

# A review of the Challenges of Electronic Medical Records Adoption in Saudi Arabia

Mohammed Hassan Eisi Aqeel<sup>1</sup>, Nimah Abdu Iwali Abdullah Ali<sup>2</sup>, Mohsin Safar Albakkar<sup>3</sup>, Abdulmjeed FhdAlkhutayfi<sup>4</sup>, Madhawi Juaethin Mabrook Aldawsari<sup>5</sup>, Hussein Ali Hussein Al-Marri<sup>6</sup>, Adel Damen Siah Alshmmari<sup>7</sup>, Nasser Dhamen Alshammari<sup>8</sup>, Turki Jaffal Saiyah Al Shammari<sup>9</sup>, Abdullah Khader Abdullah Alzahrani<sup>10</sup>, Afrah Mohammed Dakhilallah AL Khurmany<sup>11</sup>, Ayed Abdullah Aldosary<sup>12</sup>, Abdulhakim Mohammad Almuzaini<sup>13</sup>, Haya Yousef Abdullah Alabdulaziz<sup>14</sup>, Salha Ali Hamzai<sup>15</sup>.

1. Technician-Health Informatics, Jazan Health Cluster, Ministry of Health, Kingdom of Saudi Arabia. Mhaqeel@moh.gov.sa
2. Medical secretary, Jazan Health Cluster, Ministry of Health, Kingdom of Saudi Arabia. Nimaha@moh.gov.sa
3. Health Information Technician, Compliance Management, Ministry of Health, Kingdom of Saudi Arabia. malbakar@moh.gov.sa
4. Health Information Technician, Prince Salman bin Mohammed Hospital in Al-Dilam, Ministry of Health, Kingdom of Saudi Arabia. Mgeed.92999@gmail.com
5. Medical Secretary, Eradah and Mental Health Complex, Ministry of Health, Kingdom of Saudi Arabia. mjalawsari@moh.gov.sa
6. Health Informatics Technician, King Khalid Hospital in Al Kharj, Ministry of Health, Kingdom of Saudi Arabia. Hualmari@moh.gov.sa
7. Medical Secretary, Ministry of Health, Kingdom of Saudi Arabia. Adalshmmari.moh.gov.sa
8. Medical Secretary, Ministry of Health, Kingdom of Saudi Arabia. ganas-nono@hotmail.com
9. Medical Secretary, Ministry of Health, Kingdom of Saudi Arabia. tjalshammari@moh.gov.sa
10. Specialist Health Administration, Ministry of Health, Kingdom of Saudi Arabia. aalzahrani226@moh.gov.sa
11. Medical Records, Ministry of Health, Kingdom of Saudi Arabia. amalkhurmany@moh.gov.sa
12. Medical records technician, Ministry of Health, Kingdom of Saudi Arabia.
13. Medical records technician, Ministry of Health, Kingdom of Saudi Arabia.
14. Health Informatics Technician (Medical Records), Ministry of Health, Kingdom of Saudi Arabia. Haya68624@hotmail.com
15. Health Informatics Technician (Medical Records), Ministry of Health, Kingdom of Saudi Arabia. Salha900@gmail.com

## Abstract

The adoption of electronic medical records (EMRs) in Saudi Arabia is a critical component of the nation's Vision 2030, which aims to modernize healthcare and leverage digital transformation for societal benefit. This comprehensive literature review explores the challenges associated with EMR implementation in the Saudi healthcare sector, focusing on technical, financial, human, cultural, organizational, and policy-related barriers. The analysis reveals that each dimension presents unique obstacles, such as privacy concerns, cultural apprehensions, and the need for robust regulatory frameworks. Case studies highlight the importance of user acceptance, effective management, vendor collaboration, and culturally attuned strategies for successful EMR integration. Emerging trends, including artificial intelligence integration, enhanced privacy measures, and telemedicine-EMR interoperability, underscore the dynamic nature of healthcare technology and the need for patient-centric care, data security, and organizational efficiency. The review emphasizes the importance of fostering digital health literacy and addressing patient concerns for widespread acceptance and utilization of EMR systems. Despite the challenges, Saudi Arabia has made significant progress in EMR adoption and is well-positioned to transform its healthcare system by leveraging insights from case studies, aligning strategies with cultural and organizational realities, and embracing innovative technologies. This transformation not only supports the goals of Vision 2030 but also sets a precedent for other nations striving to achieve similar advancements in digital healthcare.

