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Artificial Intelligence for Patient Engagement in Digital Healthcare: A Systematic Literature Review

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ABSTRACT

Artificial Intelligence (AI) has become a key driver of digital healthcare transformation by enabling more intelligent, personalized, and patient-centered healthcare services. Despite its rapid adoption, existing studies remain fragmented across diverse AI technologies, healthcare settings, and patient populations, limiting a comprehensive understanding of how AI enhances patient engagement. Therefore, this study aims to systematically synthesize recent evidence on the role of Artificial Intelligence in improving patient engagement within digital healthcare. This study employs a Systematic Literature Review (SLR) following the PRISMA 2020 guidelines to identify, evaluate, and synthesize peer-reviewed journal articles published between 2021 and 2026. Thirty-one studies were included in the review after a systematic screening process. The review synthesizes current evidence indicating that AI applications—including conversational AI, Large Language Models, intelligent decision-support systems, and AI-powered digital health assistants—support patient engagement by improving patient communication, health education, self-management, personalized healthcare delivery, and shared decision-making. The review also highlights recurring challenges related to trust, ethical governance, data privacy, and implementation readiness while identifying future research opportunities for developing trustworthy and patient-centered AI-enabled healthcare systems. This study contributes by integrating fragmented evidence into a comprehensive understanding of how AI strengthens patient engagement and supports the future development of digital healthcare.

Keywords: Artificial Intelligence, Digital Healthcare, Patient Engagement, Systematic Literature Review, PRISMA.

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Introduction

The rapid advancement of artificial intelligence (AI) has significantly transformed the healthcare sector by enabling more intelligent, efficient, and personalized healthcare services. AI technologies—including machine learning, natural language processing (NLP), computer vision, generative AI, and large language models (LLMs)—have been increasingly integrated into various healthcare applications, ranging from disease diagnosis and clinical decision support to patient monitoring, virtual assistants, and personalized health education. These innovations have expanded the capacity of healthcare systems to deliver timely,

data-driven, and patient-centered care while addressing challenges associated with increasing healthcare demands and limited clinical resources. Consequently, AI is no longer viewed solely as a technological innovation but as a strategic enabler for improving healthcare quality and accessibility (Hayward, 2023).

Beyond improving clinical efficiency, AI has increasingly been recognized for its potential to enhance patient engagement, which has become a fundamental component of high-quality healthcare delivery. Patient engagement refers to patients' active participation in managing their health, making informed healthcare decisions, adhering to treatment recommendations, and collaborating with healthcare professionals throughout the continuum of care. Higher levels of patient engagement have been associated with improved treatment adherence, better health outcomes, enhanced patient satisfaction, and reduced healthcare costs. As healthcare continues to transition toward patient-centered and digitally enabled models of care, fostering meaningful patient engagement has become an essential objective for healthcare organizations worldwide (Martini et al., 2026).

Recent developments in digital healthcare have accelerated the adoption of AI-powered applications designed to strengthen patient engagement. AI-enabled conversational agents, virtual health assistants, intelligent clinical platforms, wearable devices, and generative AI systems increasingly support patients by providing personalized health information, facilitating continuous monitoring, assisting self-management, improving communication with healthcare professionals, and supporting shared decision-making. Rather than replacing healthcare professionals, these technologies are increasingly positioned as complementary tools that empower patients to participate more actively in their healthcare journey while extending healthcare services beyond traditional clinical settings (Al-Lataifeh et al., 2025; Babu & Boddu, 2024; Alzghaibi, 2025; Zhou et al., 2025; Schmiedmayer et al., 2025).

