Navigating Artificial Intelligence in Malaysian Healthcare: Opportunities, Challenges, and Future Pathways

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ABSTRACT

Artificial intelligence (AI) is progressively revolutionizing healthcare via its applications in clinical decision assistance, medical diagnostics, individualized treatment, patient surveillance, and administrative functions. In Malaysia, the implementation of AI is hindered by issues related to digital infrastructure, data integrity and interoperability, workforce skills, governance, privacy concerns, cybersecurity threats, algorithmic bias, and ethical responsibility. Despite the increasing research on AI in healthcare, existing studies tend to explore these concerns independently, with inadequate integration of Malaysian and worldwide evidence into a theoretically grounded framework defining the circumstances required for responsible AI adoption in Malaysia. This conceptual paper addresses this gap through a structured literature review and conceptual synthesis of literature published between 2020 and 2026. The synthesis recognizes AI preparedness, digital infrastructure, workforce competence, governance, and ethical protections as interconnected factors affecting AI implementation and healthcare results. Using the Technology-Organization-Environment (TOE) framework, the study develops a Malaysia-specific conceptual framework and proposes a stakeholder-based implementation roadmap involving government, regulators, healthcare organizations, healthcare professionals, technology developers, and patients. The paper makes a theoretical contribution by integrating technological, organizational, environmental, and ethical factors into a framework for understanding AI adoption in healthcare, as well as a practical contribution by identifying measurable Malaysian implementation priorities. The results indicate that the deployment of sustainable AI necessitates technological preparedness alongside robust governance, workforce enhancement, ethical protections, stakeholder involvement, and ongoing assessment.

Keywords: Artificial Intelligence, Healthcare, Machine Learning, Digital Health, Clinical Decision Support, Ethics, Healthcare Innovation

INTRODUCTION

Global healthcare systems are under escalating strain from aging populations (Jakobsen & Christiansen, 2024; World Health Organization, 2025), the rising incidence of chronic diseases, increasing healthcare expenditures,

and a deficit of healthcare personnel (McPake et al., 2024; World Health Organization [WHO], 2025). These problems have prompted healthcare firms to use cutting-edge technology that improve efficiency while providing high-quality patient care. Among these technologies, artificial intelligence (AI) has emerged as one of the most promising advancements for altering healthcare delivery (Alsehani, 2026; Razaki, 2026; Chan et al., 2026; Garg, 2025; Dhar et al., 2024; Mahusin et al., 2024; Ali, 2023).

Artificial intelligence includes computational frameworks that can execute functions usually necessitating human intellect, like data analysis, pattern recognition, predictive modelling, natural language comprehension, and facilitating intricate decision-making (Irene, 2025; Chong et al., 2025; Fahim et al., 2025; Maity & Saikia, 2025; Koo et al., 2024; Wang & Zhang, 2024). In other words, AI refers to the use of technology to create systems that resemble human cognition and intelligence (Lee & Mohamad, 2026; Mishra & Kumar, 2024). Artificial intelligence comprises various technologies, such as machine learning, deep learning, natural language processing, computer vision, robotics, and predictive analytics.

These technologies empower healthcare organizations to swiftly and precisely interpret substantial quantities o f medical data, yielding significant insights that facilitate clinical decision-making and patient management.

In today's quickly developing technology, the number of innovations is increasing (Bhowmik & Sanyal, 2025; Mohd Hashim et al., 2025; Hasim et al., 2025; Nasir et al., 2024; Zhang, 2024). AI usage has accelerated across a variety of healthcare settings. AI algorithms help radiologists evaluate medical pictures, forecast disease progression, identify patients at risk for problems, support tailored treatment planning, enable robotic-assisted procedures, and automate administrative tasks (Wenderott et al., 2024; Knudsen et al., 2024; Buijs et al., 2024). During the COVID-19 pandemic, AI was effective in disease surveillance, vaccine research, patient triage, and resource allocation, demonstrating its ability to boost healthcare systems during public health emergencies (Tahernejad et al., 2024; Wang et al., 2024).