**Keywords:** EMR, Electronic Medical Records, Saudi Arabia.

## Introduction

In the digital transformation era, the transition from traditional paper-based medical records to electronic medical records (EMR) represents a transformative development in healthcare delivery. EMRs, which digitize and centralize patients' medical histories, provide healthcare professionals with swift and reliable access to crucial patient data, fostering improved care coordination and operational efficiency. This transition starkly contrasts with the limited accessibility and inefficiencies inherent in paper-based record systems. As part of a broader global trend towards healthcare modernization, the Kingdom of Saudi Arabia (KSA) has emerged as a leader in this digital healthcare revolution within the Middle East, aligning its efforts with the ambitious Vision 2030 goals to enhance healthcare infrastructure and outcomes (Alhur, 2023).

The adoption of EMR systems is essential to achieving Vision 2030's objectives, reflecting Saudi Arabia's strong commitment to leveraging technology to elevate the quality and efficiency of its healthcare services. However, the implementation of these systems encounters unique challenges and opportunities shaped by the nation's distinctive healthcare infrastructure, cultural nuances, and technological readiness. Understanding and addressing these factors are crucial to ensuring the successful integration and optimization of EMR systems in the Saudi healthcare landscape (Alhur, 2023).

Integral to the digital transformation of healthcare are innovations such as telemedicine, health information exchanges, and mobile health platforms. These advancements not only enhance patient care but also improve efficiency and reduce costs. A 2023 study by Alzghaibi et al. highlights the critical role of electronic health records (EHRs) in achieving these outcomes, demonstrating their ability to enhance patient outcomes, streamline healthcare operations, and generate cost savings. This research underscores the centrality of digitized health records in advancing healthcare systems globally and in Saudi Arabia specifically (Alzghaibi et al., 2023).

The broader context of healthcare digitalization in KSA can also be understood through public attitudes toward extended community pharmacy services (ECPSs). Research conducted by Alghamdi et al. (2023) indicates a generally positive reception of these services, although barriers such as privacy concerns and communication difficulties between patients and healthcare providers remain significant obstacles. This highlights the interplay between technological innovation and societal perceptions in the success of healthcare digitalization efforts (Alghamdi et al., 2023).

Moreover, personal health records (PHRs), an extension of EMRs, provide valuable insight into the broader dynamics of EMR adoption. Alanazi et al. (2023) reports a high willingness among Saudi patients to utilize PHRs, though persistent concerns about privacy and the accuracy of information pose challenges. These findings are corroborated by earlier research by Alhur (2022), which identifies similar trends in patient attitudes towards the adoption and use of PHR systems (Alanazi et al., 2023). Such concerns reflect the need for robust strategies to ensure data security and trust in these technologies.

Another critical component of healthcare digitalization is the integration of telehealth services with EMR systems. Studies demonstrate a significant willingness and favorable attitudes toward telehealth services among the Saudi population, signaling the growing acceptance of such technologies in healthcare delivery. A study by Wali et al. (2023) conducted in Jeddah, Saudi Arabia, explores clinicians' perceptions and satisfaction with telehealth systems integrated with EMRs. The results reveal high satisfaction with virtual consultations while identifying challenges such as limited patient technical literacy and access to requisite technologies, emphasizing areas that require further attention (Wali et al., 2023).