Despite the rapid expansion of AI applications in healthcare, the existing literature remains fragmented. Previous studies predominantly examine specific AI technologies, particular diseases, or individual healthcare settings, such as diabetes management, Parkinson's disease, epilepsy care, or chatbot implementation. While these studies provide valuable evidence regarding individual AI applications, they rarely offer a comprehensive synthesis explaining how different AI technologies collectively contribute to enhancing patient engagement across digital healthcare contexts. Furthermore, the growing diversity of AI applications—including generative AI, LLMs, AI-integrated wearables, conversational agents, and clinical decision-support systems—creates an increasing need for a systematic synthesis capable of identifying common mechanisms, emerging trends, and implementation challenges across different healthcare environments (Sarhan et al., 2026; Lysen & Wyatt, 2024; Tyrol et al., 2025; Zhou et al., 2025).

In addition, previous reviews have generally emphasized technological performance, diagnostic accuracy, or clinical effectiveness, while relatively limited attention has been given to understanding patient engagement as a multidimensional process influenced by communication, education, self-management, collaborative decision-making, and patient trust. Consequently, current evidence remains insufficient to explain the broader pathways through which AI facilitates patient engagement within digital healthcare ecosystems. Addressing this knowledge gap is important for guiding both healthcare practitioners and researchers in designing AI-enabled healthcare services that are not only technologically advanced but also patient-centered and ethically responsible (Mi et al., 2024; Schmiedmayer et al., 2025).

Therefore, this study conducts a Systematic Literature Review (SLR) to synthesize current evidence regarding the role of artificial intelligence in enhancing patient engagement within digital healthcare. By systematically reviewing 31 full-text studies, this review aims to identify the primary mechanisms through which AI supports patient engagement, examine recurring implementation challenges, and provide a comprehensive conceptual understanding of AI-enabled patient engagement. The findings are expected to contribute to the growing body of knowledge on digital healthcare by offering evidence-based insights for researchers, healthcare organizations, technology developers, and

policymakers seeking to implement AI in ways that strengthen patient engagement and improve healthcare delivery.

Literature Review

Artificial Intelligence in Dıgıtal Healthcare

Artificial Intelligence (AI) has emerged as one of the most influential technological innovations in modern healthcare, fundamentally transforming the delivery, management, and accessibility of healthcare services. AI refers to computational systems capable of simulating human cognitive abilities—including learning, reasoning, pattern recognition, natural language understanding, and decision support—to assist healthcare professionals and patients in managing increasingly complex healthcare processes. Recent advances in machine learning, deep learning, natural language processing (NLP), and large language models (LLMs) have substantially expanded AI applications beyond diagnostic assistance toward more interactive, personalized, and patient-centered healthcare services. (Zhou et al., 2025; Schmiedmayer et al., 2025).

Within digital healthcare, AI technologies are increasingly integrated into telemedicine platforms, intelligent clinical decision-support systems, conversational agents, electronic health records, wearable devices, and personalized health management applications. These technologies enable continuous monitoring, personalized recommendations, automated information delivery, multilingual communication, and real-time clinical support, allowing healthcare services to extend beyond traditional healthcare facilities. Consequently, AI is increasingly viewed not merely as a clinical technology but as a core component of digital healthcare ecosystems that improve accessibility, efficiency, and continuity of care (Mi et al., 2024).

The emergence of generative AI and LLM-based healthcare applications has further expanded AI capabilities by enabling more natural interactions between patients and healthcare systems. Recent studies demonstrate that LLMs can simplify complex medical information, support multilingual communication, summarize electronic health records, and provide personalized health education tailored to different levels of health literacy. These capabilities improve patients' ability to understand their health conditions while facilitating more meaningful communication with healthcare professionals (Moëll & Sand Aronsson, 2025).

Despite these advancements, AI implementation continues to face important challenges. Previous studies consistently highlight concerns regarding algorithm transparency, hallucination risks, data privacy, ethical governance, patient autonomy, and trust. These issues influence both healthcare professionals' and patients' willingness to adopt AI-enabled healthcare services, emphasizing that successful AI implementation depends not only on technological performance but also on responsible, transparent, and patient-centered design (Ralla et al., 2025; Lysen & Wyatt, 2024).