Malaysia has proactively adopted digital transformation as a component of its national development strategy. Government programs advocating for digital health, electronic health records, telemedicine, big data analysis, and artificial intelligence advancements have facilitated the incorporation of intelligent technologies into healthcare services. Public and private healthcare organizations are progressively investigating the utilization of AI in imaging, pathology, predictive analytics, hospital administration, and patient interaction (Lee & Mohamad, 2026; Chan et al., 2026; Fahim et al., 2025; Faiyazuddin et al., 2025; Karrar et al., 2025). The insights acquired during the COVID-19 pandemic underscored the significance of digital technology, such as AI, in disease monitoring, contact tracing, telemedicine, healthcare resource allocation, and public health policymaking.

Notwithstanding these encouraging advancements, the integration of AI in Malaysian healthcare is still at a nascent phase when juxtaposed with more digitally sophisticated healthcare systems. The application of AI is fraught with various technological, ethical, legal, and organizational obstacles (Abdelwanis et al., 2026; Khattak et al., 2025; Pruski, 2025). Healthcare organizations frequently face issues pertaining to patient privacy, cybersecurity, algorithmic bias, transparency, accountability, and regulatory compliance.

Numerous obstacles persist that hinder extensive adoption, such as disjointed healthcare data, variable interoperability among health information systems, scarcity of high-quality clinical datasets, apprehensions regarding patient privacy and cybersecurity, ethical and legal ambiguities, inadequate AI proficiency among healthcare practitioners, financial limitations, and disparate digital infrastructure across various regions of the nation.

The successful integration of AI into Malaysia's healthcare system requires not only technological advancement but also comprehensive governance, supportive regulatory frameworks, interdisciplinary collaboration, workforce development, and public engagement. Investments in digital infrastructure, standardized health data management, ethical AI governance, and capacity building will be essential to maximize AI's benefits while minimizing associated risks.

Furthermore, healthcare professionals may be reluctant to depend on AI systems due to apprehensions about accuracy, explainability, and the possible obsolescence of human expertise. These difficulties necessitate meticulous deliberation to guarantee the responsible and equitable implementation of AI technologies.

Due to the swift progress of AI technologies and their increasing integration in healthcare, it is essential to consolidate existing knowledge about the advantages and drawbacks of AI. The purpose of this conceptual paper is to analyze existing literature on AI in healthcare, identify potential and difficulties, and discuss future research, policy, and practice approaches. Accordingly, this study aims to critically synthesise Malaysian and international literature on AI adoption in healthcare, identify the technological, organisational, workforce, governance, and ethical factors influencing AI readiness and adoption in Malaysia, develop a theoretically grounded conceptual framework explaining the relationships among AI readiness, AI adoption, and healthcare outcomes and propose a Malaysia-specific implementation roadmap with stakeholder responsibilities and measurable policy and performance indicators.

Despite the growing body of literature on artificial intelligence (AI) in healthcare, several gaps remain. First, existing international studies have predominantly examined AI adoption from technological, clinical, or organisational perspectives, while Malaysian studies remain relatively fragmented across issues such as digital infrastructure, ethics, governance, workforce readiness, and specific AI applications. Consequently, there is limited integration of these dimensions into a single framework that explains how they collectively influence AI adoption and healthcare outcomes in the Malaysian context. Second, much of the existing literature focuses on the potential benefits and challenges of AI without sufficiently examining the contextual conditions that determine whether AI can be implemented responsibly and sustainably within Malaysia's healthcare system. Third, limited attention has been given to translating theoretical insights into a practical implementation pathway involving the key stakeholders responsible for AI adoption.

To address these gaps, this study develops a Malaysia-specific, theoretically grounded conceptual framework that integrates organisational AI readiness, digital infrastructure, workforce capability, governance, and ethical safeguards as interrelated determinants of AI adoption and healthcare outcomes. The study synthesises Malaysian and international literature to identify contextual barriers and enabling conditions and translates these findings into a stakeholder-based implementation roadmap with measurable policy and performance indicators. In doing so, the study contributes not only to the theoretical understanding of AI adoption in healthcare but also provides practical guidance for responsible and sustainable AI implementation in Malaysia.

