Syntax Literate: Jurnal Ilmiah Indonesia
p–ISSN: 2541-0849 e-ISSN: 2548-1398
Vol. 10, No. 12, December 2025

Analysis of the Relationship Between Digital Transformation Influenced by Technology, Artificial Intelligence Diagnosis, Legal Basis and Challenges to Health Services in Hospitals

[1]Mohamad Reza Hilmy*, [2]Rahmat Dwi Putranto, [3]Erlina Puspitaloka Mahadewi, [4]Ichwan Setiawan, [5]Alika Shameela
[1,3]Universitas Esa Unggul, Indonesia
[5]Universitas Indonesia, Indonesia
[2,4]Sekolah Tinggi Ilmu Hukum Iblam, Indonesia
Email: mohamad.reza@esaunggul.ac.id*

Abstract
The rapid adoption of digital technologies and artificial intelligence (AI) is transforming healthcare services in hospitals, offering opportunities to improve diagnostic accuracy, operational efficiency, and patient-centered care. Previous studies indicate that AI-powered diagnostic tools, cloud computing, electronic health records, and IoT systems significantly enhance clinical decision-making and resource management. However, legal, ethical, and operational challenges—including patient data privacy, liability ambiguity, staff skill gaps, interoperability issues, and high implementation costs—pose significant barriers to effective adoption. This study aims to analyze the relationship between digital transformation influenced by technology, artificial intelligence diagnosis, legal basis and challenges to health services in hospitals. A systematic literature review (SLR) was conducted, analyzing peer-reviewed articles published between 2021 and 2025 from major databases, including PubMed, Scopus, ScienceDirect, and Google Scholar. Key themes were extracted and synthesized across five dimensions: technology and infrastructure, AI implementation, legal and regulatory considerations, operational challenges, and healthcare outcomes. Findings reveal that while digital transformation and AI adoption enhance hospital efficiency and diagnostic precision, their success depends on coordinated attention to regulatory compliance, staff training, system integration, and organizational readiness. Hospitals must adopt multidimensional strategies to balance technological innovation with ethical, legal, and operational considerations for sustainable healthcare delivery.
Keywords: digital transformation; artificial intelligence; hospital services; healthcare challenges; legal frameworks

INTRODUCTION

The landscape of healthcare is undergoing a profound transformation driven by rapid technological advancements and the increasing integration of digital solutions. Hospitals and healthcare institutions are increasingly adopting innovative technologies to enhance the quality, efficiency, and accessibility of medical services (Klumpp et al., 2021). Digital transformation in healthcare encompasses the application of digital tools, data-driven processes, and automation to streamline clinical workflows, improve patient outcomes, and optimize resource allocation. The adoption of technologies such as electronic health records (EHRs), telemedicine, mobile health applications, cloud computing, and the Internet of Things (IoT) has enabled healthcare providers to collect, process, and analyze large volumes of patient data efficiently, creating opportunities for personalized care and predictive medicine (Alowais et al., 2023).

Artificial intelligence (AI) has emerged as a particularly transformative force in healthcare, offering capabilities that extend beyond traditional computational methods. AI-powered systems can process complex datasets, identify patterns, and generate predictive insights that assist clinicians in diagnosis, treatment planning, and operational

management (Jabarulla & Lee, 2021). In particular, AI applications in medical imaging, disease detection, and predictive analytics have shown the potential to reduce human error, accelerate diagnostic processes, and improve clinical decision-making. The use of AI in healthcare not only enhances diagnostic precision but also enables more proactive and preventive care strategies, thereby reducing hospital readmissions and optimizing resource utilization (Chikhaoui et al., 2022).

While technological advancements provide significant opportunities, they also introduce new challenges that must be addressed to ensure effective integration into healthcare systems. Hospitals face complex operational challenges, including the need to manage heterogeneous legacy systems, ensure data interoperability, and train healthcare personnel to utilize emerging technologies effectively (Fahim et al., 2025). Staff readiness and digital literacy are crucial factors in determining the successful adoption of AI and other digital tools, as the potential benefits of technology cannot be realized without proper human oversight and understanding. Additionally, the implementation of advanced technologies often requires substantial financial investment, creating disparities in adoption between well-resourced and resource-limited healthcare institutions (Urbi & Tiva, 2025).