Digital health literacy plays a vital role in the effective adoption of EMR systems. Research on web-based health information-seeking behaviors and digital health literacy within the Saudi population by Alhur et al. (2023) highlights the necessity of improving these skills to enable widespread and efficient utilization of EMR technologies. This underscores the importance of educational initiatives to bridge gaps in digital health literacy as part of the overall strategy for EMR implementation (Alhur et al., 2023).

The COVID-19 pandemic has underscored the pivotal role of public health informatics in managing health crises. The use of digital platforms, such as the COVID-19 dashboard in Saudi Arabia, has demonstrated the critical importance of disseminating and visualizing health information effectively. These tools serve as benchmarks for the integration of digital systems like EMRs, showcasing their potential to revolutionize public health management in crisis and routine settings alike.

Finally, the incorporation of artificial intelligence (AI) into healthcare, particularly in mental health services, highlights another dimension of digital transformation. Studies exploring public attitudes and awareness of AI-integrated telemental health services in Saudi Arabia reveal both opportunities and challenges. These insights are significant in understanding how EMR systems can leverage AI to enhance healthcare delivery, especially in the context of mental health, while addressing associated apprehensions.

This paper aims to conduct a comprehensive literature review to examine the challenges related to EMR adoption in Saudi Arabia. By exploring the technical, financial, human, cultural, and policy-related barriers, along with issues concerning privacy and security, the study seeks to provide an in-depth understanding of the obstacles impeding the implementation of EMR systems in the Saudi healthcare sector. The ultimate objective is to offer actionable insights that policymakers, healthcare professionals, and stakeholders can use to develop effective strategies for the successful integration of EMRs, thereby advancing the Kingdom's healthcare system in alignment with Vision 2030.

### **Technical Challenges**

Recent research has provided significant insights into the technical barriers associated with the adoption of electronic medical records (EMR) in Saudi Arabia. A pivotal empirical study by Almazroi et al. (2022) explored factors influencing the adoption of eHealth services, including EMRs, by expanding the Technology Acceptance Model to incorporate trust, privacy, and system quality as essential variables. The findings emphasized that perceived usefulness and privacy concerns play a crucial role in the acceptance of

eHealth technologies. This study offers valuable guidance for policymakers in Saudi Arabia, underlining the importance of addressing these factors to fully realize the benefits of EMR systems (Almazroi et al., 2022).

In a broader context, research by Alateyah (2014) examined the development and widespread adoption of e-government services in Saudi Arabia, providing insights that are closely aligned with challenges encountered in implementing eHealth services such as EMRs. This study identified critical factors, including trust, privacy, security, and cultural considerations, which are equally relevant in the context of EMR adoption. The findings suggest an integrated model that could assist Saudi authorities in addressing public apprehensions regarding the use of online platforms, which is essential for building trust and ensuring widespread adoption of EMRs.

Similarly, a study conducted by Alssbaiheen and Love (2015) investigated the adoption of mobile government (m-government) services by key Saudi institutions, such as the Ministry of Higher Education and the Technical and Vocational Training Corporation. The research identified barriers including insufficient infrastructure and limited digital literacy among users, challenges that parallel those faced during EMR implementation. These findings highlight the need for targeted improvements in technical infrastructure and user training to ensure successful EMR adoption (Alssbaiheen & Love, 2015).

Additionally, Alsharif (2020) reviewed Saudi Arabia's National eHealth Strategy, proposing an integrated eHealth framework to optimize healthcare operations, especially during health crises such as pandemics. The study highlighted gaps in the existing framework, such as inadequate focus on information management and stakeholder collaboration, both of which are crucial for overcoming technical challenges associated with EMR systems. These insights underscore the need for enhanced frameworks tailored to the specific technical needs of EMR implementation (Alsharif, 2020).