LITERATURE REVIEW

Artificial Intelligence in Healthcare

Artificial Intelligence has emerged as a crucial element in the digital transformation of healthcare. AI technologies empower healthcare providers to rapidly analyze extensive datasets, enhance diagnostic precision, forecast disease outcomes, and manage healthcare operations (Bhatt et al., 2025; El Arab & Al Moosa, 2025; Chinta et al., 2025). Machine learning algorithms discern patterns from clinical data, whereas deep learning methodologies have considerably enhanced the interpretation of medical images. Natural language processing improves the extraction of useful information from electronic health records, allowing for more informed therapeutic decisions.

Healthcare organizations are progressively employing AI in radiology, pathology, cardiology, cancer, ophthalmology, and primary care. AI-powered clinical decision support systems help doctors by suggesting evidence-based diagnosis and treatment alternatives (Nojomi et al., 2025; Lee et al., 2025; Sutton et al., 2024). AI enhances hospital management through the optimization of scheduling, resource allocation, and workflow efficiency. Existing research suggests that AI can help healthcare workers with disease diagnosis, treatment planning, predictive analytics, medical imaging interpretation, medication discovery, and administrative process optimization (Aldosari, 2026; Chong et al., 2025; Sadr et al., 2025).

Research from advanced nations indicates that AI-driven diagnostic tools attain significant precision in identifying ailments including breast cancer, diabetic retinopathy, cardiovascular disorders, and lung cancer

(Bhatt et al., 2025; Alshammari et al., 2025; Kanan et al., 2024; McGenity et al., 2024). Artificial intelligence further enhances precision medicine by amalgamating genomic, clinical, and lifestyle information to propose individualized therapeutic approaches. Furthermore, AI-powered telemedicine and remote patient monitoring have increased healthcare accessible, especially since the COVID-19 epidemic.

International studies have demonstrated substantial improvements in diagnostic performance through AI-assisted medical imaging. However, evidence from high-income healthcare systems cannot be directly generalised to Malaysia because AI performance depends partly on the availability, quality, diversity, and interoperability of clinical datasets. Malaysian healthcare institutions operate within a more heterogeneous digital environment, with differences in infrastructure and health information systems between public and private facilities and between urban and rural settings. Therefore, high reported accuracy in international studies does not necessarily guarantee equivalent clinical performance or implementation feasibility in Malaysia.

In the Malaysian landscape, the implementation of AI has progressively risen due to national digital transformation efforts and investments in healthcare advancements. Public and private healthcare facilities have commenced the integration of AI-enhanced imaging, predictive analytics, electronic health records, and telemedicine services (Fahim et al., 2025; Faiyazuddin et al., 2025). Research organizations and academic institutions have also created AI applications for disease forecasting, medical imaging analysis, and healthcare resource administration.

Notwithstanding these advancements, the literature uniformly highlights numerous obstacles to the adoption of AI in Malaysia (Chan et al., 2026; Lee & Mohamad, 2026; Chong et al., 2025; Phang et al., 2024). These encompass disjointed healthcare information systems, restricted interoperability, inadequate high-quality clinical datasets, apprehensions about patient privacy and cybersecurity, ambiguous legal and ethical frameworks, a deficit of AI-proficient healthcare practitioners, and disparities in digital infrastructure between urban and rural healthcare establishments.

Contemporary studies underscore the significance of explicable AI, transparent governance, human-centric AI design, and interdisciplinary collaboration to facilitate responsible AI implementation (Kim et al., 2025; Ridley et al., 2025; Roy et al., 2026). Although Malaysia has launched various national digital projects, additional policy advancement, regulatory enhancement, and investment in digital health infrastructure are essential to expedite the integration of AI into healthcare.

Previous research indicate that AI has significant potential to improve healthcare quality, efficiency, and accessibility (Koo et al., 2024; El Arab & Al Moosa, 2025; Alzghoul et al., 2024). Nonetheless, optimizing these advantages necessitates collaborative endeavours among governmental bodies, healthcare organizations, technology suppliers, academic scholars, and medical practitioners.

Besides that, other prospects of artificial intelligence in healthcare are enhanced diagnostic precision. AI has shown amazing accuracy in interpreting medical pictures such as X-rays, CT scans, MRI scans, and retinal imaging (Sabri et al., 2025; Eskandar, 2025). Machine learning algorithms can detect nuanced irregularities that might be missed in manual assessments, resulting in earlier diagnoses and enhanced therapeutic results (Rajpurkar et al., 2024; Topol, 2025).