Legal and regulatory frameworks play a critical role in shaping the adoption and use of digital technologies in healthcare. Patient data privacy, medical liability, and compliance with national and international standards are essential considerations when implementing AI and other digital tools (Alzamily et al., 2024). Unclear or evolving regulations regarding AI accountability, ethical standards, and liability in clinical decision-making can create uncertainty for healthcare providers and potentially hinder innovation. Therefore, aligning technological adoption with robust legal and ethical guidelines is necessary to ensure that digital transformation occurs safely, responsibly, and in accordance with societal expectations.

Furthermore, digital transformation in healthcare is not merely a technological shift but represents a fundamental change in organizational processes, culture, and service delivery models. Hospitals are increasingly expected to operate as smart institutions that leverage data-driven insights for continuous quality improvement, predictive maintenance, and patient-centered service delivery. This transformation requires a strategic approach that integrates technology, human resources, regulatory compliance, and operational management into a cohesive framework. Organizations must balance the adoption of advanced technologies with the need for effective governance, risk management, and ethical oversight to maintain public trust and ensure sustainable healthcare delivery (Dangi et al., 2025).

The global healthcare environment also drives the urgency of digital transformation. Rising healthcare costs, aging populations, increasing prevalence of chronic diseases, and the ongoing threat of pandemics place enormous pressure on healthcare systems to optimize efficiency while maintaining high standards of care. Digital technologies, particularly AI, offer solutions to these challenges by enabling more accurate diagnostics, automating routine tasks, predicting patient outcomes, and

facilitating remote care. These capabilities not only improve patient experiences and outcomes but also allow healthcare institutions to allocate resources more effectively, reduce operational inefficiencies, and respond more rapidly to emergent health crises (Gehde et al., 2022).

The convergence of technology and healthcare aligns with broader societal trends, including the growth of personalized medicine, the expansion of telehealth, and the demand for accessible, data-driven healthcare solutions. Patients increasingly expect timely, accurate, and convenient services, driving hospitals to adopt digital strategies that enhance service quality and responsiveness. At the same time, the proliferation of data from wearable devices, mobile health applications, and remote monitoring systems presents both opportunities and challenges, requiring healthcare organizations to implement robust data management, privacy, and security protocols (Al Kuwaiti et al., 2023).

Previous studies have highlighted the pivotal role of digital transformation in shaping modern hospital services. (Karrouk et al., 2025) in The Digital Transformation of Smart Hospitals: Challenges and Opportunities emphasize that the adoption of new technologies, such as artificial intelligence (AI), IoT, and cloud-based systems, significantly enhances hospital efficiency, operational agility, and patient-centered care. Furthermore, AI-powered diagnostic tools are shown to improve the accuracy of medical imaging, facilitate predictive analytics, and reduce human error in clinical decision-making, while the evolution of hospital business models also plays a critical role in smart hospital development. (Maleki Varnosfaderani & Forouzanfar, 2024) in The Role of AI in Hospitals and Clinics.

Transforming Healthcare in the 21st Century extend this discussion by exploring AI's evolving role in medical imaging, diagnostics, and resource allocation, showing how hospitals can maintain operational continuity even under supply chain constraints. Additionally, (Gachago, 2025) in The Transformative Impact of Artificial Intelligence on the Digital Maturity of Hospitals provides a comprehensive analysis of AI's influence on hospital digital maturity, highlighting technical, legal, ethical, and organizational challenges that affect healthcare delivery. Collectively, these studies underscore the complex interplay between technology, AI integration, legal frameworks, and operational management in modern hospitals, forming the foundation for further research.

The rapid integration of digital technologies and AI in hospital settings raises multiple challenges that need careful consideration. Despite the potential for improving diagnostic accuracy and patient outcomes, hospitals often face data security and privacy issues, which threaten patient confidentiality and regulatory compliance. Additionally, interoperability challenges emerge due to heterogeneous legacy systems, making seamless integration difficult.

Many healthcare professionals lack sufficient training to effectively utilize AI-powered tools, resulting in underutilization or misinterpretation of diagnostic outputs. Legal ambiguities concerning liability in AI-assisted medical decisions further complicate hospital operations, while the high costs of technology adoption remain a

significant barrier, particularly for hospitals in developing regions. These challenges indicate a pressing need for a structured approach that balances technological advancement with regulatory, ethical, and human resource considerations.