Patient Engagement in Digital Healthcare

Patient engagement represents a fundamental principle of patient-centered healthcare, referring to patients' active participation in managing their health, understanding medical information, communicating with healthcare professionals, and contributing to healthcare decision-making. Rather than functioning as passive recipients of care, engaged patients collaborate with healthcare providers throughout diagnosis, treatment, monitoring, and long-term disease management. Higher levels of patient engagement have consistently been associated with improved treatment adherence, greater patient satisfaction, enhanced self-efficacy, and better health outcomes (Toker et al., 2025).

The rapid development of digital healthcare has substantially expanded opportunities to strengthen patient engagement through technology-enabled care. Digital platforms facilitate continuous communication, remote monitoring, health education, and timely access to healthcare information, allowing patients to become more informed and actively involved in their healthcare journeys. AI

further strengthens these capabilities by delivering personalized recommendations, intelligent monitoring, conversational support, predictive insights, and adaptive educational content tailored to individual patient needs (Mi et al., 2024; Alzghaibi, 2025).

Recent studies demonstrate that AI-supported healthcare technologies—including chatbots, virtual assistants, wearable devices, and LLM-based applications—can facilitate patient engagement by improving health literacy, supporting self-management, encouraging medication adherence, and strengthening communication with healthcare professionals. These technologies enable patients to monitor their conditions, interpret health information, and participate more confidently in healthcare decisions while maintaining continuous interaction with healthcare providers (Watanuki et al., 2025; Martini et al., 2026).

Nevertheless, meaningful patient engagement extends beyond technology adoption alone. Existing literature emphasizes that trust, transparency, privacy protection, ethical governance, shared decision-making, and effective communication remain essential prerequisites for sustained engagement. Patients are more likely to accept AI-supported healthcare when these technologies complement rather than replace healthcare professionals, preserve patient autonomy, and support collaborative care. Therefore, patient engagement should be understood as a multidimensional process resulting from the interaction between technological capabilities, healthcare providers, and patients themselves (Sarhan et al., 2026; Lysen & Wyatt, 2024; Tyrol et al., 2025).

Method

Research Design

This study employed a Systematic Literature Review (SLR) to synthesize and critically evaluate existing evidence regarding the role of artificial intelligence (AI) in enhancing patient engagement within digital healthcare. The SLR approach was selected because it enables a structured, transparent, and reproducible process for identifying, evaluating, and synthesizing relevant scientific literature while minimizing selection bias. Furthermore, systematic reviews facilitate the integration of findings across diverse healthcare settings and AI applications, providing a comprehensive understanding of emerging research trends and evidence. The review process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to ensure methodological transparency and reporting consistency.

Literature Search Strategy

A comprehensive literature search was conducted using the Scopus database because of its extensive coverage of peer-reviewed journals across healthcare, information technology, and interdisciplinary research. Scopus was selected due to its comprehensive indexing of high-quality international publications and its compatibility with systematic literature review methodologies. The search was performed using combinations of keywords related to artificial intelligence, patient engagement, and digital healthcare. Boolean operators (AND and OR) were used to combine search terms and improve retrieval accuracy. The search strategy was designed to capture studies investigating various AI technologies—including machine learning, conversational agents, chatbots, generative AI, large language models, wearable devices, and intelligent clinical systems—that contribute to patient engagement in digital healthcare. The literature search initially identified 233 records from the Scopus database.

Eligibility Criteria

To ensure the relevance and quality of the selected literature, explicit inculsion and exclusion criteria were established prior to the screening process. The review included peer-reviewed journal articles published in English between 2021 and 2026, focusing on the application of Artificial Inteligence in supporting patient engagement within digital healthcare settings. Studies investigating AI technologies

such as machine learning, deep learning, natural language processing, conversational AI, Large Language Models, virtual assistants, intelligent decision-support systems, or other AI-enabled healthcare applications were considered eligible when they explicitly addressed patient education, self-management, treatment adherence, patient empowerment, or shared decision-making.

