



# **Artificial Intelligence in Clinical Practice: A Comprehensive Review of Real-World Applications, Clinical Decision Support, and Healthcare Delivery**

Wen-Jie Li<sup>1</sup>, Lin-Ze Li<sup>2</sup>

<sup>1</sup>School of Art Design and Media, Guangzhou Xinhua University, Guangzhou 510520, Guangdong Province, China

<sup>2</sup>School of the Arts, Universiti Sains Malaysia, Penang 11800, Malaysia. [lilinze@student.usm.my](mailto:lilinze@student.usm.my)

**\*Corresponding Author's:** Wen-Jie Li

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## **ABSTRACT**

Gallstone disease remains a common biliary disorder with substantial diagnostic and clinical consequences, creating a need for practical tools that can support early risk identification. This study developed and internally validated an artificial intelligence-based clinical decision-support model for gallstone disease using a publicly available de-identified dataset of 319 patients and 38 candidate predictors. Demographic, comorbidity, anthropometric, laboratory, and body-composition variables were evaluated through elastic-net logistic regression, random forest, gradient boosting, and radial-basis-function support vector machine models using repeated stratified five-fold cross-validation. Model performance was assessed through receiver operating characteristic area under the curve, accuracy, sensitivity, specificity, precision, F1 score, Brier score, calibration measures, risk stratification, permutation importance, and decision-curve analysis. The extended elastic-net model was selected as the final model because it combined interpretability with good discrimination and calibration, achieving an area under the curve of 0.848, accuracy of 78.1%, sensitivity of 72.8%, specificity of 83.2%, and Brier score of 0.161. At an optimized threshold of 0.393, sensitivity increased to 85.4% while specificity remained 72.0%. Vitamin D, C-reactive protein, bone mass, extracellular fluid distribution, and visceral fat area were influential predictors. The model showed meaningful risk separation and potential net clinical benefit, but external multicenter and prospective validation remain necessary before routine implementation across diverse clinical settings and patient populations.

**Keywords:** Artificial intelligence, Clinical decision support, Gallstone disease, Machine learning, Risk prediction

## 1. Introduction

Artificial Intelligence (AI) is one of the most revolutionary technologies in the healthcare industry today, transforming the way clinical information is analysed, interpreted and utilized in patient care. In the last 30 years, with the help of the increasing power of computers, the development of machine learning and deep learning techniques and the rapid increase in the amount of data, AI has been accelerated into a wide range of healthcare environments. A growing trend of AI-related clinical research is evident in the bibliometric data, showing a significant rise in the interest in the creation of intelligent systems to assist healthcare professionals in various aspects, including diagnosis, prognosis, treatment planning, and operational decision-making. This swift transformation has taken AI out of the realm of research and into a tool that is more and more becoming a part of standard healthcare provision (Xie et al., 2025).

Today, AI tools are used in various areas of medicine such as radiology, pathology, cardiology, oncology, neurology, emergency medicine, and primary care. The aim of these systems is to help clinicians with better diagnostics, identification of high-risk patients, prediction of disease progression, optimization of therapeutic strategies, and minimization of the administrative workload. The use of AI with healthcare is not about replacing human labor, but enhancing healthcare professionals' decision-making processes. In the context of growing healthcare digitalization, AI systems have become increasingly powerful in providing clinically relevant information in the evolving healthcare landscape (Karalis, 2024; Alowais et al., 2023).

However, the use of AI in everyday clinical practice is much more difficult to achieve than the high performance that has been obtained in controlled research settings. While developing and validating many AI models, they show high predictive power, yet fail to achieve the same in practice in healthcare settings. Data heterogeneity, the lack of interoperability across healthcare systems, workflow integration issues, regulatory compliance, ethical considerations, clinicians' acceptance, and organization readiness are just a few examples of factors that can significantly impact the success of AI-powered solutions. This has led to a growing focus on the performance of algorithms in actual clinical use and if they lead to observable improvements in healthcare delivery and patient outcomes (You et al., 2025; El Arab et al., 2025).