This study aims to investigate the relationship between digital transformation driven by emerging technologies, AI-assisted diagnostics, legal frameworks, and the challenges faced by hospital health services. Specifically, the research seeks to: 1) identify the key technological factors influencing hospital digital transformation, 2) assess the effectiveness and impact of AI in medical diagnostics, 3) analyze legal and ethical considerations that govern AI implementation in hospitals, and 4) determine the operational, financial, and organizational challenges that arise from these transformations. By addressing these objectives, the study aspires to provide a comprehensive framework for hospitals to navigate technological integration responsibly and efficiently.

The urgency of this research lies in the increasing reliance of healthcare systems on digital technologies and AI to meet rising demands for quality, accessible, and efficient medical services. Global trends, including aging populations, pandemics, and rising healthcare costs, necessitate innovative solutions to optimize resource allocation and enhance patient care. Hospitals that fail to adopt effective digital strategies risk operational inefficiencies, diagnostic errors, and reduced patient satisfaction. Furthermore, evolving legal frameworks around data protection and AI accountability underscore the need for evidence-based guidance for hospital administrators and policymakers. Understanding these dynamics is critical to ensuring sustainable, safe, and technologically advanced healthcare delivery.

This study distinguishes itself by examining the interconnected relationship between technological adoption, AI diagnostics, legal frameworks, and operational challenges in hospitals a multidimensional approach rarely explored in previous literature. While prior research has addressed digital transformation, AI applications, or legal aspects separately, this study integrates these perspectives to provide a holistic understanding of how hospitals can optimize health services in a rapidly evolving digital landscape. Moreover, the research emphasizes practical implications for policy formulation, workforce training, and resource management, offering insights that are directly applicable to contemporary healthcare systems navigating the complexities of AI and digital innovation.

METHOD

This study employed a systematic literature review (SLR) approach as the primary method to collect, analyze, and synthesize findings from relevant previous studies on digital transformation, technology adoption, artificial intelligence (AI) in hospital services, as well as the legal and regulatory aspects and operational challenges. First, the research questions were formulated to map how technology and AI have been implemented in hospitals, how legal frameworks regulate their use, and what challenges arise in healthcare service delivery.

Next, a comprehensive literature search was conducted across major international and national databases, including PubMed, Scopus, ScienceDirect, and Google Scholar, using a combination of keywords in English and foreign terms such as "digital transformation hospital," "smart hospital," "AI diagnosis in hospitals," "hospital information system," "digital maturity hospital," "healthcare regulation and AI," and "electronic health records." Inclusion criteria were peer-reviewed articles published between 2021 and 2025, available in full text, and discussing aspects of technology, AI, digital transformation, or regulation in hospital healthcare settings; duplicates, non-peer-reviewed literature, and irrelevant studies were excluded.

After an initial screening based on titles and abstracts, selected articles underwent full-text analysis, followed by data extraction and thematic classification according to five dimensions: (1) technology and infrastructure, (2) AI implementation and diagnostics, (3) legal and regulatory considerations, (4) operational and organizational challenges, and (5) outcomes and impacts on healthcare services. Finally, the synthesized findings were presented narratively and comparatively to identify patterns, research gaps, and practical implications for the development of smart hospitals in the future.

RESULT AND DISCUSSION

Table 1. Result

No	Author(s) & Year	Title	Objective	Focus Area	Technology/AI Applied	Key Findings	Legal/Regulatory Aspects	Challenges Highlighted	Practical Implications
1	(Karrouk et al., 2025)	*The Digital Transformation of Smart Hospitals: Challenges and Opportunities*	Examine digital transformation in smart hospitals	Smart hospitals, business model evolution	AI-powered diagnostics, IoT, cloud systems	AI enhances diagnostic accuracy, improves operational efficiency	Discusses compliance with hospital regulations	Integration with legacy systems, data security, staff training	Guides hospital managers in adopting smart technologies
2	(Maleki Varnosfaderani & Forouzanfar, 2024)	*The Role of AI in Hospitals and Clinics: Transforming Healthcare in*	Explore AI's role in healthcare	Medical imaging, diagnostics, resource allocation	AI in imaging and diagnostic decision-making	AI improves diagnostic precision and reduce	Emphasizes adherence to privacy and ethical standards	Supply chain independence, staff adaptation	Supports AI adoption for continuity in hospital operations

