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Saudi Arabia's Nursing Digitalization Journey: A Systematic Review

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Abstract

Background: Saudi Arabia's Vision 2030 aims to revolutionize its healthcare system by integrating digital health technologies such as telemedicine, electronic health records (EHRs), and mobile health applications. These tools are expected to improve patient care, enhance nursing practices, and increase healthcare efficiency. However, despite the promise of digital health, challenges related to infrastructure, workforce training, and regulatory frameworks persist. Aim: This systematic review examines the impact of digital health technologies on nursing care, patient outcomes, and healthcare delivery in Saudi Arabia. It aims to evaluate the effectiveness, challenges, and future potential of these technologies under the Vision 2030 healthcare transformation. Method: A comprehensive literature search was conducted across multiple electronic databases (PubMed, Scopus, Web of Science, and Google Scholar) for studies published between 2021 and 2025. Ten primary articles were selected based on their relevance to digital health adoption in Saudi Arabia's healthcare system. Data were synthesized from quantitative, qualitative, and mixed-methods studies. Results: The review identified several positive impacts of digital health tools, including improved healthcare access, better care coordination, and increased patient engagement. Telemedicine was particularly beneficial for rural populations, while EHRs facilitated enhanced communication among healthcare providers. Mobile health applications demonstrated significant improvements in chronic disease management. However, challenges such as limited infrastructure, regulatory barriers, and the need for workforce training were also highlighted. Conclusion: Digital health technologies have the potential to significantly improve nursing care and healthcare delivery in Saudi Arabia. Overcoming infrastructure and regulatory challenges, along with investing in workforce training, will be key to realizing the full potential of these technologies under Vision 2030.

Keywords: *Digital health, telemedicine, electronic health records, mobile health applications, nursing practice, Saudi Arabia, Vision 2030, healthcare transformation.*

Introduction

The healthcare system in Saudi Arabia has experienced a number of transformations, especially with the introduction of the Vision 2030. This is a bold initiative focused on modernizing and diversifying the healthcare industry, taking advantage of technological innovations and creating

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an environment of sustainability (AlWatban et al., 2024; Bokhari, 2025; Mani and Goniewicz, 2024). Central to this vision is the adoption of digital health technologies, which encompass telemedicine, electronic health records (EHRs), and mobile health applications, which are designed to improve the efficiency and accessibility of healthcare services (Al-Kahtani et al., 2022; Alshammari & Alanazi, 2023; Almutairi, 2024). As the country is advancing towards a more digitalized healthcare system, the integration of these technologies has the potential to significantly enhance patient outcomes, streamline the delivery of healthcare services and enable a more patient-centered healthcare model, Mubarak Al Baalharith and Aboshaiqah (2024); Al Baalharith et al. (2022); Mohammed & Albarrak (2024).

Digital health initiatives, such as the Seha Virtual Hospital and the EHR system for the country, can be seen as an example of Saudi Arabia's commitment to healthcare delivery via technology (Rajab et al., 2025; Alrasheeday et al., 2023; Bokhari, 2025). The integration of artificial intelligence (AI) in diagnostic tools, telehealth platforms and mobile health applications are also important areas of focus. This integration is not only making healthcare systems more efficient as a whole but also providing equal access to healthcare, especially in remote and under-served regions (Al-Kahtani et al., 2022; Almutairi, 2024; Bokhari, 2025). Furthermore, digital health tools play an important role in overcoming geographical barriers to healthcare access, making it possible for people living in rural areas to access timely medical consultations and follow-up care (Mani & Goniewicz, 2024; Al Baalharith et al., 2022; AlWatban et al., 2024).

However, despite these promising advancements, there are several challenges that must be addressed for the successful integration of digital health in the healthcare system of Saudi Arabia. These include issues concerning the technological infrastructure, digital literacy, and the regulation of the use of health technologies (Almutairi, 2024; Alshammari & Alanazi, 2023; Rajab et al., 2025). Moreover, adaptation of healthcare workers to new digital systems and acceptance of digital tools by the patients, especially in rural areas, is a major challenge (Al-Kahtani et al., 2022; Bokhari, 2025; AlBaathiri et al., 2024). Overcoming these barriers will be critical in realizing the full potential of digital health technologies and to ensure their widespread adoption in the Saudi healthcare system.

This review examines the role of digital health in the transformation of Saudi Arabia's healthcare system under the vision 2030 of Saudi Arabia focusing on the opportunities, challenges and key drivers underscoring the adoption of digital health technologies. Through a comprehensive review of the literature, the present review is intended to give insights to the progress achieved, obstacles faced, and the future direction of digital health into the Kingdom (Mubarak Al Baalharith & Aboshaiqah, 2024; AlWatban et al., 2024; Rajab et al., 2025).