Conference papers, book chapters, editorials, notes, short surveys, duplicate publication versions, and publications outside the defined publication period were excluded. Studies focusing primarily on algorithm development or technical AI performance without discussing patient engagement in healthcare contexts were also excluded.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Publication Type	Peer-reviewed journal articles	Conference papers, book chapters, editorials, notes, short surveys
Language	English	Non-English
Publication Year	2021-2026	Before 2021
Research Focus	AI for patient engagement in digital healthcare	AI studies unrelated to patient engagement
Document Availabity	Full-text accessible	Full-text unavailable

Study Selection

The study selection process followed the PRISMA 2020 framework. A total of 233 records were identified through the Scopus database. After title and abstract screening, 27 articles were excluded because they did not meet the predefined eligibility criteria. The remaining 206 reports were sought for full-text retrieval. However, 175 reports could not be retrieved for eligibility assessment because their full-text versions were unavailable. Consequently, 31 full-text articles were successfully accessed and assessed for eligibility. All 31 studies met the inclusion criteria and were included in the final synthesis. The overall study selection process is illustrated in Figure 1.

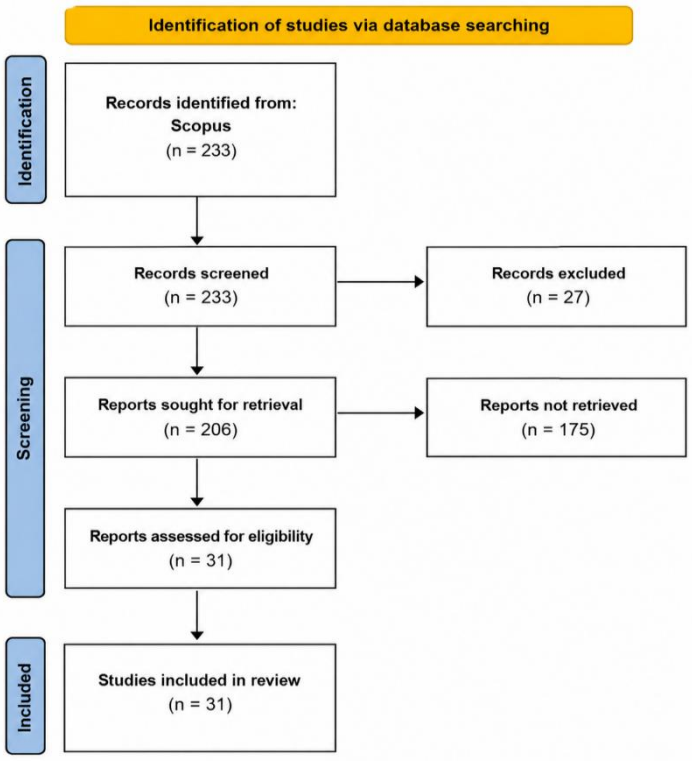


Figure 1. PRISMA 2020 flow diagram illustrating the study selection process

Data Extraction and Synthesis

Data from the included studies were extracted using a standardized data extraction form to ensure consistency throughout the review process. Information collected included publication year, study objectives, healthcare context, AI technology employed, research methodology, key findings, and reported contributions to patient engagement.

Following data extraction, a thematic synthesis approach was employed to identify recurring concepts and patterns across the selected studies. The analysis involved iterative coding, categorization, and comparison of findings to develop broader analytical themes describing how AI enhances patient engagement in digital healthcare. Rather than summarizing individual studies separately, thematic synthesis enabled the integration of evidence across multiple healthcare contexts and AI applications, resulting in a more comprehensive conceptual understanding of AI-supported patient engagement.