No	Author(s) & Year	Title	Objective	Focus Area	Technology/AI Applied	Key Findings	Legal/Regulatory Aspects	Challenges Highlighted	Practical Implications
		the 21st Century				s delays			
3	(Gachago, 2025)	*The Transformative Impact of Artificial Intelligence on the Digital Maturity of Hospitals*	Analyze AI impact on hospital digital maturity	Digital maturity, hospital operations	AI-assisted diagnostics, predictive analytics	AI contributes to hospital digital maturity, enhances patient care	Highlights technical, legal, and ethical regulations	Organizational readiness, technical barriers	Offers framework for AI integration and policy compliance
4	(Singh et al., 2021)	*Digital Transformation in Healthcare: Innovation and Technologies*	Investigate technology-driven healthcare innovation	AI diagnostics, blockchain, innovation	AI for disease pattern detection	AI facilitates early diagnosis and workflow automation	Limited discussion on legal/regulatory framework	High costs, technological literacy gaps	Provides guidance on integrating AI for improved diagnosis
5	(Bhagat & Kanyal, 2024)	*Navigating the Future: Transformative Impact of AI on Hospital Management*	Review ethical, legal, and practical AI considerations	Hospital management, diagnostics	AI in genetic and disease analysis	AI accelerates diagnostics and clinical decision-making	Discusses ethical and legal considerations	Ethical dilemmas, liability concerns	Supports ethical implementation strategies
6	(Razavi et al., 2025)	*Transforming Health Care with Artificia*	Examine AI regulations and challenges	Medical imaging, diagnostic	AI-driven imaging diagnostics	AI improves precision and operat	Highlights regulatory compliance for AI developers	Technical adaptation, staff training	Informs policy on AI regulatory

No	Author(s) & Year	Title	Objective	Focus Area	Technology/AI Applied	Key Findings	Legal/Regulatory Aspects	Challenges Highlighted	Practical Implications
		l Intelligence: Regulations, Challenges, and Future Directions		accuracy		ional outcomes			compliance
7	(Rashid et al., 2025)	*The Paradigm of Digital Health: AI Applications and Transformative Trends*	Study AI applications in hospital transformation	Diagnostic accuracy, service efficiency	AI-driven diagnostic tools	AI enhances accuracy and operational efficiency	Mentions ethical/legal governance	Integration challenges, workforce readiness	Encourages adoption of AI for transformative healthcare delivery
8	(Wong et al., 2024)	*Healthcare Digital Transformation through the Adoption of AI*	Examine technology adoption in hospitals	AI adoption, healthcare facilities	AI predictive tools, diagnostics	Technology adoption improves clinical outcomes	Discusses compliance with healthcare policies	Limited infrastructure, resource constraints	Case study of Malaysia shows practical adoption strategies
9	(Lee & Yoon, 2021)	*Application of AI-based Technologies in the Healthcare Industry: Opportunities and*	Identify opportunities and challenges of AI	Skin diagnostics, hospital administration	AI-assisted diagnostics	Positive impact on diagnostic quality and patient satisfaction	Data privacy and hospital administration regulations	Ethical concerns, technological adaptation	Guides hospital administrators in AI integration

No	Author(s) & Year	Title	Objective	Focus Area	Technology/AI Applied	Key Findings	Legal/Regulatory Aspects	Challenges Highlighted	Practical Implications
		Challenges							
10	(Faiyazuddin et al., 2025)	*The Impact of AI on Healthcare: Advancements in Diagnostics, Treatment, and Operational Efficiency*	Review AI impact on diagnostics, treatment, operations	Hospital admissions, operational efficiency	Neural networks, AI diagnostics	Reduces hospital admissions, enhances efficiency	Legal cooperation needed for liability	Organizational and operational challenges	Provides strategic insights for AI adoption and operational planning