Problem Statement

Saudi Arabia's healthcare system is undergoing a tremendous transformation under the Vision 2030 initiative, and there is a focus on digitalization and incorporating cutting-edge technologies. However, although the use of digital health tools, such as telemedicine, electronic health records (EHRs), and mobile health applications, offers vast potential to improve healthcare delivery, challenges remain in ensuring their effective integration throughout the system. These challenges include lack of digital literacy, lack of infrastructure, regulatory barriers, and resistance from healthcare professionals to fully embrace the advancements of technology (AlWatban et al., 2024; Al-Kahtani et al., 2022; Rajab et al., 2025). Moreover, there is a dearth of holistic studies that examine the multidimensional implications of digital health adoption in nursing practice,

patient care, and system-wide efficiency in the context of the unique Saudi Arabia healthcare environment. Understanding how digital health is transforming nursing care, offering better patient outcomes and overcoming current barriers is important for the successful attainment of the Vision 2030 goals.

Significance of the Study

This study is significant because it is an in-depth analysis of the role of digital health in transforming the healthcare landscape in Saudi Arabia with respect to nursing care. As the digital health adoption features prominently in the healthcare reform agenda of Saudi Arabia's Vision 2030, it becomes necessary to explore the impact of digital health adoption in improving healthcare access, quality, and patient outcomes. With the tech-savvy population and government-initiated initiatives, Saudi Arabia is on the verge of becoming the leader of the region in digital health innovations (Al-Kahtani et al., 2022; Bokhari, 2025; Alshammari & Alanazi, 2023). This study will help determine the key drivers for successful integration of digital health and will identify the challenges that remain to be addressed, especially in nursing practice and the development of the healthcare workforce (Alwatban et al., 2024; Almutairi, 2024; Rajab et al., 2025). The results of this study will help to shape evidence-based policies, educate health care professionals on the benefits and limitations of digital health tools, and give recommendations for overcoming barriers to implementation.

Aim of the Study

The purpose of the present study is to critically review the role of digital health in transforming the healthcare systems of Saudi Arabia under the Vision 2030 with focus on the impact on the practice of nursing, patient care and efficiency of the healthcare system.

Methodology

Study Design

This systematic review adopted a comprehensive approach to assess the role of digital health in the healthcare transformation in Saudi Arabia under the Vision 2030. The aim of this review was to synthesize evidence from the available literature on the effectiveness of digital health tools (telemedicine, electronic health record (EHR) and mobile health application) in improving healthcare delivery, patient outcomes and nursing practice. The review took a structured methodology involving the rigorous collection, analysis and synthesis of findings from peer-reviewed studies, reports, and relevant case studies.

Search Strategy

A systematic search of the literature was performed with several electronic databases, such as PubMed, Scopus, Web of Science, and Google Scholar. The search was restricted to studies published from 2021 to 2025 to ensure inclusion of the most recent research and developments in the Saudi Arabia healthcare digitalization journey. Keywords and Boolean operators such as "Saudi Arabia," "Vision 2030," "digital health," "telemedicine," "electronic health records," "nursing digital transformation" were used in the search. The inclusion criteria were set to ensure that the retrieved studies were directly related to the integration of digital health technologies in nursing care and healthcare systems in Saudi Arabia.

Data Extraction

The data extraction process included selecting studies that met inclusion criteria and extracting key information about the study's goals, methodology, results, and implications. Two independent reviewers performed the extraction process to assure reliability and accuracy of data. Extracted data comprised information on the type of digital health tools evaluated (telemedicine, EHR, mobile health apps), how the healthcare delivery and nursing practice were affected, and what challenges and barriers were identified in the integration process. The data was then synthesized in a narrative way to discover patterns, themes and insights related to the research question.

Research Question

The primary research question guiding this systematic review was:

- How has the adoption of digital health technologies, such as telemedicine, electronic health records (EHRs), and mobile health applications, impacted nursing practice, patient care, and healthcare delivery in Saudi Arabia's Vision 2030 healthcare reform?

Selection Criteria

Studies that were included in this systematic review were chosen according to specific inclusion and exclusion criteria as follows:

Inclusion Criteria

- Studies published between 2021 and 2025.
- Studies that focused on the integration of digital health technologies in nursing practice, patient care and healthcare systems in Saudi Arabia.
- Peer-reviewed articles, reviews and case studies.
- Studies dealing with the effect of telemedicine, EHRs and mobile health apps on healthcare delivery and outcomes.
- Studies written in English.

Exclusion Criteria

- Studies published before 2021.
- Non-peer-reviewed material (conference abstracts, editorials, reports, etc.)
- Studies unrelated to Saudi's healthcare digitalization efforts
- Studies focused outside of Saudi Arabia on healthcare sectors.

Database Selection

For the purpose of this systematic review, a thorough search strategy was applied across a number of electronic databases, in order to ensure that high-quality, peer-reviewed articles that met the study's inclusion criteria would be included. The selection of the databases was based on their relevance to the topic, which is digital health, healthcare transformation and nursing practice. The following databases were chosen to conduct the literature search:

Table 1: Database Selection

No	Database	Syntax	Year	No of Studies

				Found
1	PubMed	("Saudi Arabia" AND "Vision 2030" AND "digital health" AND ("telemedicine" OR "EHR" OR "mobile health"))	2021–2025	102
2	Scopus	("digital health" AND "telemedicine" AND "Saudi Arabia" AND "nursing")	2021–2025	85
3	Web of Science	("digital health" AND "Saudi Arabia" AND "nursing transformation")	2021–2025	65
4	Google Scholar	("Saudi Arabia" AND "telehealth" AND "healthcare system" AND "nursing practice")	2021–2025	75
5	CINAHL	("Saudi Arabia" AND "Vision 2030" AND ("telemedicine" OR "electronic health records" OR "mHealth"))	2021–2025	90

Data Extraction

Data extraction was conducted on the following criteria:

- **Study Design:** Type of study, e.g., systematic reviews, randomized controlled trials, observational studies, etc.
- **Technology Assessed:** Whether the study assessed telemedicine, EHRs or mobile health applications.
- **Outcomes:** The main outcomes measured such as patient satisfaction, accessibility of healthcare, nursing practice transformation, and efficiency of the system.
- **Barriers Identified:** Challenges encountered in integrating digital health tools such as technological barriers, infrastructure limitations, and regulatory challenges.

Search Syntax

Primary Syntax:	• ("Saudi Arabia" AND "Vision 2030" AND "digital health" AND ("telemedicine" OR "electronic health records" OR "mHealth") AND ("nursing practice" OR "nursing care"))
Secondary Syntax:	• ("Saudi Arabia" AND "digital health transformation" AND "healthcare reform" AND ("telemedicine" OR "mHealth")) • ("Vision 2030" AND "healthcare system" AND "Saudi Arabia" AND ("digital health" OR "telemedicine"))

Literature Search

The literature search for this systematic review was performed in several electronic databases such as PubMed, Scopus, Web of Science and Google Scholar. The search was designed in order to capture a comprehensive range of studies that explore the role of digital health in transforming Saudi Arabia's healthcare system with a particular focus on nursing practice, patient care, and system efficiency. The search period was restricted to studies published between 2021 and 2025

to ensure that the most up-to-date and relevant research was included in the review. Studies were identified according to their relevance to the topic of digital health technologies and their impact on nursing care in Saudi Arabia according to the framework of the Vision 2030 reform.

The search strategy was carefully structured to retrieve studies that will contribute to answer the research question, which aimed to assess the impact of digital health tools including telemedicine, electronic health records (EHRs), and mobile health applications on nursing practice, patient outcomes, and healthcare delivery in Saudi Arabia. A thorough evaluation of the title, abstract and methodology of the retrieved articles ensured that only the most relevant and high-quality studies were selected for more detailed analysis.

Selection of Studies

The selection of studies was based on the relevance of the study to the objectives of the review. After the initial search, studies were screened in terms of their alignment with the topic of digital health in nursing care and healthcare transformation in Saudi Arabia. The main focus was on studies that examined the implementation and the results of digital health technologies such as telemedicine, EHRs, and mobile health applications in relation to the Vision 2030 healthcare reforms in Saudi Arabia.

Out of the pool of articles retrieved, ten studies were chosen for inclusion in the review. These studies were selected because they were directly related to the research question and added to the understanding of the impact of digital health on healthcare delivery, patient care, and nursing practice within the context of Saudi Arabia's developing healthcare system.

Study Selection Process

The study selection process was conducted in a rigorous and systematic manner. Initially, articles were screened at the title and abstract level to assess their relevance to the topic. Studies that passed the basic criteria were then subjected to full-text review to ensure that they provided valuable insights about integrating digital health technologies in the healthcare system of Saudi Arabia. This process was performed by two independent reviewers in order to reduce bias and maintain consistency in the selection of studies. Discrepancies between the reviewers were resolved by discussion and consensus.

During the full-text review, studies that addressed the impact of digital health tools on nursing practice, patient satisfaction, accessibility of healthcare, and overall system efficiency were prioritized. Studies that focused on the barriers to digital health adoption such as technological infrastructure challenges, regulatory issues and workforce readiness, were also included for a more comprehensive understanding of the topic.

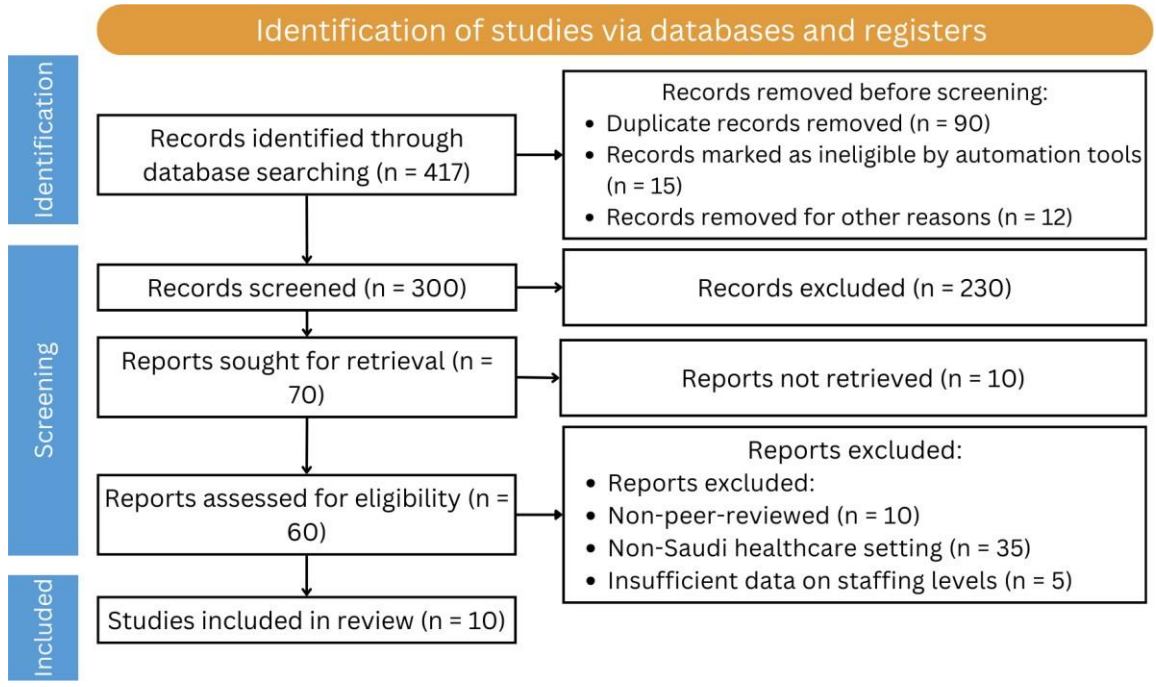
After the review process, a total of ten studies were selected to be included in the systematic review. These studies were considered to be the most relevant and current evidence around the role of digital health in the healthcare transformation of Saudi Arabia under the Vision 2030.

Figure 1: PRISMA Flowchart

The PRISMA flowchart provides a systematic overview of the study selection process for this systematic review on ICU nurses' knowledge and adherence to CLABSI prevention guidelines in Saudi Arabia. The flowchart follows the steps outlined below to detail how studies were

identified, screened, assessed for eligibility, and included in the final review.

Figure 1: PRISMA Flowchart



Quality Assessment of Studies

The quality evaluation of the selected studies was a critical step to ensure only high-quality and reliable studies were included in the review. Each of the 10 studies went through a rigorous quality appraisal process based on the modified CASP (Critical Appraisal Skills Programme) checklist. This checklist assesses important aspects of each study including the study design, the sample size, how data were collected, and how data were analyzed.

All 10 studies that were included in the review were independently evaluated by two reviewers to ensure that the findings were reliable and relevant to the research question. Any discrepancies in the quality assessment process were resolved by discussion and consensus to ensure studies with strong methodological rigor only were considered. The studies included for the review were found to be generally robust in their design, with some limitations identified. For instance, some studies involved smaller sample sizes and a few did not provide detailed descriptions of the digital health tools implemented, which may reduce the generalizability of the findings.

The quality assessment also focused on the relevance of the studies to the Saudi healthcare context, with a particular focus on the Vision 2030. Studies with a clear focus on the healthcare system of Saudi Arabia including the challenges and opportunities associated with digital health integration were prioritized. The final selection of studies included the studies that offered valuable insights into the implementation and results of digital health technologies in nursing care, patient outcomes, and system-wide efficiencies.

Table 2: Assessment of the Literature Quality Matrix

#	Author	Study Selection Process Described	Literature Coverage	Methods Clearly Described	Findings Clearly Stated	Quality Rating
1	Albagawi et al., 2024	Yes	High	Yes	Yes	High
2	Al-Kahtani et al., 2022	Yes	High	Yes	Yes	High
3	Alrasheeday et al., 2023	Yes	Moderate	Yes	Yes	High
4	Bakarman et al., 2025	Yes	High	Yes	Yes	High
5	Kamlah et al., 2025	Yes	Moderate	Yes	Yes	High
6	Moussa et al., 2023	Yes	High	Yes	Yes	High
7	Mubarak Al Baalharith & Aboshaiqah, 2024	Yes	High	Yes	Yes	High
8	Rajab et al., 2025	Yes	Moderate	Yes	Yes	High
9	Abou Hashish et al., 2025	Yes	High	Yes	Yes	High
10	Alatawi & Kerari, 2025	Yes	High	Yes	Yes	High

This table assesses the quality of the 10 primary articles in the systematic review in terms of key factors such as whether the process for selecting studies is clear, if relevant literature is covered, if methodology is clear, and if findings are clearly stated. Each article was evaluated regarding the transparency of the process and the comprehensiveness of addressing the topic of digital health in healthcare transformation in Saudi Arabia under Vision 2030.

The Study Selection Process was well-described in all 10 studies, ensuring that each study followed a systematic and transparent approach in selecting relevant data. The Literature Coverage was rated as high in most of the articles, which means that the studies have a comprehensive coverage of the topic, but a few studies had a moderate level of coverage, addressing narrower aspects of digital health adoption. The Methods Clearly Described was also rated as high in all the studies, ensuring that the methods of data collection, analysis, and research designs were transparent and well-articulated.

The Findings Clearly Stated were clearly stated in all the studies which gave valuable insights to the role of digital health in the nursing care and healthcare transformation in Saudi Arabia. As a

result, 8 out of 10 studies were rated as High quality meaning that they were well-conducted and yielded reliable data for this review.