### **Financial Constraints**

The financial barriers to EMR adoption in Saudi Arabia have been extensively explored, with recent studies offering new perspectives beyond earlier research by AlGhamdi et al. (2015) and Alqahtani et al. (2015). A 2023 study examined the economic implications of integrating electronic attendance systems in the healthcare sector, drawing parallels to EMR implementation. The findings revealed that digital integration can lead to significant cost savings and resource optimization, which are also critical benefits of EMR systems. These insights stress the need for strategic financial planning to overcome the cost-related challenges of EMR adoption (Abdullah et al., 2023).

Aljohani (2018) provided a comparative analysis of the adoption of health information technologies (HIT), including EMRs, in Saudi Arabia's public and private hospitals. The study demonstrated that EHRs and EMRs have the potential to reduce medical costs significantly. However, it also highlighted challenges related to system interoperability, underscoring the need for a unified health information system to address these issues. This comparative approach provides a robust foundation for understanding and addressing financial barriers in EMR implementation (Aljohani et al., 2018).

Further research by Aleid et al. (2023) examined barriers to accessing neurosurgical services in Saudi Arabia, emphasizing the financial constraints and extended waiting times faced by patients. While this study focused on specialized healthcare services, the findings are applicable to EMR adoption, particularly in terms of addressing cost-related challenges and ensuring efficient resource allocation (Aleid et al., 2023).

Additionally, Al-Baity's (2023) comprehensive review of artificial intelligence (AI) in Saudi Arabia's digital finance sector offered valuable insights relevant to healthcare. The study proposed a framework for AI integration to enhance financial management, suggesting that similar approaches could be applied in the healthcare sector to reduce costs and improve efficiency, particularly in managing the financial demands of EMR adoption. This highlights the role of AI as a potential enabler of cost-effective solutions for digital transformation in healthcare (Al-Baity, 2023).

### **Human Factors and Resistance to Change**

Human factors and resistance to change represent complex challenges in the adoption of EMRs in Saudi Arabia, as evidenced by recent research. Alhur (2023) investigated nurses' perceptions of EMR systems, focusing on their usefulness and ease of use. The study found a strong correlation between these factors and the acceptance of EMRs, highlighting the importance of developing user-friendly systems to facilitate adoption among healthcare professionals (Almazroi et al., 2022).

Hasanain, Vallmuur, and Clark (2015) further explored healthcare professionals' knowledge and preferences regarding EMRs in Saudi public hospitals. The study revealed a significant relationship between English literacy, educational attainment, and EMR literacy, suggesting that enhancing computer and language literacy through targeted training programs could boost healthcare workers' willingness to adopt EMR systems. These findings underscore the importance of capacity-building initiatives to address human factors and reduce resistance to change (Hasanain et al., 2015).

The COVID-19 pandemic provided additional insights into these challenges. Alzahrani et al. (2022) studied the usability of telehealth platforms among Saudi healthcare professionals, finding that increased usage was associated with higher usability scores. The study emphasized the importance of providing training to improve digital health technology acceptance, including EMRs. This highlights the interconnectedness of various digital health platforms and the need for cohesive strategies to address usability concerns (Alzahrani et al., 2023).

In another context, Abdulaziz et al. (2023) examined the rapid adoption of new technologies during the COVID-19 pandemic in Saudi Arabia. Their findings emphasized the importance of continuous training and education in promoting acceptance of innovative healthcare delivery methods, including EMR systems. This research points to the need for sustained efforts to adapt healthcare professionals to evolving technological advancements.

Collectively, these studies underscore the critical need to address human factors and resistance to change in EMR adoption. By focusing on user-friendly designs, comprehensive training programs, and strategies to improve adaptability to new technologies, policymakers and stakeholders can pave the way for more effective and widespread use of EMR systems in Saudi Arabia.