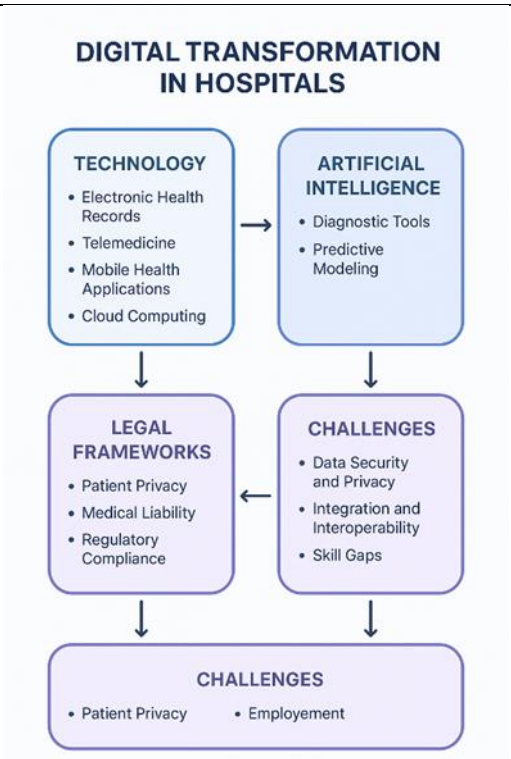


Figure 1. Healthcare digital transformation infographic

The relationship between technology-driven digital transformation, *artificial intelligence* (AI) diagnostics, legal frameworks, and operational challenges in hospitals is highly interconnected, as illustrated in the infographic. Technological adoption, including electronic health records, telemedicine, mobile health applications, and cloud computing,

serves as the foundational driver for digital transformation, enabling AI-powered diagnostic tools and predictive modeling that improve clinical accuracy and decision-making. However, the implementation of these technologies is constrained by legal and regulatory frameworks that govern patient privacy, medical liability, and compliance standards, ensuring that hospitals use AI responsibly and ethically.

Simultaneously, operational challenges such as data security risks, interoperability issues, and workforce skill gaps pose significant barriers to effective adoption. The interplay of these factors indicates that while AI and digital technologies have the potential to enhance hospital efficiency, accuracy, and patient outcomes, successful transformation requires coordinated attention to regulatory compliance, staff training, and system integration. Overall, the analysis highlights that hospitals must approach digital innovation as a multidimensional process, balancing technological potential with legal, ethical, and organizational considerations to achieve sustainable and effective healthcare delivery.

The integration of digital technologies and artificial intelligence (AI) in hospital healthcare services has profoundly transformed the delivery of medical care, offering significant opportunities for improving patient outcomes, operational efficiency, and clinical decision-making. Technologies such as electronic health records (EHRs), cloud computing, telemedicine, mobile health applications, and Internet of Things (IoT) devices enable hospitals to collect, store, and analyze large volumes of patient data efficiently.

This data-driven approach allows healthcare providers to tailor treatments to individual patients, identify emerging health trends, and implement predictive care strategies. AI applications in medical imaging, diagnostics, and predictive analytics have demonstrated the capacity to enhance the precision of diagnoses, reduce human error, and accelerate clinical workflows. By identifying complex patterns in patient data, AI supports clinicians in making more informed decisions, thereby reducing readmissions and improving overall hospital performance. Moreover, AI-powered tools allow hospitals to anticipate patient needs, optimize resource allocation, and implement preventive measures, making healthcare delivery more proactive rather than reactive.

However, the adoption of these advanced technologies is closely intertwined with legal and regulatory considerations, which are critical for ensuring responsible and ethical use. Patient data privacy, medical liability, and adherence to national and international standards are paramount in the deployment of AI-assisted healthcare systems. Ambiguity in regulations or gaps in legal frameworks can create significant uncertainty for healthcare institutions, potentially slowing innovation or exposing hospitals to legal disputes. Ethical challenges also arise, particularly regarding transparency, accountability, and bias in AI decision-making.

Hospitals must therefore implement governance mechanisms that guarantee AI outputs are explainable, reliable, and aligned with professional and ethical standards. Ensuring compliance with legal frameworks while maintaining high-quality care requires hospitals to continuously monitor, evaluate, and adjust AI systems, as well as to engage policymakers, technology developers, and clinicians in discussions about best practices.

Operational challenges further complicate the adoption of AI and digital tools. Many hospitals still rely on heterogeneous legacy systems, which often lack interoperability with newer technologies. This can result in inefficiencies, errors, or delays in patient care. The integration of multiple software platforms and databases requires careful planning, technical coordination, and ongoing maintenance to ensure smooth functionality. Workforce readiness is another critical factor, as hospital staff need adequate digital literacy and training to utilize AI effectively.

Without appropriate education and support, there is a risk of underutilization, misinterpretation of diagnostic outputs, or resistance to change. Financial constraints add an additional layer of complexity, particularly for hospitals in resource-limited regions, as implementing AI and digital systems involves substantial costs for procurement, infrastructure, and continuous upgrades. These challenges indicate that technological adoption cannot be treated as an isolated endeavor; instead, it must be part of a holistic strategy encompassing technical, organizational, legal, and human resource considerations.