A few recent implementation studies and systematic reviews have emphasized the need for the translation of AI innovations into sustainable clinical practice. Yet, evidence points to the need for interdisciplinary cooperation, open model-building efforts, iterative clinical testing and testing, and efforts to adapt to local health care settings. Moreover, explainability, trustworthiness, and evidence-based evaluation have become key considerations for clinician trust and responsible deployment of AI. Together these considerations highlight that whilst the technical performance is crucial, AI's utility extends to its capacity to fit into the clinical workflow while ensuring patient safety and facilitating informed medical decisions (Baldwin et al., 2022; Tseng et al., 2026; Coiera & Liu, 2022).

However, with the growing volume of evidence, a complete synthesis of the existing knowledge is needed to gain insight into the practical use of AI in real-world clinical environments. Hence, this review covers current practices of AI in clinical settings, assesses its impact on clinical decision support and healthcare provision, highlights obstacles and potential for integration, and outlines future directions which can support the responsible use of AI in clinical practice (Yin et al., 2021; Cruz-Suarez et al., 2026).

## 2. Methodology

This review was a comprehensive review, based on structured literature review approach. Peer-reviewed journals were searched in PubMed, Scopus, Web of Science, ScienceDirect, SpringerLink, Wiley Online Library and Google Scholar using predefined keywords related to AI, clinical decision support and healthcare delivery. Only English-language articles describing actual clinical uses of AI were included, excluding opinion pieces, duplicates, and non-clinical. The identified studies were screened and critically evaluated thematically to provide a summary of current evidence, difficulties in implementation, clinical outcomes and future research directions.

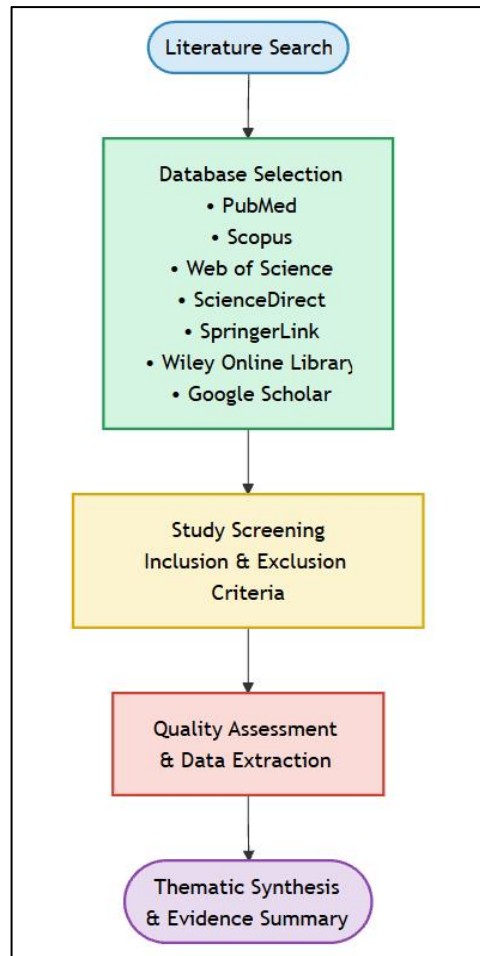


**Figure 1. Methodological Workflow of the Review**

### 3. Results

#### 3.1 Current Landscape of Artificial Intelligence in Clinical Practice

AI has proven to be a valuable asset in healthcare, helping healthcare professionals to diagnose illnesses, predict patient outcomes, optimize treatment, and improve healthcare delivery. The growth of machine learning, deep learning, natural language processing, and computer vision has led to AI systems being able to process large volumes of clinical information quickly and accurately. These technologies have recently made their way into everyday healthcare practice within hospitals in order to ensure better diagnostic accuracy, improve workflow, and support evidence-based clinical decision-making. This trend demonstrates that there has been a move away from using these technologies on a trial basis towards implementing them broadly across healthcare organizations of all types (Fahim et al., 2025; Thomas et al., 2025).

The clinical practice of today reveals how AI is being employed in such diverse medical fields as radiology, oncology, cardiology, pathology, emergency and critical care. Some of the more well-developed applications include AI-powered imaging analysis, predictive risk assessment, automated clinical documentation, and electronic health record (EHR) analytics. Moreover, with the use of artificial intelligence, virtual assistants, remote patient monitoring, and systems for recommending treatments, patient access is enhanced and treatment can be continued outside of hospital environments. Such innovations can contribute to improving the efficiency of operations, timely interventions and personalized care (Maleki Varnosfaderani & Forouzanfar, 2024).