Results

AI Enhanced Communication and Health Education

Personalized communication and health education emerged as one of the most prominent mechanisms through which artificial intelligence (AI) enhances patient engagement across the reviewed studies. The findings consistently demonstrate that AI-powered technologies—including large language models (LLMs), generative AI health assistants, conversational agents, and healthcare chatbots—enable patients to access health information more efficiently while receiving personalized responses tailored to their individual needs. Rather than functioning solely as information retrieval tools, these AI applications facilitate continuous interaction between patients and healthcare systems, allowing patients to ask health-related questions, obtain understandable explanations, and receive guidance beyond conventional clinical encounters (Watanuki et al., 2025; Sarhan et al., 2026).

Across multiple studies, AI-supported communication contributed to improved patient understanding of health conditions by providing timely educational resources and interactive consultations. Generative AI health assistants and LLM-based applications were frequently reported to assist patients in interpreting medical information, supporting symptom-related inquiries, and delivering personalized health recommendations. Similarly, disease-specific conversational agents demonstrated their ability to combine medical information with emotional support, encouraging patients to engage more actively with healthcare information while reducing barriers to communication. These findings indicate that AI strengthens patient engagement by improving health literacy and promoting continuous learning throughout the patient's healthcare journey (Watanuki et al., 2025; Sarhan et al., 2026).

İmportantly, the reviewed studies consistently describe AI as a complementary technology rather than a replacement for healthcare professionals. AI-enabled communication primarily supports patients between clinical encounters by improving access to reliable health information and facilitating more responsive interactions. Consequently, personalized communication and health education represent foundational mechanisms through which AI contributes to greater patient participation within digital healthcare environments (Watanuki et al., 2025; Sarhan et al., 2026).

AI Supported Patient Self-Management

Another recurring theme identified across the reviewed studies was the role of AI in strengthening patient self-management through continuous monitoring and personalized support. AI-enabled technologies—including wearable devices, mobile health applications, and intelligent health assistants—were consistently reported to assist patients in managing chronic conditions outside traditional healthcare settings. By enabling real-time monitoring, personalized feedback, and continuous access to health information, these technologies encouraged patients to become more actively involved in monitoring their health status and adhering to recommended treatment plans (Martini et al., 2026).

Several studies demonstrated that AI-supported self-management extends beyond passive health monitoring. AI systems were found to assist patients in interpreting health data, supporting lifestyle modifications, improving medication adherence, and facilitating daily disease management through personalized recommendations and interactive guidance. In studies involving diabetes and prediabetes management, participants perceived AI as particularly useful for structured and data-intensive activities, such as tracking health indicators, interpreting clinical information, and supporting healthy behavioral changes. These findings suggest that AI enhances patient engagement by increasing patients' confidence and capacity to manage their own health on a continuous basis (Alzghaibi, 2025).

Despite these benefits, several studies also highlighted factors that may influence the effectiveness of AI-supported self-management. Concerns regarding usability, affordability, and data privacy may limit long-term adoption, particularly among patients with varying levels of digital literacy. Consequently, successful implementation of AI for self-management requires not only technological capability but also user-centered design, accessible interfaces, and integration with healthcare professionals to ensure sustained patient engagement (Al-Lataifeh et al., 2025).

AI Assisted Collaborative Decision-Making and Personalized Healthcare

The reviewed studies further indicated that AI contributes to patient engagement by supporting collaborative decision-making and delivering more personalized healthcare services. Rather than replacing healthcare professionals in clinical decision-making, AI functions as a decision-support technology that assists both patients and clinicians in interpreting health information, evaluating treatment options, and facilitating more informed healthcare discussions. This complementary role enables patients to participate more actively in decisions regarding their care while maintaining the central role of healthcare professionals in final clinical judgments (Zhou et al., 2025).

Recent developments in large language models and AI-based clinical platforms further expand opportunities for personalized care. AI systems are increasingly capable of synthesizing patient information, generating context-specific recommendations, and presenting medical information in a more understandable manner for patients. Studies included in this review suggest that these capabilities improve communication during clinical consultations and support shared decision-making by enabling patients to better understand available treatment options and participate in discussions with healthcare providers (Martini et al., 2026; (Schmiedmayer et al., 2025).