Despite these challenges, research indicates that successful digital transformation and AI integration can yield substantial benefits for hospitals. AI-driven diagnostics, predictive analytics, and workflow automation enhance the efficiency of clinical and administrative processes, enabling healthcare providers to deliver higher-quality care with fewer errors and delays.

Hospitals that embrace digital transformation can allocate resources more effectively, optimize staff deployment, and improve operational resilience, particularly during periods of high demand or public health emergencies. Furthermore, these technologies support patient-centered care by enabling personalized treatment plans, remote monitoring, and telehealth consultations, thereby improving accessibility, satisfaction, and engagement. Achieving these outcomes, however, requires hospitals to adopt a multidimensional approach, combining technological implementation with staff training, change management, and adherence to ethical and regulatory standards.

The adoption of AI and digital technologies also has broader implications for hospital culture and organizational dynamics. Transitioning to data-driven decision-making necessitates changes in workflow design, communication patterns, and leadership strategies. Hospital administrators must foster a culture of innovation, continuous learning, and interdisciplinary collaboration to ensure that new technologies are integrated successfully and sustainably. Engaging stakeholders including clinicians, IT personnel, administrators, and patients is essential to align expectations, address concerns, and optimize the use of AI tools. Moreover, ongoing monitoring and evaluation are critical to ensure that these systems function as intended, maintain compliance with evolving regulations, and continue to improve patient outcomes over time.

From a systemic perspective, the convergence of digital transformation and AI has the potential to improve healthcare delivery beyond individual hospitals. Enhanced diagnostic accuracy, predictive capabilities, and efficient resource allocation contribute to broader public health benefits, including better management of chronic diseases,

reduced emergency service burdens, and improved responsiveness during pandemics or other crises. However, these advantages depend on robust cybersecurity measures and effective data governance, as breaches or misuse of sensitive patient information can have severe ethical, legal, and reputational consequences. Hospitals must therefore implement comprehensive risk management strategies that integrate technology adoption, legal compliance, ethical oversight, and operational readiness into a cohesive framework.

Ultimately, the effective integration of AI and digital technologies in hospitals requires a careful balance between innovation and responsibility. Hospitals must align technical implementation with regulatory standards, ethical considerations, workforce development, and organizational change. By addressing these interconnected dimensions, healthcare institutions can maximize the benefits of AI and digital transformation while mitigating potential risks.

This holistic approach ensures that hospitals not only improve clinical accuracy, operational efficiency, and patient-centered care but also maintain public trust and long-term sustainability in a rapidly evolving healthcare landscape. The evidence underscores that technological innovation alone is insufficient; success depends on a coordinated strategy that incorporates legal compliance, workforce readiness, infrastructure optimization, and ethical governance, thereby enabling hospitals to deliver safe, efficient, and high-quality care in a complex, technology-driven environment.

CONCLUSION

The integration of digital transformation and artificial intelligence (AI) in hospital healthcare services drives profound improvements in diagnostic accuracy, operational efficiency, and patient-centered outcomes through technologies like AI-assisted diagnostics, electronic health records, cloud computing, and telemedicine, which enable predictive analytics and streamlined workflows. However, this adoption faces intertwined legal, regulatory, and ethical hurdles—such as patient privacy, medical liability, and compliance—as well as operational challenges including workforce skill gaps, legacy system interoperability, and high costs, necessitating multidimensional strategies focused on technical readiness, organizational change, staff training, and evidence-based governance for responsible, sustainable implementation. Future research should conduct empirical case studies in diverse hospital settings, particularly in developing regions like Indonesia, to evaluate the long-term impact of AI governance frameworks on equity in healthcare access and cost-effectiveness.

REFERENCES

Al Kuwaiti, A., Nazer, K., Al-Reedy, A., Al-Shehri, S., Al-Muhanna, A., Subbarayalu, A. V., Al Muhanna, D., & Al-Muhanna, F. A. (2023). A review of the role of artificial intelligence in healthcare. *Journal of Personalized Medicine*, *13*(6), 951.

Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., Aldairem, A., Alrashed, M., Bin Saleh, K., & Badreldin, H. A. (2023). Revolutionizing healthcare: the role of artificial intelligence in

clinical practice. *BMC Medical Education*, *23*(1), 689.

Alzamily, J. Y. I., Bakeer, H., Almadhoun, H., Abunasser, B. S., & Abu-Naser, S. S. (2024). *Artificial Intelligence in Healthcare: Transforming Patient Care and Medical Practices*.