There have been great advances, but using AI in routine clinical care isn't uniform within health care systems. Factors that impact successful adoption include digital maturity, quality of data, regulatory requirements, readiness of staff and readiness of organizations. However, further obstacles such as algorithm trust and transparency, patient information ethics, interoperability, and clinician acceptance need to be addressed for successful implementation of the algorithm. As a result, ongoing efforts are increasingly targeted at clinically validated, understandable and patient-centric AI solutions that can easily be incorporated into existing healthcare workflows, while at the same time being safe, reliable, and providing high standards of care (Aldwean & Tenney, 2024). This is illustrated in figure 2, where the key actors in the AI ecosystem in the clinical environment are represented, and where the clinical data is transformed into the use of AI to support decision making and deliver better quality healthcare provision.

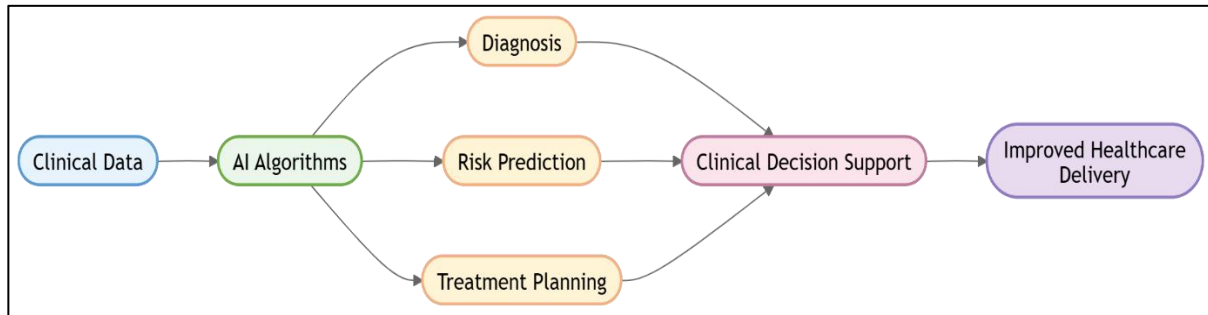


**Figure 2. Artificial Intelligence Ecosystem in Clinical Practice**

### 3.2 Real-World Clinical Applications of Artificial Intelligence

AI has proven to be beneficial to a wide variety of clinical specialties, helping to make more accurate diagnoses, more timely interventions and personalized treatment strategies. In patient care, AI-driven decision support systems utilize clinical data, laboratory results, and medical imaging to help healthcare providers recognize disease trends and choose the best treatment strategies. The use of these technologies also helps to minimize the variability in diagnostics, optimize workflow and enhance patient safety making evidence based recommendations (Poalelungi et al., 2023).

AI has been playing a more significant role in oncology and pathology in the interpretation of histopathological images, molecular biomarkers, and genomic information. Multidisciplinary teams are able to make more informed clinical decisions as advanced algorithms are used to aid in tumor classification, prognosis prediction and treatment planning. AI can also be combined with molecular diagnostics, which is also useful

for precision oncology by identifying characteristics specific to the disease that guide individualized treatment and radiotherapy strategies (Pelosi et al., 2026).

AI has also been extensively used in neurological disorders and infectious diseases management. In the context of COVID-19, AI tools were used to analyze the data and help identify neurological complications at an early stage, track the progression of the disease, and assess the risk levels of patients with acute and chronic neuro-COVID symptoms. These are examples of how AI can enhance the clinical evaluation and patient management in the dynamic landscape of healthcare emergencies (Cascella & De Blasio, 2022).

AI can be used for continuous monitoring of physiological parameters, early detection of clinical deterioration, and prediction of adverse events like sepsis, respiratory failure, and organ dysfunction, particularly in critical care settings. Predictive algorithms can help guide intensive care teams on what to do first and how to use resources most effectively, which will lead to improved patient outcomes. Likewise, prognostic models have been used to assess the severity of diseases in childhood inflammatory disorders, enabling clinicians to adjust and tailor patient-specific care and treatment based on available healthcare resources, while also providing equitable and efficient clinical care (Schell, 2024; Bodnarchuk-Sokhatska & Pavlyshyn, 2026). Table 1 presents a summary of the major current use cases of AI in clinical specialties, their clinical roles and their contributions in the real world.