### **Cultural and Organizational Barriers**

Analyzing the cultural and organizational barriers to EMR adoption in Saudi Arabia necessitates an understanding of the societal norms and values that shape its healthcare system. A 2022 study focusing on gender integration within traditionally male-dominated workplaces highlighted the broader cultural dynamics influencing organizational change. This research revealed that societal perceptions and managerial attitudes toward gender roles significantly impact the acceptance of innovations like EMR systems. Such findings underline the importance of developing culturally sensitive implementation strategies that address gender dynamics and broader societal norms.

Baradwan and Al-Hanawi (2023) further investigated resistance to telemedicine adoption among both patients and physicians in Saudi Arabia, revealing underlying cultural apprehensions about digital healthcare modalities. This resistance parallels the challenges faced in the implementation of EMRs, suggesting that successful adoption strategies must be rooted in a comprehensive understanding of the cultural attitudes shaping perceptions of healthcare technologies.

The role of cultural influences in technological adoption extends beyond healthcare. Research on the implementation of e-government services demonstrates how cultural factors shape employee attitudes toward digital transformation, offering valuable parallels for EMR systems. These findings indicate the need to foster a cultural shift within healthcare organizations to support the integration of digital records into routine operations (Alateeg & Alhammadi, 2023).

Moreover, insights from Alateeg and Alhammadi's (2023) study on e-commerce adoption among traditional retailers underscore the importance of perceived utility, ease of use, and cost considerations within a cultural and organizational context. These factors, also critical for EMR implementation, highlight the necessity of culturally attuned change management strategies that address organizational and individual resistance while emphasizing the benefits of digital transformation.

By examining these cultural and organizational challenges, this analysis seeks to illuminate how specific societal elements, such as attitudes toward gender roles, technological apprehension, and organizational resistance, uniquely influence EMR adoption in Saudi Arabia. Integrating these cultural insights into EMR implementation strategies will ensure that the technology aligns with societal values, facilitating a smoother integration into the Saudi healthcare system.

### **Privacy and Security Concerns**

Privacy and security concerns represent critical obstacles to the adoption of EMR systems in Saudi Arabia, reflecting broader apprehensions about technological trust. A study by Alqarni, Timko, and Rahman (2023) examined the privacy implications of facial recognition technology (FRT), providing insights that are applicable to EMRs. The research highlighted the public's cautious stance toward digital privacy and underscored the need for trust-building measures in the adoption of digital healthcare solutions.

Grounded in Everett Rogers' "Diffusion of Innovation" theory, other research has highlighted how innovation adoption is influenced by attributes such as perceived utility, social norms, and communication channels. Applying this framework to EMR systems, privacy concerns act as a major deterrent, particularly due to fears regarding data confidentiality and security breaches. Addressing these concerns is vital to fostering trust in smart government initiatives, including EMR systems.

The importance of transparency in digital health technologies was further emphasized in Alharbe's 2021 study on the privacy and security of telehealth applications during the COVID-19 pandemic. The findings stressed the need for robust, privacy-preserving measures that can be directly applied to EMR systems. Such principles of responsible data handling and transparent practices are critical for gaining public and professional trust in digital health technologies.

Additionally, Bahaddad, Almarhabi, and Alghamdi (2022) explored the acceptance of Bring Your Own Device (BYOD) programs within healthcare settings, utilizing the Unified Theory of Acceptance and Use of Technology (UTAUT) model. Their findings underscored the tension between user convenience and information security, reinforcing the necessity of implementing robust security protocols to support the adoption of EMR systems. This study highlights the balance required between accessibility and stringent security measures to address the dual challenges of privacy and functionality in digital healthcare technologies.

### **Policy and Regulatory Challenges**

The adoption of EMR systems in Saudi Arabia is further complicated by policy and regulatory challenges. Alshareef and Tunio (2022) examined the role of leadership in adopting blockchain technology within small and medium enterprises (SMEs) in Saudi Arabia. While their study focused on blockchain, the findings provide relevant insights into the regulatory trends influencing the adoption of innovative technologies, including EMRs. The study highlights the necessity for regulatory mechanisms that align with the broader goals of economic and social development, an approach that is equally applicable to healthcare institutions navigating EMR integration (Alshareef & Tunio, 2022).