Bhagat, S. V, & Kanyal, D. (2024). Navigating the future: the transformative impact of artificial intelligence on hospital management-a comprehensive review. *Cureus*, *16*(2).

Chikhaoui, E., Alajmi, A., & Larabi-Marie-Sainte, S. (2022). Artificial intelligence applications in healthcare sector: ethical and legal challenges. *Emerging Science Journal*, *6*(4), 717–738.

Dangi, R. R., Sharma, A., & Vageriya, V. (2025). Transforming healthcare in low-resource settings with artificial intelligence: Recent developments and outcomes. *Public Health Nursing*, *42*(2), 1017–1030.

Fahim, Y. A., Hasani, I. W., Kabba, S., & Ragab, W. M. (2025). Artificial intelligence in healthcare and medicine: clinical applications, therapeutic advances, and future perspectives. *European Journal of Medical Research*, *30*(1), 848.

Faiyazuddin, M., Rahman, S. J. Q., Anand, G., Siddiqui, R. K., Mehta, R., Khatib, M. N., Gaidhane, S., Zahiruddin, Q. S., Hussain, A., & Sah, R. (2025). The impact of artificial intelligence on healthcare: a comprehensive review of advancements in diagnostics, treatment, and operational efficiency. *Health Science Reports*, *8*(1), e70312.

Gachago, J. (2025). The Transformative Impact of Artificial Intelligence on the Digital Maturity of Hospitals. In *Digital Maturity in Hospitals: Strategies, Frameworks, and Global Case Studies to Shape Future Healthcare* (pp. 291–321). Springer.

Gehde, K. M., Rausch, F., & Leker, J. (2022). Business model configurations in digital healthcare—a German case study about digital transformation. *International Journal of Innovation Management*, *26*(03), 2240018.

Jabarulla, M. Y., & Lee, H.-N. (2021). A blockchain and artificial intelligence-based, patient-centric healthcare system for combating the COVID-19 pandemic: Opportunities and applications. *Healthcare*, *9*(8), 1019.

Karrouk, Y., Debasa, F., & Sanchez, L. M. F. (2025). The Digital Transformation of Smart Hospitals: Challenges and Opportunities. *Utilizing AI of Medical Things for Healthcare Security and Sustainability*, 1–54.

Klumpp, M., Hintze, M., Immonen, M., Ródenas-Rigla, F., Pilati, F., Aparicio-Martínez, F., Çelebi, D., Liebig, T., Jirstrand, M., & Urbann, O. (2021). Artificial intelligence for hospital health care: application cases and answers to challenges in European hospitals. *Healthcare*, *9*(8), 961.

Lee, D., & Yoon, S. N. (2021). Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *International Journal of Environmental Research and Public Health*, *18*(1), 271.

Maleki Varnosfaderani, S., & Forouzanfar, M. (2024). The role of AI in hospitals and clinics: transforming healthcare in the 21st century. *Bioengineering*, *11*(4), 337.

Rashid, Z., Ahmed, H., Nadeem, N., Zafar, S. B., & Yousaf, M. Z. (2025). The paradigm of digital health: AI applications and transformative trends. *Neural Computing and Applications*, 1–32.

Razavi, J., Dhafar, H. O., & BaHammam, A. S. (2025). Transforming health care with artificial intelligence: Regulations, challenges, and future directions. *Saudi Journal for Health Sciences*, *14*(1), 11–22.

Singh, S., Bhatt, P., Sharma, S. K., & Rabiu, S. (2021). Digital transformation in healthcare: Innovation and technologies. In *Blockchain for Healthcare Systems* (pp. 61–79). CRC Press.

Urbi, S. R. C., & Tiva, M. G. (2025). Technology and innovation in healthcare: Adoption of AI and predictive analytics in hospital management. *Pathfinder of Research*, *3*(2), 22–45.

Wong, B. K. M., Vengusamy, S., & Bastrygina, T. (2024). Healthcare digital transformation through the adoption of artificial intelligence. In *Artificial Intelligence, big data, blockchain and 5G for the digital transformation of the healthcare industry* (pp. 87–110). Elsevier.

Copyright holder:
Mohamad Reza Hilmy*,Alika Shameela, Erlina Puspitaloka Mahadewi, Rahmat Dwi Putranto, Ichwan Setiawan (2025)

First publication right:
Syntax Literate: Jurnal Ilmiah Indonesia

This article is licensed under:

