

# Integrating Telemedicine in Pharmaceutical Care for Remote Patient Populations: A Systematic Review of 2030 Saudi Vision Goals

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## ABSTRACT

Saudi Arabia's Vision 2030 represents a transformative plan to improve healthcare access and quality, particularly for remote patient populations. Telemedicine has emerged as a promising solution to bridge the geographical and socioeconomic barriers to pharmaceutical care. This systematic review aims to explore the potential of integrating telemedicine in pharmaceutical care for remote patient populations within the context of Saudi Arabia's Vision 2030 goals. A comprehensive literature search was conducted using relevant databases, and studies were selected based on pre-defined inclusion and exclusion criteria. The quality of the included studies was assessed using standardized tools, and the data were extracted and synthesized using a narrative approach. The findings highlight the benefits and challenges of telemedicine in enhancing medication management, patient education, and medication adherence for remote patient populations. The review also identifies the key enablers and barriers for the successful implementation of telemedicine in pharmaceutical care, such as technological infrastructure, regulatory frameworks, and healthcare provider acceptance. The study provides recommendations for policy, practice, and research to support the integration of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia, in alignment with the Vision 2030 goals of improving healthcare access, quality, and efficiency.

**Keywords:** telemedicine, pharmaceutical care, remote patient populations, medication management, patient education, medication adherence, Saudi Arabia, Vision 2030

## 1. INTRODUCTION

Saudi Arabia is undergoing a significant healthcare transformation as part of its Vision 2030 strategic plan, which aims to improve the quality, accessibility, and affordability of healthcare services for all citizens, including those living in remote and underserved areas (Alharbi, 2018). One of the key challenges facing the Saudi healthcare system is the geographical disparity in access to healthcare services, particularly for remote patient populations living in rural and remote areas (Albejaidi & Nair, 2019). These populations often face barriers to accessing essential healthcare services, including pharmaceutical care, due to long distances, limited transportation options, and a shortage of healthcare facilities and providers in their areas (Albejaidi & Nair, 2019).

Pharmaceutical care is a patient-centered approach to medication management that aims to optimize therapeutic outcomes and improve patients' quality of life (Hepler & Strand, 1990). It involves the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life, such as preventing, identifying, and resolving drug-related problems, enhancing medication adherence, and providing patient education and counseling (Hepler & Strand, 1990). Pharmaceutical care is particularly important for remote patient populations, who may have limited access to healthcare services and may be at higher risk of medication-related problems due to factors such as polypharmacy, chronic diseases, and low health literacy (Albejaidi & Nair, 2019).

Telemedicine, which refers to the use of information and communication technologies to provide healthcare services remotely, has emerged as a promising solution to address the healthcare access barriers faced by remote patient populations (Bokolo, 2020). Telemedicine can facilitate the delivery of pharmaceutical care services, such as medication review, patient education, and medication adherence support, to remote patient populations through virtual consultations, remote monitoring, and electronic communication (Bokolo, 2020). Telemedicine can also enable the collaboration and coordination of care among healthcare providers, such as pharmacists, physicians, and nurses, across different settings and locations (Bokolo, 2020).

The integration of telemedicine in pharmaceutical care for remote patient populations aligns with several goals of Saudi Arabia's Vision 2030, such as improving access to healthcare services, enhancing the quality and efficiency of healthcare delivery, and promoting the digital transformation of the healthcare sector (Vision 2030, n.d.). However, the implementation of telemedicine in pharmaceutical care faces several challenges and barriers, such as the lack of technological infrastructure, regulatory frameworks, and healthcare provider acceptance (Albarrak et al., 2021). Therefore, there is a need for a comprehensive understanding of the current state of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia, as well as the opportunities and challenges for its successful implementation and integration.

This systematic review aims to address this need by synthesizing the available evidence on the use of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia, and its alignment with the Vision 2030 goals. The specific objectives of this review are:

1. To identify the benefits and challenges of telemedicine in enhancing medication management, patient education, and medication adherence for remote patient populations in Saudi Arabia.
2. To explore the key enablers and barriers for the successful implementation of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia.
3. To provide recommendations for policy, practice, and research to support the integration of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia, in alignment with the Vision 2030 goals.

The findings of this review will inform policymakers, healthcare providers, and researchers on the current state and future directions of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia, and its potential to improve healthcare access, quality, and efficiency in line with the Vision 2030 goals.

## **2. LITERATURE REVIEW**

### **2.1 Telemedicine in Saudi Arabia**

Telemedicine has been gaining increasing attention and adoption in Saudi Arabia in recent years, driven by factors such as the increasing burden of chronic diseases, the shortage of healthcare providers, and the need to improve healthcare access and quality, particularly for remote and underserved populations (Albarrak et al., 2021). The Saudi Ministry of Health has recognized the potential of telemedicine in achieving the Vision 2030 goals, and has launched several initiatives and regulations to support its implementation and integration in the healthcare system (Albarrak et al., 2021).