The subsequent prospects of artificial intelligence encompass tailored medicine. Artificial intelligence facilitates customized healthcare by examining individuals' genetic data, lifestyle elements, medical backgrounds, and clinical information to propose tailored treatment strategies (Liu et al., 2025; Maity & Saikia, 2025). Personalized medicine minimizes needless treatments while increasing clinical efficacy. Next is clinical decision support. AI-powered decision support systems deliver evidence-based suggestions to healthcare providers, enhancing diagnostic uniformity and treatment planning (Ouanes & Farhah, 2024; Kim et al., 2024; Elhaddad et al., 2024). These solutions minimize human error and help professionals manage complex medical problems.

Subsequently is remote patient monitoring. Wearable technology infused with artificial intelligence facilitates ongoing surveillance of those suffering from chronic illnesses (Jafleh et al., 2024; Sameh et al., 2025; Liu et al.,

2025). Artificial intelligence evaluates physiological data instantaneously, enabling healthcare professionals to identify preliminary indicators and take action prior to the onset of difficulties. Apart of that, artificial intelligence is also giving administrative efficiency. Healthcare firms are rapidly using AI to automate scheduling, paperwork, invoicing, and patient data management (Aldosari, 2026; Bracken et al., 2025; Kunze et al., 2025). Automation alleviates administrative responsibilities and enables healthcare practitioners to dedicate more time to direct patient care.

Barriers to AI Adoption in Healthcare

Data Privacy and Security

Artificial intelligence systems necessitate a substantial amount of patient information for their training and functionality. The aggregation, retention, and dissemination of confidential medical data provoke apprehensions about privacy violations and cybersecurity risks. Adherence to national and international data protection laws is crucial.

Algorithmic Bias and Equity

AI models may produce biased outcomes if training datasets are not representative of diverse patient populations. Biased algorithms can contribute to healthcare inequalities by generating less accurate predictions for certain demographic groups.

Transparency and Explainability

Numerous AI models function as "black boxes," complicating healthcare workers' comprehension of the suggestion generation process. Restricted elucidation diminishes healthcare professionals' trust in AI-supported determinations.

Ethical and Legal Accountability

The growing independence of AI systems prompts inquiries about responsibility in the event of diagnostic or treatment mistakes. Informed consent, patient autonomy, justice, and equitable access to AI technologies are all examples of ethical concerns.

Workforce Capability and Professional Trust

Effective AI integration necessitates that healthcare practitioners cultivate digital skills and comprehend AI-enhanced decision-making processes. Opposition to technological advancement and insufficient AI proficiency persist as obstacles in numerous healthcare institutions.

Malaysian and International Evidence: A Critical Synthesis

Dimension	International Evidence	Malaysian Context	Implication for Malaysian AI Adoption
Digital Infrastructure	Higher maturity in some high-income systems	Uneven infrastructure	Adoption requires infrastructure readiness
Data	Large datasets and established systems	Fragmentation/interoperability challenges	Data governance is essential
Workforce	Increasing AI literacy programmes	Skills remain uneven	Training is necessary
Governance	Developing regulatory frameworks	Healthcare-specific governance needs strengthening	Regulatory clarity is important

Ethics	Increasing attention to fairness and explainability	Similar issues with local contextual concerns	Ethical safeguards required
Adoption	More mature implementation in some systems	Adoption remains emerging	Phased implementation is appropriate

The comparison indicates that AI adoption cannot be transferred directly from international healthcare systems to Malaysia without considering contextual differences. International evidence demonstrates the potential of AI to improve clinical and operational performance; however, these outcomes are often supported by mature digital infrastructure, established data ecosystems, specialised workforce capabilities, and developed governance mechanisms. In Malaysia, differences in digital maturity, data interoperability, workforce preparedness, and regulatory capacity may affect the feasibility, scalability, and reliability of AI implementation. Therefore, AI adoption in Malaysia requires a context-sensitive approach that integrates technological readiness with organisational capability, governance, ethical safeguards, and stakeholder engagement.