**Table 1. Real-World Applications of Artificial Intelligence Across Clinical Specialties**

| Clinical area                    | AI application                        | Clinical function                                | Practical contribution                                                | References                                         |
|----------------------------------|---------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------|
| Radiology and medical imaging    | Deep-learning image analysis          | Detection, segmentation, and classification      | Improves interpretation speed and diagnostic consistency              | Poalelungi et al. (2023); Alharbi et al. (2025)    |
| Oncology and pathology           | Histopathology and biomarker analysis | Tumour classification and treatment selection    | Supports precision oncology and multidisciplinary planning            | Pelosi et al. (2026)                               |
| Neurology and infectious disease | Predictive clinical analytics         | Disease recognition and risk stratification      | Supports monitoring of neurological and post-infectious complications | Cascella and De Blasio (2022); Kumar et al. (2026) |
| Cardiology and primary care      | AI-assisted focused ultrasound        | Identification of cardiac abnormalities          | Strengthens early diagnosis and referral decisions                    | Iacob et al. (2025)                                |
| Critical and emergency care      | Continuous physiological prediction   | Early identification of deterioration and sepsis | Enables timely intervention and resource prioritization               | Schell (2024); Arora (2023)                        |

|                 |                               |                                |                                                                |                                           |
|-----------------|-------------------------------|--------------------------------|----------------------------------------------------------------|-------------------------------------------|
| Paediatric care | Prognostic severity modelling | Prediction of disease severity | Supports treatment planning according to resource availability | Bodnarchuk-Sokhatska and Pavlyshyn (2026) |
|-----------------|-------------------------------|--------------------------------|----------------------------------------------------------------|-------------------------------------------|

### 3.3 Artificial Intelligence for Clinical Decision Support

The utilization of artificial intelligence has greatly enhanced clinical decision support (CDS), facilitating the effective interpretation of complex clinical data and the informed, timely decision-making of healthcare professionals. Today, the CDS is built on artificial intelligence, providing clinical recommendation and prediction of risk based on patient history, laboratory results, medical imaging and other electronic health records (EHR). Distributed decision support platforms also bolster collaboration, enabling healthcare providers in various departments and institutions to use consistent, data-informed clinical insights and enhance continuity and quality of patient care (Almadani et al., 2025).

However, nowadays, the capabilities of decision support using AI technology have significantly increased as it now involves virtual health twins, probabilistic reasoning, and embedding, providing means for the context of the support system to be taken into account. Such technologies help build virtual images of the patients and, therefore, enable simulation of the development of the disease and observation of how the patients react to different treatments and development of management strategies based on the peculiarities of each individual. Such advanced systems make the diagnostics more accurate and help perform proactive clinical interventions in cases of complex or chronic diseases (Srinivasan et al., 2025).

The use of artificial intelligence in conjunction with knowledge about biomarkers, molecular diagnostics and treatment is an integral part of precision oncology which helps to take clinical decisions for personalized therapy. AI can assist clinicians to make the best decision for the selection of optimal treatment using several data dimensions which are important in personalization. It will be possible to make treatment more effective and prevent useless interventions which have some adverse effect (Tinger, 2024).

The safety of patients and proper handling of medications are also highly influenced by the decision support systems driven by artificial intelligence as well as the process of diagnostics and treatment planning. Intelligent systems can prove to be effective in identifying possible medication-related mistakes, adverse drug reactions, prioritizing clinical warnings, and optimizing health information technologies to reduce preventable issues. HITs can also prove to be useful in enhancing documentation and the safe provision of clinical care, maternity and neonatal care. In the future, with the development of AI, its uses in helping make dependable and transparent decisions will definitely increase.