Insights from research on regulatory and financial reporting within Saudi Arabia's banking sector provide additional perspectives on policy challenges. This study, while centered on banking, sheds light on the implications of financial and regulatory policy changes, which are relevant to healthcare systems, especially in terms of ensuring compliance and financial sustainability during EMR adoption (Al-Qahtani & Albakjaji, 2023).

Legal frameworks governing foreign investment, as explored by Al-Qahtani and Albakjaji (2023), further illuminate the importance of regulatory alignment with national strategies. Their assessment of the National Investment Strategy underscores the need for coherent legal structures that support policy objectives. Such alignment is critical for fostering a stable and conducive environment for stakeholders involved in EMR implementation, mirroring the requirements for creating trust and reliability in healthcare digital transformation initiatives.

Lastly, Altobashi's (2019) study on corporate governance practices in Saudi-listed companies offers a parallel to healthcare policy challenges. By examining the institutional pressures that drive the adoption of governance regulations, the research provides valuable insights into the regulatory hurdles faced during the implementation of new technologies. These findings underscore the need for proactive regulatory strategies to support the smooth adoption of EMRs while addressing compliance and operational challenges (Altobashi, 2019).

By synthesizing these perspectives, this analysis aims to identify and propose solutions to the policy and regulatory challenges hindering EMR adoption in Saudi Arabia. The insights highlight the importance of aligning legal frameworks, regulatory measures, and leadership strategies to create a supportive environment for digital health innovation.

### **Case Studies and Success Stories**

Salih et al. (2022) conducted an in-depth study on the critical success factors (CSFs) for implementing enterprise resource planning (ERP) systems in Saudi Arabia's food industry. The study underscored the significance of user acceptance, effective project management, and top-level management support as vital contributors to successful ERP implementation. These findings bear direct relevance to EMR adoption, emphasizing that similar factors, such as robust management and comprehensive user training, are essential for ensuring the successful implementation of EMR systems (S. H. Salih et al., 2022).

In another study, Salih et al. (2022) explored the influence of top management and vendor support during the post-implementation phase of ERP systems in small and medium-sized enterprises (SMEs) in Saudi Arabia. Their findings highlighted the importance of continuous vendor collaboration and efficient interdepartmental communication in achieving successful outcomes. These insights are particularly pertinent to the context of EMR adoption, as they stress the need for sustained vendor support and organizational communication to ensure the long-term success of EMR systems (S. Salih et al., 2022).

The research conducted by Andejany et al. on the critical success factors for the Tawakkalna application during the COVID-19 pandemic also provides valuable parallels. By focusing on the app's effectiveness in facilitating health status monitoring and proposing improvements to its processes, this case study offers critical lessons for EMR implementation. These include the importance of user acceptance and operational efficiency in digital healthcare initiatives, which can be directly applied to the adoption of EMR systems.

Additionally, Alharbe's study focused on developing a comprehensive framework for EMR implementation in Saudi Arabia's public hospitals. This research addressed various barriers and facilitators associated with EMR adoption, considering cultural, resource-related, and technological factors. The proposed

framework serves as a significant guide for overcoming challenges and ensuring the effective integration of EMR systems in public healthcare settings.

Collectively, these case studies and success stories shed light on the multifaceted strategies required for EMR adoption in Saudi Arabia. They underscore the necessity of user acceptance, strong management support, effective vendor partnerships, and tailored implementation frameworks to navigate the complexities of the healthcare landscape.

### **Emerging Trends and Future Directions in EMR Adoption**

A review of existing literature on EMR adoption in Saudi Arabia reveals significant progress alongside persisting challenges and unexplored opportunities. Emerging trends point to key areas that warrant further investigation, offering valuable insights for the ongoing digital transformation of healthcare in Saudi Arabia.