Importantly, the reviewed evidence consistently emphasizes that AI should function as a collaborative partner rather than an autonomous decision-maker. Patients generally perceived AI as valuable for structured analytical tasks and information processing but continued to prefer healthcare professionals to retain responsibility for complex treatment decisions. These findings indicate that AI enhances patient engagement not by replacing clinical expertise, but by strengthening collaboration between patients and healthcare providers through more personalized and evidence-informed decision support (Al-Lataifeh et al., 2025).

Challenges Affecting AI-Enabled Patient Engagement

Although the reviewed studies consistently demonstrate the potential of AI to enhance patient engagement, they also identify several barriers that may hinder its successful implementation in digital healthcare. Across different AI applications, concerns related to trust, ethical governance, data privacy, and user acceptance were repeatedly reported as critical factors influencing patients' willingness to engage with AI-enabled healthcare services. These findings indicate that technological capability alone is insufficient to ensure meaningful patient engagement without establishing confidence in AI-supported healthcare systems (Sarhan et al., 2026).

Several studies emphasized that patients are generally more willing to accept AI when the technology demonstrates transparency, reliability, and clear clinical benefits while maintaining

appropriate involvement of healthcare professionals. Conversely, concerns regarding algorithmic bias, misuse of personal health information, limited explainability, and insufficient human oversight may reduce patients' trust and intention to use AI-based healthcare services. Studies involving AI-integrated wearable devices further reported that usability, affordability, and data security remain important considerations influencing long-term adoption (Lysen & Wyatt, 2024).

Collectively, these findings suggest that successful AI implementation requires balancing technological innovation with ethical responsibility and patient-centered design. Rather than focusing solely on improving AI performance, future digital healthcare initiatives should prioritize transparency, privacy protection, user involvement, and collaborative governance to foster sustainable patient engagement. The consistent emphasis on these challenges across the reviewed studies demonstrates that trust and responsible AI development are fundamental prerequisites for realizing the full potential of AI in enhancing patient engagement (Alzghaibi, 2025).

Discussion

The findings of this systematic literature review demonstrate that artificial intelligence contributes to patient engagement through multiple interconnected mechanisms rather than a single technological function. Across the reviewed studies, AI was consistently associated with improvements in personalized communication, health education, patient self-management, and collaborative decision-making. Rather than operating as independent outcomes, these mechanisms collectively illustrate a progressive patient engagement pathway in which patients gradually become more informed, empowered, and actively involved in managing their health. This finding extends previous discussions on AI in healthcare by emphasizing that patient engagement is achieved through the integration of several complementary AI-supported functions rather than isolated technological applications (Schmiedmayer et al., 2025; Mi et al., 2024).

The first key finding highlights the importance of personalized communication and health education as the foundation of patient engagement. Consistent with the literature on patient-centered healthcare, effective communication enables patients to better understand their health conditions, treatment options, and available healthcare services. The findings of this review suggest that AI strengthens this process by providing timely, personalized, and interactive health information that complements conventional healthcare delivery. Consequently, AI-supported communication not only improves access to health information but also enhances patients' confidence to participate more actively throughout the healthcare process (Watanuki et al., 2025; Schmiedmayer et al., 2025; Sarhan et al., 2026).

The findings further indicate that improved communication and health education create important conditions for strengthening patient self-management. Patients who receive continuous guidance and personalized support through AI-enabled technologies are more capable of monitoring their health conditions, adhering to treatment recommendations, and making informed lifestyle decisions. This progression reflects the broader concept of patient empowerment, in which engagement develops through patients' increasing ability to independently manage their health while maintaining appropriate support from healthcare professionals. Therefore, AI should be viewed as an enabling technology that facilitates sustained patient participation rather than merely automating healthcare services (Alzghaibi, 2025; Jiang et al., 2025).