### 3.4 Artificial Intelligence in Healthcare Delivery

In healthcare, AI is making a significant impact in various areas, such as optimizing patient care, enhancing clinic efficiency, and improving clinical workflows. Healthcare IT solutions that leverage AI provide more efficient documentation processes, automation of repetitive tasks, and secure sharing of clinical data between healthcare systems. These features alleviate clinician burden, enhance coordination and quality of care, and ensure timely access to patient data, all of which aid in efficient healthcare delivery. Additionally, AI-powered medication management systems can detect prescribing errors, track drug interactions, and enhance the safety of medication management across the entire healthcare journey (Devin, 2022; Pereira, 2025).

The integration of telemedicine has also made tangible the ways AI can be applied to real-world situations to enhance healthcare access, transcending the boundaries of a traditional clinic. Intelligent virtual triage systems which prioritize the patient and assist in initial diagnosis and suggest level of care, based on patient reported information and physiological measurements. These systems are effective, provide better access to healthcare, minimize unnecessary hospital visits and facilitate quick clinical assessment, especially in the context of an infectious disease outbreak and in areas with less healthcare coverage (Villafuerte et al., 2023).

Also, AI has increased remote patient monitoring technology. This has made it possible to monitor and analyze the physiological data obtained through wearable devices and health care platforms in real time. These technologies have allowed for early warning of patient deterioration so that health care providers can intervene before the problem becomes more severe. From the above data, it is clear that remote monitoring with the help of AI can be used as an effective way to prevent hospital admissions among patients with infections and sepsis (Yende et al., 2026).

Furthermore, deep learning-based telehealth frameworks have created better long-term monitoring and prediction of chronic diseases, and personalized clinical suggestions for their management. AI's ability to facilitate ongoing patient interaction and proactive disease management is a key factor in enhancing patient-centric healthcare delivery. In the future, the ongoing advancements of digital health technologies are likely to see an even greater contribution from AI in the field of health care, both inside and outside of hospitals, to provide high quality care (Verma et al., 2022). Table 2 outlines the key AI-driven systems for clinical decision-making and healthcare delivery, their sources of information, clinical applications, and benefits of operation.

**Table 2. AI-Enabled Clinical Decision Support and Healthcare Delivery**

| AI-enabled system | Data or technology used | Clinical purpose | Healthcare delivery benefit | References |
|-------------------|-------------------------|------------------|-----------------------------|------------|
|-------------------|-------------------------|------------------|-----------------------------|------------|

|                                     |                                                    |                                                          |                                                                |                                                      |
|-------------------------------------|----------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------|
| Distributed decision-support system | Electronic health records and clinical data        | Diagnosis and coordinated decision-making                | Improves continuity across departments and institutions        | Almadani et al. (2025)                               |
| Virtual health twin                 | Probabilistic models and contextual patient data   | Simulation of disease progression and treatment response | Supports proactive and personalized care                       | Srinivasan et al. (2025)                             |
| Precision oncology platform         | Biomarkers and molecular information               | Targeted treatment selection                             | Reduces unnecessary interventions and improves personalization | Tinger (2024)                                        |
| Medication safety system            | Prescribing records and automated alerts           | Detection of medication errors and interactions          | Strengthens patient safety and clinical workflow               | De Micco et al. (2025); Devin (2022); Pereira (2025) |
| Virtual telemedicine triage         | Symptoms and electronic physiological measurements | Preliminary assessment and care prioritization           | Expands access and reduces avoidable visits                    | Villafuerte et al. (2023)                            |
| Remote patient monitoring           | Wearables and health connected platforms           | Detection of post-discharge deterioration                | Supports continuity of care and early intervention             | Yende et al. (2026); Verma et al. (2022)             |

### 3.5 Clinical Outcomes Associated with Artificial Intelligence Implementation

AI in clinical practice has been linked to tangible improvements in diagnosis, efficiency in care delivery, and patient outcomes. By continuously analyzing the physiological data, AI-driven decision support systems (DSS) with IoT integration can help clinicians identify a decline in health sooner and make timely clinical decisions. These advanced monitoring solutions facilitate proactive actions, care coordination, and improved healthcare provision within hospitals and beyond, including at the patient's home (Whig et al., 2024).

AI-powered diagnostic technologies have also demonstrated great improvements in diagnostic accuracy. One example of such AI technologies is focused cardiac ultrasound (FOCUS), which provides assistance in the interpretation of cardiac ultrasound images and reduces the variance in diagnosis when making a cardiac ultrasound decision in primary care. In such settings, where expertise may be limited, these applications can facilitate early detection, improve referrals, and enhance clinical decision-making and particularly an informed approach to clinical decisions (Iacob et al., 2025).

