efficiency in operation. The worldwide use of clinical support defences, medical image analysis, patient assessment, and administrative work is becoming more and more dependent on AI. Nevertheless, although there is an incremental emergence of AI technologies, there are major challenges in their safe, ethical and effective implementation in practical clinical settings (Graziani et al., 2023; Rengaramanujam et al., 2026). Most of the existing AI systems are deemed successful based on technical parameters like sensitivity, specificity, and accuracy, but fail to consider such important parameters as clinical utility, workflow integration, ethical fairness, and regulatory approval. The chapter responds to the timely necessity of the elaborated evaluation model that is designed to meet the variety of complexities of hospital settings. It puts a special focus on the necessity of a multidimensional solution that cuts across the whole life-cycle of AI, including its development in systems as well as its clinical validation, monitoring after deployment, and continuous feedback (Hantel et al., 2024). The intended framework will provide AI tools with consistent, fair and evidence-based results by addressing the technical, clinical, ethical and regulatory dimensions. The chapter presents effective recommendations to clinicians, developers, and policymakers who participate in the piloting of AI through the usage of detailed analysis and case studies. Ultimately this is expected to reduce the gap between innovation of AI and clinical readiness leading to development of trust and accountability in the healthcare system across the world that will lead to delivery of better patient care.

With Artificial Intelligence (AI) entering hospitals more, the role it can play in the sphere of diagnostics, treatment planning, workflow streamlining, and care provision is considerable. Nonetheless, the accelerated use of AI in the clinical settings has exceeded the formulation of effective standardized assessment models. The evaluation of current practices usually views algorithm accuracy in a limited context that overlooks important aspects on clinical usability, ethical adherence, safe practices, bias, regulatory governance, and the actual results. Without the elaborate and systematic evaluation strategy, the AI applications are likely to fail to perform, diagnose, become biased or destabilize clinical workflows. This will create a multidisciplinary framework where the AI devices in hospitals are more than just being

The Symphony of Efficiency: Transforming Healthcare Through Robotic Process Automation

Jaspreet Kaur, Roop Kamal, Manpreet Kaurand Shivani Malhan (2024). *Clinical Practice and Unmet Challenges in AI-Enhanced Healthcare Systems (pp. 249-266).*
www.irma-international.org/chapter/the-symphony-of-efficiency/352922