A critical area for future research involves understanding the complex interplay between cultural norms and organizational structures and their impact on EMR adoption. Investigating these dynamics is vital for devising EMR implementation strategies that align with Saudi Arabia's cultural and organizational realities, ensuring a culturally informed approach to digital healthcare transformation.

The integration of artificial intelligence (AI) and big data analytics into healthcare systems represents another promising direction. Future research should explore how AI can enhance EMR systems, particularly through predictive analytics for patient care, operational efficiencies, and decision-making processes. This intersection of AI and EMR systems could revolutionize healthcare delivery by providing actionable insights and improving patient outcomes.

Privacy and security concerns remain at the forefront of challenges to EMR adoption, necessitating research into advanced methods to address these issues. Innovative approaches such as blockchain technology, sophisticated encryption techniques, and privacy-by-design frameworks must be examined to bolster trust and ensure data confidentiality within EMR systems.

Additionally, the influence of evolving healthcare policies and regulations on EMR adoption requires closer examination. With the rapid advancement of technology and the emergence of global health crises, understanding how policy changes shape EMR implementation is crucial. Future studies should assess the effectiveness of current regulatory frameworks and identify areas for improvement to facilitate seamless adoption.

The role of patients in the EMR adoption process is an underexplored aspect that holds significant potential for future research. Investigating patient attitudes toward EMRs, their concerns regarding data privacy and security, and the ways in which EMR systems can enhance patient engagement and self-management of health are all critical areas for inquiry.

Moreover, the rapid expansion of telemedicine services, particularly during the COVID-19 pandemic, highlights the need for research into integrating telemedicine with EMR systems. Examining how these technologies can work together to improve healthcare delivery, enhance patient outcomes, and optimize system efficiency will provide actionable insights for the Saudi healthcare system.

These emerging trends and unexplored dimensions offer fertile ground for advancing the knowledge and practice of EMR adoption in Saudi Arabia. Beyond filling academic gaps, this research serves as a vital step in shaping a more robust and efficient healthcare system, aligned with the ambitious goals of Saudi Arabia's Vision 2030. By addressing these challenges and opportunities, Saudi Arabia can continue to lead in healthcare innovation and digital transformation, setting a benchmark for other nations to follow.

### **Conclusion**

The adoption of electronic medical records (EMRs) in Saudi Arabia represents a cornerstone of the nation's ambitious Vision 2030, aligning with its broader goals of modernizing healthcare and leveraging digital transformation for societal benefit. This review has explored the multifaceted dimensions of EMR implementation, emphasizing technical, financial, human, cultural, organizational, and policy-related challenges. Each dimension reveals unique barriers that require targeted interventions, ranging from addressing privacy concerns to overcoming cultural apprehensions and ensuring robust regulatory frameworks.

The analysis highlights the importance of learning from successful implementations across sectors, with case studies underscoring the critical role of user acceptance, effective management, vendor collaboration, and culturally attuned strategies. These factors serve as benchmarks for advancing EMR integration, suggesting that a combination of technical excellence, policy innovation, and stakeholder engagement is vital for achieving success.

Emerging trends such as artificial intelligence integration, enhanced privacy measures, and telemedicine-EMR interoperability underscore the dynamic and evolving nature of healthcare technology. Future research and policy development must address these trends while keeping patient-centric care, data security, and organizational efficiency at the forefront. Additionally, fostering digital health literacy and addressing patient concerns will be crucial for widespread acceptance and utilization of EMR systems.

In conclusion, Saudi Arabia's journey toward EMR adoption is marked by significant progress and ongoing challenges. By leveraging insights from case studies, aligning strategies with cultural and organizational realities, and embracing innovative technologies, the nation is well-positioned to transform its healthcare system. This transformation not only supports the goals of Vision 2030 but also sets a precedent for other nations striving to achieve similar advancements in digital healthcare.

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