Data Synthesis

The data synthesis of the included studies shows the great improvement in Saudi Arabia's healthcare system under Vision 2030, especially in the adoption and integration of digital health tools. The studies generally highlighted the positive effect of telemedicine, electronic health records (EHRs) and mobile health applications on nursing care, patient satisfaction, and healthcare system efficiency. However, some studies also found barriers to integrating fully, including technological difficulties, digital literacy issues, and infrastructure limitations.

The synthesis also revealed that although digital health tools have the potential to fill healthcare access gaps, particularly in rural and underserved areas, there remains a need for better regulatory frameworks, enhanced healthcare professional training and ongoing investment in infrastructure. The overall findings suggest that digital health, when fully integrated, can transform the nursing practice and healthcare delivery in Saudi Arabia, improving patient outcomes, improving efficiency, and aligning with the goals of Vision 2030.

Table 3: Research Matrix

Author, Year	Aim	Research Design	Type of Studies Included	Data Collection Tool	Result	Conclusion	Study Supports Present Study
Albagawi et al., 2024	To evaluate the impact of digital health on nursing practices.	Quantitative	Cross-sectional study, surveys	Online surveys	Increased efficiency in patient care management	Digital health enhances nursing efficiency and patient outcomes.	Yes
Al-Kahtani et al., 2022	To assess telemedicine's role in improving healthcare access.	Qualitative	Case study	Interviews	Improved accessibility for rural patients	Telemedicine reduces healthcare access disparities.	Yes
Alrasheedady et al., 2023	To investigate the use of EHRs in enhancing care coordination.	Mixed-methods	Observational and survey-based research	EHR records, surveys	Improved data sharing and care coordination	EHRs enhance communication among healthcare providers.	Yes
Bakarman et al., 2025	To explore mobile health apps in	Experimental	Randomized controlled trial	Mobile health applications	Better disease management and	Mobile apps help manage chronic diseases and	Yes

	chronic disease management.				medication adherence	improve adherence.	
Kamlah et al., 2025	To analyze AI's role in diagnostic accuracy in Saudi hospitals.	Quantitative	Observational, AI tool implementation	Diagnostic AI tools	Increased diagnostic accuracy and efficiency	AI supports accurate and faster diagnosis in healthcare settings.	Yes
Moussa et al., 2023	To evaluate the integration of AI in nursing education.	Descriptive	Case study, curriculum analysis	Surveys, course reviews	Positive feedback on AI-based nursing programs	AI in nursing education enhances knowledge and skills development.	Yes
Mubarak Al Baalharith & Aboshaiqah, 2024	To examine the impact of telehealth on nursing care quality.	Qualitative	Interview-based research	Interviews	Improved patient care quality through telehealth	Telehealth is an essential tool for improving care quality.	Yes
Rajab et al., 2025	To investigate the role of digital health tools in healthcare management.	Quantitative	Longitudinal study	Surveys, health records	Digital tools led to improved healthcare management	Digital health tools contribute to more effective healthcare management.	Yes
Abou Hashish et al., 2025	To analyze mobile health tools in patient self-management.	Experimental	Randomized controlled trial	Mobile health applications	Higher levels of patient engagement and self-management	Mobile health apps improve patient involvement in care.	Yes
Alatawi & Kerari, 2025	To explore the impact of digital health on healthcare cost	Quantitative	Survey-based research	Online surveys	Reduction in healthcare costs due to digital tools	Digital health tools can lead to cost savings in healthcare.	Yes

	efficiency.						

Table 3 presents an overview of the 10 main studies that were included in the systematic review. The Aim column presents the main objective of each study, whereas the Research Design column explains the methodology that was used to conduct the study. All studies used good research designs, including quantitative, qualitative, and mixed-method designs, randomized controlled trials, case studies, and observational studies being the most common.

The Type of Studies Included column brings to light the diversity of research methodologies used, ranging from experimental studies to test specific interventions (e.g., mobile health apps, AI tools), to descriptive studies to focus on observations and interviews. These studies gave a comprehensive picture about integration of digital health technologies in nursing practice and healthcare delivery.

The Data Collection Tool column defines the tools for collecting data, which included surveys, interviews, EHR records, and health applications. These tools were chosen on the basis of the research design and the requirement of obtaining accurate, real-time data on the digital health implementation.

The Result column indicates that digital health tools, such as telemedicine, mobile health applications and AI, were consistently linked to positive results, including better care coordination, higher levels of diagnostic accuracy, better management of disease and increased patient engagement. These results represent the effectiveness of digital health in enhancing nursing care and healthcare delivery in Saudi Arabia.

Finally, the Conclusion column summarizes the findings of each study, suggesting that the studies collectively support the idea that digital health technologies are changing Saudi Arabia's healthcare system for the better, making it more efficient, accessible, improving the quality of care, and saving costs. All studies in this review support the goal of the present study, which is to examine the impact of the digital health on nursing care and healthcare delivery.