The availability of healthcare and continuity of care has been further affected by the spread of telemedicine, which has also helped to bring about positive clinical outcomes. AI-powered telehealth platforms enable virtual appointments and post-surgical monitoring, as well as managing chronic conditions, minimizing unnecessary trips to the hospital. Telemedicine has proven to be effective in the field of orthopedic and other specialties in ensuring the quality of patient care while promoting healthcare efficiency during and after COVID-19. Likewise, the use of technology in tracking blood pressure levels has revolutionized the management of hypertension in primary care, enabling frequent monitoring and effective management with prompt interventions (Haider et al., 2022; Teo et al., 2024).

AI-powered digital health interventions have proven to have significant economic implications, as well as clinical. The application of Telepsychiatry and other forms of remote healthcare with AI has been linked to cost savings in healthcare, such as travel, resource use, and access to specialist services, with no decrease in quality of care. The findings suggest that AI has the potential to enhance patient outcomes and help create more efficient and sustainable healthcare systems (Naslund et al., 2022). The important clinical applications derived from the application of AI are listed in Figure 3, which highlights that the use of AI can help to increase the accuracy of their diagnosis, improve their workflow and improve their patient's outcome and improve the sustainability of healthcare.

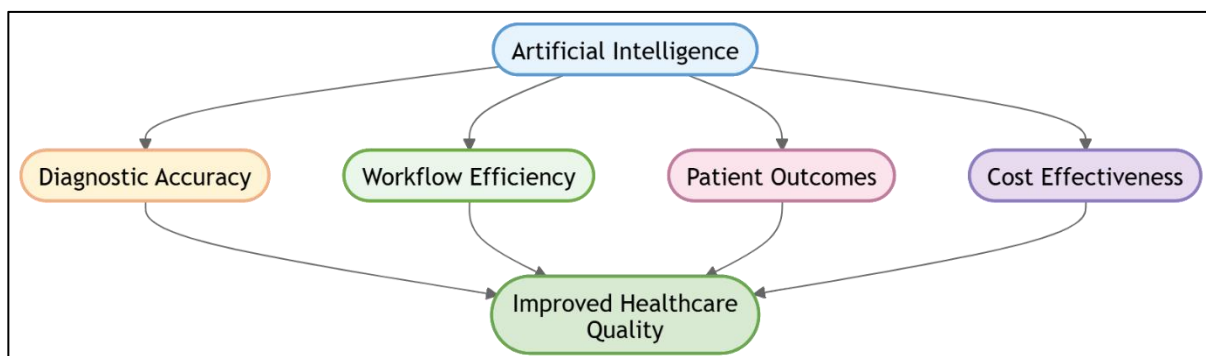


**Figure 3. Clinical Outcomes Associated with Artificial Intelligence Implementation**

### 3.6 Barriers to Clinical Implementation

While there has been significant advancement in the use of AI in healthcare, there are still a number of obstacles that make it difficult to implement AI in everyday clinical practice. The integration of AI technologies into existing clinical workflows while minimizing disruption to patient care and the workload for healthcare professionals is one of the significant challenges. While the use of telemedicine and digital health platforms has enhanced access to healthcare, their effective implementation requires robust infrastructure, user adoption, and efficient coordination among healthcare providers (Haider et al., 2022).

Ethical issues are also a major barrier to the use of AI. As more and more devices and digital health technologies are adopted in the Internet of Things (IoT), issues of patient privacy, informed consent, data ownership, algorithmic bias and transparency are all under scrutiny. To foster public trust and safeguard patient rights at the point of clinical implementation, it is crucial for AI systems to be fair, secure, and adhere to ethical standards (El Bouchikhi et al., 2024). The other important issue is to protect information in health care systems while allowing for easy sharing of information across systems. Though AI systems need access to vast and high-quality datasets, issues of cybersecurity and interoperability often limit data sharing. To address these challenges, emerging solutions that integrate blockchain with AI promise to enhance data integrity, traceability, and secure information sharing, yet face technical and operational hurdles when it comes to scaling up.