Theoretical Foundation and Conceptual Framework

Theoretical foundation

The Technology-Organization-Environment (TOE) framework provides the theoretical basis for understanding the deployment of artificial intelligence (AI) in healthcare. The TOE framework proposes that the adoption of technological innovation is influenced by three interrelated contexts: technological, organisational, and environmental factors. This viewpoint is suitable for analysing AI integration in healthcare, as effective execution relies on both the accessibility and proficiency of AI technologies and the readiness of organizations, along with the overarching regulatory and institutional context in which healthcare entity’s function.

In Malaysian healthcare, the technological context includes digital infrastructure, data quality, interoperability, information systems, and the technical capabilities needed to implement and integrate AI technology. The development, validation, and implementation of AI systems require adequate infrastructure as well as reliable, accessible, and interoperable healthcare data. Consequently, technological preparedness serves as a crucial basis for successful AI implementation.

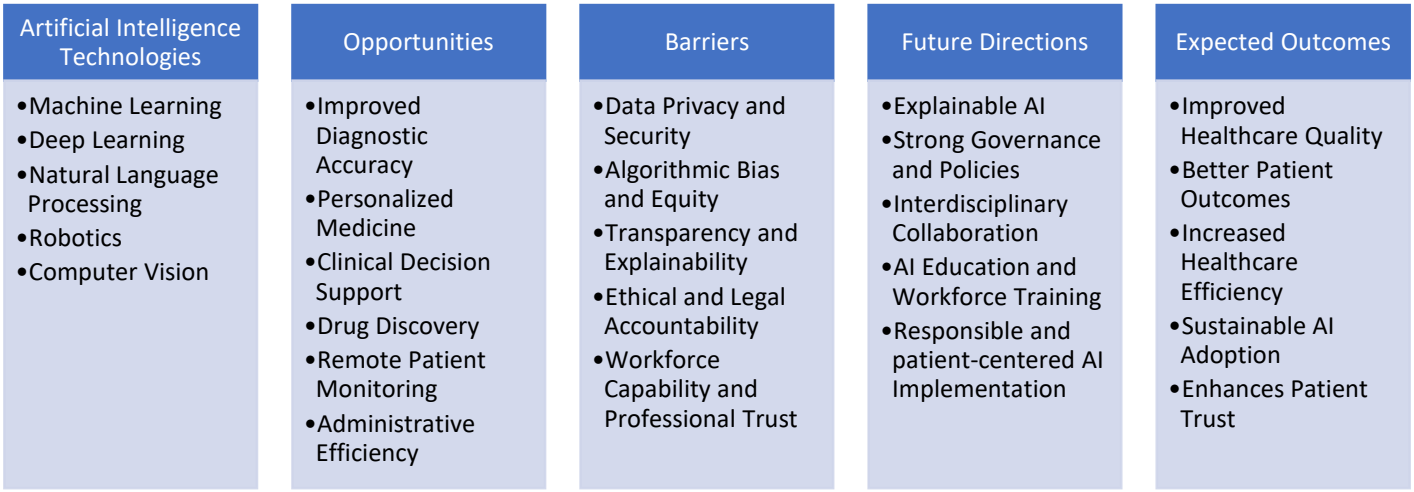
The organizational context refers to healthcare organizations' internal capacities and readiness to embrace and apply AI. This encompasses organization preparation, workforce competency, leadership support, financial resources, institutional capacity, and healthcare professionals' ability to operate effectively with AI-supported systems. The proficiency of the workforce is crucial as healthcare practitioners need adequate digital and AI literacy to comprehend, assess, and effectively implement AI-generated suggestions. Thus, the preparedness of the organization and the proficiency of the workforce are anticipated to affect the degree to which healthcare entities can convert technology possibilities into tangible AI implementation.

The environmental context encompasses external elements that influence technology adoption, such as government laws, regulatory requirements, professional standards, market conditions, and stakeholder expectations. Governance and regulatory structures are particularly critical in healthcare since AI applications deal with sensitive patient information, clinical decision-making, accountability, and patient safety. Efficient governance may establish frameworks for data safeguarding, cybersecurity, transparency, accountability, and adherence to regulations, thus fostering an atmosphere conducive to responsible AI deployment.