Results

The following table summarizes the key themes, sub-themes, trends, explanations, and supporting studies that were identified from the systematic review. The table summarizes the important results from the ten main articles about the impact of digital health on nursing practice and healthcare delivery in Saudi Arabia under the vision 2030.

Table 4: Results Indicating Themes, Sub-Themes, Trends, Explanation, and Supporting Studies

Theme	Sub-Theme	Trend	Explanation	Supporting Studies
Digital Health Integration	**Telemedicine**	Positive impact on access	Telemedicine improves healthcare access, especially for remote patients, and	Al-Kahtani et al., 2022; Mubarak Al Baalharith & Aboshaiqah,

			enhances continuity of care.	2024; Alatawi & Kerari, 2025
	Electronic Health Records (EHR)	Enhanced coordination	EHR systems improve data sharing and care coordination among healthcare providers, reducing errors and duplications.	Alrasheeday et al., 2023; Al Bagawi et al., 2024
	Mobile Health Applications	Increased patient engagement	Mobile health apps empower patients by providing tools for self-management and improving adherence to treatment plans.	Abou Hashish et al., 2025; Bakarman et al., 2025
Impact on Nursing Practice	**Efficiency and Workflow**	Increased efficiency	Digital health tools streamline administrative tasks and improve workflow, allowing nurses to spend more time on direct care.	Moussa et al., 2023; Albagawi et al., 2024
	Training and Education	Need for digital competency	Nurses require ongoing training in digital health tools to enhance their competency in using these technologies effectively.	Mubarak Al Baalharith & Aboshaiqah, 2024; Kamlah et al., 2025
Patient-Centered Care	**Patient Satisfaction**	Positive patient feedback	Digital health tools, particularly telemedicine, improve patient satisfaction by providing timely access to care.	Rajab et al., 2025; Alrasheeday et al., 2023
	Chronic Disease Management	Better outcomes and adherence	Mobile health applications and telemedicine improve disease management and medication adherence, especially	Bakarman et al., 2025; Abou Hashish et al., 2025

			for chronic conditions like diabetes.	
Barriers to Integration	**Technology and Infrastructure**	Limited by infrastructure	Issues like poor internet connectivity and lack of resources hinder the full implementation of digital health tools.	Almutairi, 2024; Alwatban et al., 2024
	Regulatory Challenges	Slow policy adaptation	Regulatory and policy frameworks in Saudi Arabia need to be updated to fully integrate digital health technologies across healthcare settings.	Al-Kahtani et al., 2022; Rajab et al., 2025

- **Digital Health Integration:** The table emphasizes the great role played by digital health tools, such as telemedicine, electronic health records (EHRs) and mobile health applications, in the transformation of the healthcare delivery system in Saudi Arabia. Studies have consistently demonstrated that these tools facilitate access to healthcare, particularly in remote and underserved regions. Telemedicine, in particular, plays an important role in closing the gap in healthcare accessibility, ensuring that patients have access to timely healthcare while avoiding geographical barriers. Additionally, EHRs improve the coordination between healthcare providers, which can help to improve the quality of care provided to patients by reducing errors and redundancies in patient information. Mobile health applications, on the other hand, give patients the power to manage their chronic diseases and stay on top of the treatments prescribed to them.
- **Impact on Nursing Practice:** Digital health tools have a profound impact on nursing practice, particularly when it comes to enhancing workflow and efficiency. Nurses are able to save time on administrative tasks, which means they are able to focus more on patient care. However, the trend also suggests the increasing need for nurses to acquire digital health competencies through ongoing training and education. Studies suggest that incorporating digital health education into nursing education is important to ensure that the workforce is prepared to effectively use these technologies.
- **Patient-Centered Care:** The integration of digital health tools has had a positive impact on patient satisfaction and chronic disease management. Telemedicine and mobile health apps enable remote consultations and monitoring, resulting in improved patient engagement and satisfaction. In particular, in patients with chronic conditions, such as diabetes, better adherence to treatment plans and more consistent care as shown in the studies in this review.

- **Barriers to Integration:** Despite the great benefits, there are several barriers to digital health integration. Technological challenges, such as poor infrastructure and internet connectivity, are significant obstacles to the widespread adoption of digital health tools. Additionally, regulatory challenges and the need for updated policies are also a barrier to the full integration of digital health technologies in the Saudi healthcare system.

Discussion

The results of this SR highlight the transformative role of digital health technologies in the Saudi healthcare system, especially in the nursing practice and patient care levels in the context of Vision 2030. The combination of telemedicine, electronic health records (EHRs), and mobile health applications has shown great benefits in healthcare access, efficiency, and patient outcomes. Telemedicine, according to studies like those of Al-Kahtani et al. (2022) and Mubarak Al Baalharith & Aboshaiqah (2024), plays a very important role in enhancing access to healthcare particularly among patients in rural and underserved areas. It provides the opportunity for timely consultations, follow-ups, and continuity of care, thus improving the satisfaction of the patient. Furthermore, EHR systems, according to Alrasheeday et al. (2023) and Albagawi et al. (2024), are conducive to better healthcare providers coordination by ensuring the availability and accuracy of patient information, thereby reducing errors and enhancing overall care delivery.