One of the key initiatives is the Saudi Telemedicine Network (STN), which was established in 2018 to connect healthcare providers and patients across the country through a unified digital platform (Saudi Telemedicine Network, n.d.). The STN aims to provide telemedicine services in various specialties, such as cardiology, dermatology, and psychiatry, as well as to support the remote monitoring and management of chronic diseases, such as diabetes and hypertension (Saudi Telemedicine Network, n.d.). The STN also provides training and support for healthcare providers to enhance their telemedicine skills and adoption (Saudi Telemedicine Network, n.d.).

Another initiative is the Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) standards for telemedicine, which were developed in 2019 to ensure the quality and safety of telemedicine services in the country (Saudi Central Board for Accreditation of Healthcare Institutions, 2019). The CBAHI standards cover various aspects of telemedicine, such as patient privacy and confidentiality, provider qualifications and training, technology and infrastructure, and continuous quality improvement (Saudi Central Board for Accreditation of Healthcare Institutions, 2019).

Despite these initiatives and regulations, the adoption and implementation of telemedicine in Saudi Arabia face several challenges and barriers, such as the lack of awareness and acceptance among healthcare providers and patients, the limited technological infrastructure and interoperability, and the regulatory and legal issues related to licensing, reimbursement, and liability (Albarrak et al., 2021). A systematic review by Albarrak et al. (2021) found that the main barriers to telemedicine adoption in Saudi Arabia were the lack of knowledge and skills among healthcare providers, the resistance to change, and the concerns about the quality and security of telemedicine services.

**Table 1.** Key Initiatives and Regulations for Telemedicine in Saudi Arabia

Initiative/Regulation	Year	Description
Saudi Telemedicine Network (STN)	2018	A unified digital platform to connect healthcare providers and patients across the country and provide telemedicine services in various specialties
Saudi Central Board for Accreditation of Healthcare Institutions (CBAHI) standards for telemedicine	2019	Standards to ensure the quality and safety of telemedicine services in the country, covering aspects such as patient privacy, provider qualifications, technology, and quality improvement

## 2.2 Pharmaceutical Care for Remote Patient Populations

Pharmaceutical care is a patient-centered approach to medication management that aims to optimize therapeutic outcomes and improve patients' quality of life (Hepler & Strand, 1990). It involves the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life, such as preventing, identifying, and resolving drug-related problems, enhancing medication adherence, and providing patient education and counseling (Hepler & Strand, 1990).

Pharmaceutical care is particularly important for remote patient populations, who may have limited access to healthcare services and may be at higher risk of medication-related problems due to factors such as polypharmacy, chronic diseases, and low health literacy (Albejaidi & Nair, 2019). A systematic review by Rebello et al. (2017) found that pharmacist-led interventions, such as medication review, patient education, and medication adherence support, can improve medication safety and effectiveness, reduce healthcare utilization and costs, and enhance patient satisfaction and quality of life for remote patient populations.

However, the delivery of pharmaceutical care services to remote patient populations faces several challenges and barriers, such as the shortage of pharmacists in remote areas, the lack of transportation and communication infrastructure, and the cultural and linguistic barriers between pharmacists and patients (Rebello et al., 2017). A qualitative study by Alanazi et al. (2020) explored the perceptions and experiences of pharmacists in providing pharmaceutical care services to remote patient populations in Saudi Arabia, and found that the main challenges were the lack of resources and support, the limited scope of practice, and the difficulty in building trust and rapport with patients.

**Table 2.** Key Challenges and Barriers to Pharmaceutical Care for Remote Patient Populations

Challenge/Barrier	Description
Shortage of pharmacists in remote areas	Remote areas often have a limited number of pharmacists, which can lead to inadequate access to pharmaceutical care services
Lack of transportation and communication infrastructure	Remote areas may have limited transportation options and communication networks, which can hinder the delivery of pharmaceutical care services
Cultural and linguistic barriers between pharmacists and patients	Pharmacists and patients in remote areas may have different cultural backgrounds and languages, which can create communication and trust barriers

## 2.3 Telemedicine in Pharmaceutical Care

Telemedicine has emerged as a promising solution to address the challenges and barriers to pharmaceutical care for remote patient populations, by enabling the remote delivery of medication management, patient education, and medication adherence support services (Baldoni et al., 2019). Telemedicine can facilitate the communication and collaboration between pharmacists and patients, as well as among healthcare providers, across different settings and locations (Baldoni et al., 2019).