While the TOE paradigm offers a valuable foundation for elucidating AI adoption, the integration of AI in healthcare encompasses ethical factors that surpass traditional technology adoption. The suggested framework incorporates ethical precautions, such as fairness, openness, explainability, privacy, accountability, informed consent, and protection against algorithmic bias, as cross-cutting requirements for responsible AI deployment. These protections are especially pertinent to the healthcare sector, since the assessment of technological integration must consider not just efficiency and organizational advantages but also its effects on patient safety, equity, autonomy, and trust.

According to the TOE paradigm, this study defines AI ready as an integrated condition moulded by technological, organizational, and environmental elements. Digital infrastructure and data preparedness serve as crucial technology facilitators, whilst workforce competency and organizational preparedness act as organizational facilitators. Governance and regulatory systems represent environmental circumstances, while ethical protections serve as a cross-cutting factor that enables responsible implementation. These elements are suggested to affect the adoption of AI, which may subsequently lead to enhanced clinical results, operational efficiencies, and overall healthcare improvements. The proposed framework therefore extends the TOE perspective by incorporating ethical safeguards as a cross-cutting dimension particularly relevant to the responsible adoption of AI within the Malaysian healthcare context.

Proposed Conceptual Framework



This framework demonstrates that healthcare organizations can achieve successful AI implementation by balancing technological innovation with ethical responsibility, regulatory compliance, and organizational preparedness.

Development of the Conceptual Framework

Drawing on the TOE framework and the critical synthesis of Malaysian and international literature, this study develops a conceptual framework for responsible AI adoption in Malaysian healthcare. The framework proposes that AI adoption is influenced by the interaction of technological, organisational, and environmental conditions. Digital infrastructure and data readiness represent key technological foundations, while workforce capability and organisational readiness represent internal organisational conditions. Governance and regulatory arrangements represent environmental conditions that shape the institutional context for AI implementation. Ethical safeguards are incorporated as a cross-cutting condition because responsible healthcare AI requires attention to transparency, explainability, fairness, privacy, accountability, and patient autonomy.

Digital infrastructure and data readiness represent key technological foundations, while workforce capability and organisational readiness represent internal organisational conditions. Governance and regulatory arrangements represent environmental conditions. The framework therefore moves beyond viewing AI adoption as a purely technological process and conceptualises adoption as an organisational and institutional process requiring technological readiness, human capability, governance, and ethical responsibility. Ethical safeguards are positioned as a cross-cutting condition that influences the responsible implementation of AI across all stages of adoption, rather than as a standalone TOE dimension.

METHODOLOGY

This study adopts a conceptual paper methodology based on a structured literature review and conceptual synthesis of existing literature. In contrast to empirical research, conceptual studies do not gather primary data; rather, they synthesize existing information to formulate theoretical insights and suggest conceptual connections among variables.

The examined literature encompasses peer-reviewed journal articles, conference proceedings, books, policy papers, and publications from global entities including the World Health Organization (WHO) and the Organisation for Economic Co-operation and Development (OECD). Sources published between 2020 and 2026 were chosen to ensure that the conversation reflects current breakthroughs in AI and healthcare.

The search strategy was conducted separately for Malaysian and international literature to enable contextual comparison. Malaysia-focused search "artificial intelligence" OR "machine learning" OR "deep learning" OR "generative AI" AND "healthcare" OR "health care" OR "hospital*" OR "clinical" AND "Malaysia" OR "Malaysian" AND "adoption" OR "implementation" OR "readiness" OR "governance" OR "ethics". Meanwhile, for international search "artificial intelligence" OR "machine learning" OR "deep learning" OR "generative AI" AND "healthcare" OR "health care" OR "hospital*" OR "clinical" AND "adoption" OR "implementation" OR "readiness" OR "governance" OR "ethics". The retrieved literature was subsequently compared thematically to identify similarities, differences, contextual variations, and gaps between Malaysian and international evidence.

The selected literature was subjected to thematic synthesis through four stages. First, relevant findings were extracted according to the study objectives. Second, recurring concepts relating to AI applications, readiness, infrastructure, workforce capability, governance, ethics, adoption, and healthcare outcomes were coded. Third, related codes were grouped into higher-order themes. Finally, the themes were compared across Malaysian and international literature to identify areas of convergence, divergence, contextual differences, and research gaps. These themes subsequently informed the development of the conceptual framework.