Furthermore, there is a need for organisational readiness and workforce competence for the successful adoption of AI. To ensure clinical reliability, the continuous monitoring, model validation and regular system updates are essential to predictive analytics and intelligent automation. Besides, healthcare professionals and technology experts need to be AI-literate so they can understand the recommendations given by the algorithms, be aware of the system's limitations, and effectively use the technology to make clinical decisions. Thus, it is crucial to invest in education, governance, and multidisciplinary teamwork for responsible and sustainable deployment of AI in healthcare environments (Sivakumar et al., 2024; RO, 2025). The key clinical outcomes, barriers to implementation, and actions needed to ensure responsible AI are summarized in Table 3.

**Table 3. Clinical Outcomes, Implementation Barriers, and Required Responses**

| Implementation dimension           | Reported benefit or challenge                                   | Clinical implication                                    | Required response                                                    | References                                       |
|------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------|
| Diagnostic performance             | Improved recognition of clinical abnormalities                  | May support earlier diagnosis and referral              | Conduct prospective and external clinical validation                 | Iacob et al. (2025); Lam et al. (2022)           |
| Remote care                        | Greater accessibility and continuity                            | Reduces unnecessary travel and hospital attendance      | Integrate telehealth with routine care pathways                      | Haider et al. (2022); Teo et al. (2024)          |
| Economic efficiency                | Lower travel and service-delivery costs                         | May improve sustainability of specialist care           | Assess cost-effectiveness across different settings                  | Naslund et al. (2022)                            |
| Privacy and ethics                 | Risks involving consent, surveillance, bias, and data ownership | May weaken patient and clinician trust                  | Apply transparent governance and ethical safeguards                  | El Bouchikhi et al. (2024); Younis et al. (2024) |
| Data security and interoperability | Restricted and fragmented health-information exchange           | Limits scalability across institutions                  | Strengthen secure and interoperable data architecture                | Merhej et al. (2024)                             |
| Workforce readiness                | Limited AI literacy and ability to interpret outputs            | Increases inappropriate reliance or rejection           | Provide multidisciplinary education and continuous training          | RO (2025); Aldwean and Tenney (2024)             |
| Regulation and monitoring          | Inconsistent validation and reporting standards                 | Creates uncertainty regarding safety and accountability | Follow standards, post-deployment monitoring, and clinical oversight | Wang et al. (2023); You et al. (2025)            |

### 3.7 Emerging Trends and Future Opportunities

The development of AI systems will continue, and such systems will not only remain within the sphere of traditional decision support. During the last few years, deep learning systems have provided an impressive step ahead in the field of medical imaging, which made it possible to detect, segment and classify complicated abnormalities using automated methods. Such improvements can be expected to contribute to the improvement of diagnostic reliability, save time spent on interpretations, and help clinicians cope with complicated cases (Alharbi et al., 2025).

AI's future is also incredibly connected to intelligent healthcare solutions based on patient care. In the field of neurology

and other medical specialties, AI-powered systems are becoming more prevalent to aid in the detection, diagnosis, and monitoring of neurological conditions that are considered chronic, as well as therapeutic planning tailored to individual patients. With a multimodal patient-centric approach that combines clinical data from multiple modalities with advanced analytic capabilities, the potential applications of this comprehensive approach to healthcare information have the potential to revolutionize the field of precision medicine and patient care in medical settings (Kumar et al., 2026).

The other emerging trend with significant clinical potential is generative AI. LLMs and generative AI have the potential to help healthcare professionals in clinical documentation, patient communication, medical education, and evidence synthesis, and alleviate administrative burden. As these technologies continue to evolve, they could play a key role in improving the efficiency of healthcare, by reducing the time spent on repetitive tasks and leaving more time for patient care.

The adoption of telemedicine, eHealth platforms and connected healthcare ecosystems is also being further spurred by digital transformation. The integration of these AI and remote monitoring tools, EHRs, and digital communication platforms holds great promise for improving the continuity of care, expanding access to healthcare, and promoting collaboration between healthcare professionals. Additionally, AI-driven predictive models may have the potential to predict conditions that require prompt clinical intervention, such as sepsis, an early-stage disease that could have a positive impact on patient survival. Continued clinical trials, ensuring good governance, and the cooperation of people from different disciplines will be critical to achieving the potential of these new AI tools in everyday healthcare (Glinkowski et al., 2025; Arora, 2023).