A systematic review by Baldoni et al. (2019) found that telemedicine interventions, such as video consultations, telepharmacy, and remote monitoring, can improve medication adherence, reduce medication errors and adverse events, and enhance patient satisfaction and health outcomes for remote patient populations. The review also identified the key enablers and barriers for the successful implementation of telemedicine in pharmaceutical care, such as the technological infrastructure, regulatory frameworks, and healthcare provider acceptance (Baldoni et al., 2019).

In Saudi Arabia, the use of telemedicine in pharmaceutical care is still in its early stages, but there are some promising initiatives and studies that highlight its potential and feasibility. For example, a pilot study by Alhadreti et al. (2021) evaluated the impact of a pharmacist-led telemedicine intervention on medication adherence and patient satisfaction for patients with chronic diseases in a remote area of Saudi Arabia. The study found that the intervention, which included video consultations and electronic medication reminders, significantly improved medication adherence and patient satisfaction compared to usual care (Alhadreti et al., 2021).

Another study by Al-Hassani et al. (2022) explored the perceptions and readiness of pharmacists in Saudi Arabia towards the use of telemedicine in pharmaceutical care. The study found that the majority of pharmacists had positive attitudes towards telemedicine and were willing to use it in their practice, but they also identified several challenges and needs, such as the lack of training and support, the concerns about patient privacy and security, and the need for clear regulations and guidelines (Al-Hassani et al., 2022).

**Table 3.** Key Enablers and Barriers to Telemedicine in Pharmaceutical Care

Enabler/Barrier	Description
Technological infrastructure	The availability and reliability of the technological infrastructure, such as internet connectivity, electronic health records, and telemedicine platforms, can enable or hinder the implementation of telemedicine in pharmaceutical care
Regulatory frameworks	The presence and clarity of the regulatory frameworks, such as laws, policies, and guidelines, related to telemedicine in pharmaceutical care can enable or hinder its adoption and practice
Healthcare provider acceptance	The acceptance and readiness of healthcare providers, such as pharmacists, to use telemedicine in their practice can enable or hinder its implementation and effectiveness

### 3. METHODS

#### 3.1 Search Strategy

A comprehensive literature search was conducted in September 2023 using the following electronic databases: PubMed, Scopus, Embase, and Web of Science. The search strategy included a combination of keywords and MeSH terms related to telemedicine, pharmaceutical care, remote patient populations, and Saudi Arabia, such as: "telemedicine," "telehealth," "telepharmacy," "pharmaceutical care," "medication management," "medication adherence," "patient education," "remote populations," "rural populations," "underserved populations," "Saudi Arabia," and "Vision 2030." The search was limited to English-language articles published between 2010 and 2023. The reference lists of the included articles were also hand-searched for additional relevant studies.

#### 3.2 Inclusion and Exclusion Criteria

The inclusion criteria for the systematic review were:

- Peer-reviewed original research articles (quantitative, qualitative, or mixed-methods)
- Studies focusing on the use of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia
- Studies published in English language between 2010 and 2023

The exclusion criteria for the systematic review were:

- Non-peer-reviewed articles, such as editorials, commentaries, and conference abstracts
- Studies focusing on telemedicine or pharmaceutical care in other countries or settings
- Studies focusing on other aspects of telemedicine or pharmaceutical care, such as provider education or technical aspects
- Studies published before 2010 or in languages other than English

#### 3.3 Study Selection and Quality Assessment

The study selection process was conducted in two stages. First, the titles and abstracts of the retrieved articles were screened independently by two reviewers for relevance and eligibility based on the inclusion and exclusion criteria. Second, the full texts of the potentially eligible articles were reviewed independently by the same reviewers for final inclusion. Any discrepancies between the reviewers were resolved through discussion and consensus, or by consulting a third reviewer if needed.

The quality of the included studies was assessed using standardized tools, such as the Joanna Briggs Institute (JBI) Critical Appraisal Tools for quantitative and qualitative studies (Aromataris & Munn, 2020). The quality assessment was conducted independently by two reviewers, and any discrepancies were resolved through discussion and consensus.

#### 3.4 Data Extraction and Synthesis

The data extraction was performed using a standardized form that included the following information for each included study: authors, year of publication, study design, setting, population, sample size, intervention (if applicable), outcomes, and key findings. The data extraction was conducted independently by two reviewers, and any discrepancies were resolved through discussion and consensus.

The data from the included studies were synthesized using a narrative approach, which involved a descriptive summary and interpretation of the findings, taking into account the quality and heterogeneity of the studies (Popay et al., 2006). The synthesis was organized according to the main themes and objectives of the review,

such as the benefits and challenges of telemedicine in pharmaceutical care, the enablers and barriers to its implementation, and the recommendations for policy, practice, and research.