The inclusion criteria are publications from 2020–2026, healthcare-related AI research, Malaysian and relevant international studies, peer-reviewed articles and relevant policy reports, and studies addressing AI adoption, readiness, governance, ethics, infrastructure, workforce, or outcomes. Meanwhile, the exclusion criteria are publications outside the selected period, AI research unrelated to healthcare, studies with no relevance to the research objectives, duplicate records, and sources lacking substantive relevance to the conceptual framework.

The literature-selection process involved identification, screening, eligibility assessment, and final inclusion. Retrieved records were first screened for relevance based on titles and abstracts, followed by full-text assessment of potentially relevant publications. Duplicate records were removed before the final screening stage. Publications were included when they met the predefined inclusion criteria and contributed evidence relevant to AI adoption, readiness, infrastructure, workforce capability, governance, ethics, or healthcare outcomes. The final literature set was then organised thematically for synthesis.

DISCUSSION

The literature suggests that AI readiness cannot be understood solely as the availability of technological infrastructure. While international research shows that AI may deliver high diagnostic performance, its deployment in Malaysia depends on the intersection of infrastructure, workforce capability, governance, and organizational readiness. This implies that technological proficiency is a requisite yet inadequate criterion for implementation. Specifically, deficiencies in interoperability and data integrity could restrict the applicability of AI models created in extensively digitized healthcare settings.

Ethical considerations like transparency, accountability, informed consent, and explainability sway public and professional adoption of AI technologies. Healthcare workers are more likely to believe AI advice when the underlying reasoning is clear and practically applicable. Overall, artificial intelligence should augment rather

than replace healthcare professionals. Human proficiency, compassion, moral judgment, and effective patient interaction remain essential elements of superior healthcare that AI cannot completely replicate.

Malaysia-Specific Ai Healthcare Implementation Roadmap

Stakeholder	Responsibility	Implementation priority	Indicator
Government	National AI-health strategy and funding	Establish national implementation priorities	National AI-health strategy implementation rate
Regulators	Safety, privacy, accountability	Governance standards	% of AI systems meeting regulatory requirements
Hospitals	Infrastructure and implementation	Pilot and evaluate AI systems	Number/% of validated AI systems implemented
Healthcare Professionals	Clinical oversight and AI literacy	Training and human-AI collaboration	% of relevant professionals completing AI training
Technology Developers	Safe and interoperable systems	Validation, explainability and interoperability	% of systems meeting validation/interoperability requirements
Patients	Consent, participation and feedback	Patient-centred implementation	Patient trust/satisfaction

The proposed implementation roadmap consists of four sequential phases. Phase 1 focuses on readiness, including the development of digital infrastructure, data governance, workforce capability, and regulatory arrangements. Phase 2 involves controlled pilot implementation in selected healthcare settings, accompanied by clinical validation, safety assessment, and stakeholder feedback. Phase 3 focuses on scaling validated AI applications across appropriate healthcare institutions while strengthening interoperability and workforce capacity. Phase 4 involves continuous monitoring and governance, including performance auditing, safety surveillance, equity assessment, cybersecurity monitoring, and evaluation of clinical and operational outcomes.

CONCLUSION

This conceptual paper contributes to the literature by proposing an integrated framework in which AI readiness, digital infrastructure, workforce capability, governance, and ethical safeguards jointly shape AI adoption and subsequent healthcare outcomes. The synthesis also suggests that the Malaysian context demands an implementation approach that accommodates for differences in digital development, workforce preparedness, regulatory capability, and stakeholder trust. Consequently, the adoption of responsible AI should advance through a staged deployment that includes government entities, regulatory bodies, healthcare organizations, medical experts, technology creators, and patients.

In theory, the framework broadens the TOE perspective by including ethical protections as a cross-cutting concern in healthcare AI deployment. Practically, the proposed implementation roadmap provides a coordinated approach for government, regulators, healthcare organisations, healthcare professionals, technology developers, and patients. Future empirical research should test the proposed relationships and examine whether the identified factors predict AI adoption and healthcare outcomes across different Malaysian healthcare settings.

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