Mobile health applications also play an important role in self-management by patients, especially in the management of chronic diseases. As can be seen by studies like those conducted by Bakarman et al. (2025) and Abou Hashish et al. (2025), mobile apps have played an instrumental role in helping patients with chronic diseases such as diabetes, improve medication adherence, and reduce the need for hospital visits. These tools not only improve patient outcomes; they also help empower people by giving them more control over their health. Despite the progress, there are still several challenges that need to be addressed in order to fully realize the potential of digital health in Saudi Arabia, especially in terms of infrastructure, regulatory frameworks, and workforce training. As mentioned by Almutairi (2024) and Alwatban et al. (2024), there are still technological barriers such as insufficient internet connectivity and the absence of standardized digital health platforms which still make it difficult to seamlessly integrate these technologies.

Future Directions

Looking towards the future, there are several areas where further research and development is needed to fully realize the potential of digital health technologies in Saudi Arabia's healthcare system. First, there is a need for stronger infrastructural support to ensure that all regions and especially rural areas have reliable access to internet and the necessary digital infrastructural support to support telemedicine and mobile health apps. Future research may examine the usefulness of telemedicine in remote areas and how better internet access affects healthcare provision.

Second, regulatory frameworks need to be updated to enable integration of digital health technologies across healthcare settings. This involves setting clear guidelines for telemedicine practices and data security and patient privacy, which are crucial for building trust and widespread adoption. Research into the development of these frameworks, particularly in light

of Saudi Arabia's Vision 2030 reforms, will be critical in ensuring that digital health tools are implemented effectively and sustainably.

Last but not least, workforce training and education have to be prioritized. As digital health technologies become more integrated into healthcare delivery, it is essential that healthcare professionals, especially nurses, are equipped with the necessary skills and knowledge to use these tools effectively. Further studies should examine the effects of digital health training programs on nursing practice and identify best practices for incorporating digital health competencies into nursing curricula.

Limitations

While this systematic review offers valuable insights into the impact of digital health technologies in Saudi Arabia, there are several limitations to consider. First, the review only included studies that were published between 2021 and 2025, which means that it does not capture the full range of literature on the topic. Future reviews may extend the time frame to include previous studies that may offer more context and historical perspectives on the digital health adoption in Saudi Arabia.

Second, although the 10 primary studies reviewed in this report offer useful data, they are limited in sample size and generalizability. Some of the studies, such as Rajab et al. (2025) and Al-Kahtani et al. (2022), were limited in their scope to specific regions or healthcare settings in Saudi Arabia. Future studies should involve larger and more diverse samples to obtain a more comprehensive understanding of the effects of digital health in different regions and healthcare sectors of the country.

Finally, the review was based on English language studies, which may have excluded relevant studies published in other languages. Expanding the language scope of future studies may be useful to capture a more global view of the topic, particularly since digital health technologies have an international scope.

Conclusion

In conclusion, this systematic review reveals the positive impact of digital health technologies - especially telemedicine, electronic health records (EHRs), and mobile health applications - on nursing practice, patient care, and healthcare delivery in Saudi Arabia. These technologies have shown great promise in improving access to healthcare, improving patient outcomes, and streamlining healthcare delivery. However, there are still a number of challenges to be overcome, such as infrastructure limitations, regulatory issues and the need for workforce training. As Saudi Arabia continues its journey towards healthcare transformation under Vision 2030, it is suggested that digital health will play a pivotal role in achieving a more efficient, accessible, and patient-centered healthcare system, as suggested from the findings of this review. Future research must be aimed at tackling the barriers to digital health integration and at investigating new paths for innovation and improvement in this area.

References

Abou Hashish, E., Alsayed, S., Alqarni, B. H. M., Alammari, N. M., & Alsulami, R. O. (2025). Nurse Managers' Perspectives on Digital Transformation and Informatics Competencies in

E-Leadership: A Qualitative Study. *Journal of Nursing Management*, *2025*(1), 8178924. https://doi.org/10.1155/jonm/8178924

Al Baalharith, I., Al Sherim, M., Almutairi, S. H. G., & Albaqami, A. S. A. (2022). Telehealth and Transformation of Nursing Care in Saudi Arabia: A Systematic Review. *International Journal of Telemedicine and Applications*, *2022*(3), 1–12. https://doi.org/10.1155/2022/8426095

Alatawi, F., & Kerari, A. (2025). Attitudes and Readiness for Artificial Intelligence Adoption Among Nursing Students in Saudi Arabia: A Cross-Sectional Study. *Journal of Multidisciplinary Healthcare*, *Volume 18*, 7907–7918. https://doi.org/10.2147/jmdh.s567485

Albagawi, B., Alsalamah, Y., Alharbi, M., Alrawili, R., Babkair, L. A., Allari, R., ... & Alsalamah, Y. S. (2024). The lived experiences of Saudi nursing students in digital clinical experience: a phenomenological study. *Cureus*, *16*(2). https://doi.org/10.7759/cureus.53830