Another important finding concerns the contribution of AI to collaborative decision-making and personalized healthcare. The reviewed evidence suggests that AI supports patients in interpreting complex medical information and understanding available treatment options, thereby encouraging more meaningful interactions between patients and healthcare professionals. Importantly, the reviewed studies consistently position AI as a decision-support tool rather than an autonomous decision-maker. This finding reinforces the importance of maintaining human oversight while utilizing AI to improve communication, shared decision-making, and personalized healthcare delivery (Martini et al., 2026; Schmiedmayer et al., 2025; Tyrol et al., 2025).

Despite these promising opportunities, the findings consistently demonstrate that technological advancement alone is insufficient to ensure successful patient engagement. Trust, transparency, ethical governance, privacy protection, and user acceptance emerged as fundamental prerequisites for sustainable AI implementation. These factors influence patients' willingness to engage with AI-enabled healthcare services and determine whether technological innovations can be successfully integrated into routine healthcare practice. Accordingly, future AI development should prioritize responsible innovation that balances technological performance with ethical considerations and patient-centered values (Sarhan et al., 2026; Lysen & Wyatt, 2024; Alzghaibi, 2025).

The findings of this review provide several implications for both research and healthcare practice. From a practical perspective, healthcare organizations should consider AI as a tool for strengthening patient engagement through personalized communication, continuous self-management support, and collaborative care rather than focusing solely on technological efficiency. From a research perspective, future studies should evaluate the long-term effectiveness of AI across diverse healthcare settings and patient populations while addressing challenges related to trust, digital literacy, ethical governance, and equitable access. Such efforts will contribute to the development of AI systems that are not only technologically advanced but also socially acceptable and clinically meaningful.

Conclusion

This systematic literature review synthesized evidence from 31 peer-reviewed studies to examine the role of artificial intelligence (AI) in enhancing patient engagement within digital healthcare. The findings demonstrate that AI contributes to patient engagement through four interconnected mechanisms: (1) AI-enhanced communication and health education, (2) AI-supported patient self-management, (3) AI-assisted collaborative decision-making and personalized healthcare, and (4) the influence of trust, ethical governance, privacy protection, and user acceptance on successful AI implementation. Collectively, these mechanisms indicate that AI extends beyond its traditional role as a clinical support technology by enabling patients to become more informed, engaged, and actively involved in managing their healthcare.

This review further highlights that meaningful patient engagement cannot be achieved through technological innovation alone. The successful implementation of AI depends on maintaining transparency, preserving patient trust, protecting privacy, and ensuring that AI complements rather than replaces healthcare professionals. Accordingly, AI should be implemented within patient-centered healthcare models that integrate technological capability with ethical responsibility and collaborative care. Overall, this review provides a comprehensive synthesis of current evidence and contributes to a broader conceptual understanding of how AI supports patient engagement across digital healthcare environments while offering practical insights for healthcare organizations, researchers, technology developers, and policymakers.

Recommendations

Based on the findings of this systematic literature review, several recommendations can be proposed for future research and healthcare practice. From a practical perspective, healthcare organizations should prioritize the implementation of AI technologies that strengthen patient engagement through personalized communication, continuous health education, self-management support, and collaborative decision-making. AI applications should be developed with a patient-centered approach that emphasizes transparency, usability, privacy protection, and human oversight to foster patient trust and long-term acceptance.

From a research perspective, future studies should investigate the long-term effectiveness of AI-enabled patient engagement across diverse healthcare settings, populations, and disease conditions. Further research is also needed to examine the role of emerging AI technologies, such as generative AI

and large language models, in improving patient engagement while addressing ethical challenges, explainability, digital literacy, equity, and responsible AI governance. Comparative studies evaluating different AI technologies and healthcare contexts would further strengthen the evidence base for AI-supported patient engagement in digital healthcare.

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