#### 4. Discussion

The results of this review show that AI has gone beyond being an emerging technology and has become a viable part of today's clinical practice. AI technologies are now used in various medical fields to detect diseases, predict risks, aid in clinical decision-making, plan treatments, and manage healthcare. Over the years, significant strides in deep learning, medical imaging, and predictive analytics have given physicians the ability to better and more quickly analyze complex medical data. AI has now been introduced in everyday clinical processes as well, and there is recent evidence of this (Karalis, 2024; Alharbi et al., 2025; Aleksandra et al., 2026), showing a trend towards evidence-based, patient-centric healthcare involving intelligent technologies.

One major point that comes out from reviewing the available literature is that for the effectiveness of AI not only depends on the performance of the algorithm but also the successful implementation of the algorithm into the actual practice of health care. AI has been found to be effective in improving clinical processes based on randomized controlled trials and studies on the implementation of AI which has revealed that AI technology can increase diagnostic accuracy, optimal treatment choices, and increase operational efficiency. However, data quality, health care system, interoperability, and acceptance by users can influence the performance in the clinic. (Lam et al., 2022; Giroi et al., 2021; Aravazhi et al., 2025).

The emergence of new technologies such as the use of generative artificial intelligence, precision medicine, digital health tools, and artificial intelligence-assisted surgery will transform the provision of health care services. There are a lot of promising prospects in the future of AI. For example, there are many exciting possibilities offered by generative AI in clinical documentation, patient communication, medical education, and evidence synthesis, besides the advancements in telemedicine and digital transformation. There are promising prospects in the future of AI as the potential applications of generative AI in clinical documentation, patient communication, medical education, and evidence synthesis keep growing, while the advancements in telemedicine and digital transformation improve the delivery of healthcare services. At the same time, in various medical specialties, AI-supported surgery planning and intraoperative decision-making provide opportunities for greater safety and individualization of surgical procedures (Gupta et al., 2025; Rabbani et al., 2025; Glinkowski et al., 2025; Morris et al., 2024).

While all these positive developments persist, however, there are also several barriers that impede widespread adoption. The problems related to ethics, transparency of algorithms, algorithmic bias, cybersecurity, regulation compliance, patient acceptance and trust in the algorithm are key challenges that require coordinated action. Being aware of the necessity to ensure patient safety and responsible use of artificial intelligence, the international guidelines call for uniform methods of algorithm validation and monitoring, development of explainable AI and a multidisciplinary governance system. In addition, it is crucial to continue research into the sustainability of the use of AI through prospective multicenter and real-world clinical trials, and by establishing a successful implementation strategy. Further research and understanding into the advantages of disease-specific predictive models such as sepsis make the necessity for AI that can aid in interventions more pressing than ever before (Arora, 2023; Younis et al., 2024; Wang et al., 2023). In summary, the future of medicine will undoubtedly involve the use of AI technology, which will have to be backed by solid clinical evidence, ethical standards, and cooperation between all healthcare professionals involved.

#### 5. Conclusion

AI has demonstrated itself as a disruptive force in different fields of clinical practice, where it allows for improving diagnosis, clinical decision-making based on scientific evidence, designing treatment protocols and generally delivering health care services in a more efficient manner. Based on the findings from the literature review, it is evident that AI has moved beyond the experimental stage and started to become a normal part of the clinical workflow, telemedicine,

remote patient monitoring, and precision medicine practices. All of these applications have allowed improving patient outcomes, increasing efficiency of operations and personalizing care for patients. At the same time, some problems related to the quality of data, interoperability issues, ethical concerns, cybersecurity, regulatory compliance and workforce readiness have remained barriers to the widespread adoption of AI solutions. As advances in generative AI, multimodal analytics, and intelligent digital health platforms are made in the future, there is no doubt that such innovations will further advance patient-centered care and the efficiency of the healthcare system. For the future, it will be necessary to develop a joint approach by practitioners, scientists, innovators, and policy makers in order to make such innovations possible and viable and thus improve the quality and access to healthcare services.

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