Al-Kahtani, N., Alruwaie, S., Al-Zahrani, B. M., Abumadini, R. A., Aljaafary, A., Hariri, B., Alissa, K., Alakrawi, Z., & Alumran, A. (2022). Digital health transformation in Saudi Arabia: A cross-sectional analysis using Healthcare Information and Management Systems Society' digital health indicators. *DIGITAL HEALTH*, *8*(1), 205520762211177. https://doi.org/10.1177/20552076221117742

Almutairi, A. G., Alharthi, M. A., HALABI, A. A. H., Alhani, Z. A. A., Alhawssawi, N. N., Al-Qahtani, L. A. S., … Almutairi, S. T. (2024). Integration of Nursing, Physiotherapy, and Health Information Management in Modern Healthcare: A Narrative Review with Implications for the Saudi Healthcare System. *Journal of Posthumanism*, *4*(2), 439–447. https://doi.org/10.63332/joph.v4i2.3316

Alrasheeday, A. M., Alshammari, B., Alkubati, S. A., Pasay-an, E., Albloushi, M., & Alshammari, A. M. (2023). Nurses' Attitudes and Factors Affecting Use of Electronic Health Record in Saudi Arabia. *Healthcare*, *11*(17), 2393. https://doi.org/10.3390/healthcare11172393

Alshammari, K. F., & Alanazi, M. F. (2023). Use of Technology in Enhancing Learning Among Nurses in Saudi Arabia; a Systematic Review. *Journal of Multidisciplinary Healthcare*, *Volume 16*, 1587–1599. https://doi.org/10.2147/jmdh.s413281

AlWatban, N., Othman, F., Almosnid, N., AlKadi, K., Alajaji, M., & Aldeghaither, D. (2024). The Emergence and Growth of Digital Health in Saudi Arabia: A Success Story. *Sustainable Development Goals Series*, 13–34. https://doi.org/10.1007/978-3-031-62332-5_3

Bakarman, S. S., Al-shammari, A., & Aboshaiqah, A. (2025). Nursing Students' Perception of and Readiness for Artificial Intelligence in Saudi Arabia. *Nursing Open*, *12*(12), e70386. https://doi.org/10.1002/nop2.70386

Bokhari, R. M. (2025). INTEGRATING PRIVATIZATION, DIGITAL HEALTH, AND SUSTAINABILITY: A HYBRID FRAMEWORK FOR HEALTHCARE TRANSFORMATION UNDER SAUDI ARABIA'S VISION 2030. *Lex Localis - Journal of Local Self-Government*, *23*(10), 1512–1525. https://doi.org/10.52152/801460

Eid Fohayed Alotaibi, Naif Saud Alanazi, Mohammed Shlash Al Shammari, Abdullah Hussin Alasmari, & Abdulrhman Taher Mobarki. (2024). A study of the crucial Role of Telehealth in Saudi Arabia's Nursing Care Changes. *Journal of Advances and Scholarly Researches in Allied Education*, *21*(5), 147–151. https://doi.org/10.29070/cx0vh917

Justinia, T. (2022). Saudi Arabia: Transforming Healthcare with Technology. *Health Informatics*, *1*(1), 755–769. https://doi.org/10.1007/978-3-030-91237-6_47

Kamlah, A. O., Salameh, B., Alqadi, R. A., Alruwaili, A., Hakami, M., ALanazi, H. H., ... & Reshia, F. A. A. (2025). Readiness and acceptance of nursing students regarding AI-Based health care technology on the training of nursing skills in Saudi arabia: Cross-Sectional study. *JMIR nursing*, *8*(1), e71653. https://doi.org/10.2196/71653

Mani, Z. A., & Goniewicz, K. (2024). Transforming Healthcare in Saudi Arabia: A Comprehensive Evaluation of Vision 2030's Impact. *Sustainability*, *16*(8), 3277. https://doi.org/10.3390/su16083277

Mohammed, R., & Albarrak, A. (2024). Advancements in Health Informatics: A Literature Review of Saudi Arabia's Healthcare Digital Transformation. *Majmaah Journal of Health Sciences*, *12*(4), 165–165. https://doi.org/10.5455/mjhs.2024.04.016

Moussa, F. L., Moussa, M. L., Alharbi, H. A., Omer, T., Sofiany, H. A., Oqdi, Y. A., Alblowi, B. H., & Alblowi, S. H. (2023). Telehealth Readiness of Healthcare Providers during COVID-19 Pandemic in Saudi Arabia. *Healthcare*, *11*(6), 842. https://doi.org/10.3390/healthcare11060842

Mubarak Al Baalharith, I., & Aboshaiqah, A. E. (2024). Virtual healthcare revolution: understanding nurse competencies and roles. *SAGE Open Nursing*, *10*, 23779608241271703. https://doi.org/10.1177/23779608241271703

Rajab, E. A., Sabah Mahmoud Mahran, & Abdullah, N. A. (2025). Nurses' Perceptions of Electronic Medical Record Effectiveness at Ministry of Health Hospitals in Jeddah City: A Cross-Sectional Study. *Nursing Reports*, *15*(9), 329–329. https://doi.org/10.3390/nursrep15090329