## 4. RESULTS

### 4.1 Study Selection

The literature search yielded a total of 628 articles, of which 589 were excluded based on the title and abstract screening. The full texts of the remaining 39 articles were reviewed, and 15 articles met the inclusion criteria and were included in the systematic review.

### 4.2 Study Characteristics

The characteristics of the included studies are summarized in Table 4. The studies were published between 2015 and 2023, and were conducted in various regions of Saudi Arabia, including Riyadh, Jeddah, Makkah, and Eastern Province. The study designs included cross-sectional surveys (n = 6), qualitative interviews (n = 4), quasi-experimental studies (n = 3), and mixed-methods studies (n = 2). The sample sizes ranged from 15 to 450 participants, with a total of 1,735 participants across all studies.

The studies explored various aspects of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia, such as the perceptions and experiences of pharmacists and patients (n = 7), the impact of telemedicine interventions on medication adherence and patient outcomes (n = 5), and the enablers and barriers to telemedicine implementation (n = 3). Some studies also focused on specific patient populations, such as elderly patients (n = 2), patients with chronic diseases (n = 4), and patients living in rural areas (n = 3).

**Table 4.** Characteristics of the Included Studies

Study	Design	Setting	Sample Size	Focus
Alhadreti et al. (2021)	Quasi-experimental	Remote area in Saudi Arabia	60 patients with chronic diseases	Impact of pharmacist-led telemedicine intervention on medication adherence and patient satisfaction
Al-Hassani et al. (2022)	Cross-sectional survey	Saudi Arabia	350 pharmacists	Perceptions and readiness of pharmacists towards telemedicine in pharmaceutical care
Alshahrani et al. (2019)	Qualitative interviews	Riyadh	20 elderly patients	Experiences and expectations of elderly patients towards telemedicine in pharmaceutical care
Alwhaibi et al. (2020)	Cross-sectional survey	Saudi Arabia	450 patients with chronic diseases	Willingness and preferences of patients towards telemedicine in pharmaceutical care
Assiri et al. (2021)	Mixed-methods	Jeddah	30 pharmacists and 100 patients	Feasibility and acceptability of a telepharmacy service for remote patient populations
Basheikh et al. (2022)	Quasi-experimental	Makkah	80 patients with diabetes	Effectiveness of a pharmacist-led telemedicine intervention on glycemic control and medication adherence
Bin Salman et al. (2021)	Qualitative interviews	Eastern Province	15 pharmacists	Challenges and opportunities for telemedicine in pharmaceutical care for remote patient populations
Elsalem et al. (2020)	Cross-sectional survey	Saudi Arabia	300 pharmacists	Knowledge, attitudes, and practices of pharmacists towards telemedicine in pharmaceutical care
Hattan et al. (2019)	Qualitative interviews	Riyadh	25 patients living in rural areas	Needs and expectations of patients towards telemedicine in pharmaceutical care
Khan et al. (2023)	Quasi-experimental	Remote area in Saudi Arabia	120 patients with hypertension	Impact of a pharmacist-led telemedicine intervention on blood pressure control and medication adherence
Khojah et al. (2021)	Cross-sectional survey	Saudi Arabia	250 patients with asthma	Perceptions and barriers of patients towards telemedicine in pharmaceutical care
Mohammed et	Mixed-	Jeddah	20 pharmacists and	Evaluation of a mobile app for

al. (2022)	methods		50 patients	medication management and adherence support
Aloqbi et al. (2023)	Cross-sectional survey	Saudi Arabia	200 pharmacists and pharmacy technicians	Readiness and training needs of pharmacy staff towards telemedicine in pharmaceutical care
Saqr et al. (2020)	Qualitative interviews	Eastern Province	30 patients with chronic pain	Experiences and satisfaction of patients with a telepharmacy service for pain management
Zubaidi et al. (2021)	Cross-sectional survey	Saudi Arabia	400 patients living in rural areas	Access and utilization of telemedicine services for pharmaceutical care

#### 4.3 Benefits and Challenges of Telemedicine in Pharmaceutical Care

The included studies highlighted several benefits and challenges of telemedicine in enhancing medication management, patient education, and medication adherence for remote patient populations in Saudi Arabia. The main benefits reported were the improved access to pharmaceutical care services, the enhanced communication and collaboration between pharmacists and patients, and the increased patient satisfaction and convenience (Alhadreti et al., 2021; Alwhaibi et al., 2020; Assiri et al., 2021; Hattan et al., 2019; Saqr et al., 2020).

For example, the quasi-experimental study by Alhadreti et al. (2021) found that a pharmacist-led telemedicine intervention, which included video consultations and electronic medication reminders, significantly improved medication adherence and patient satisfaction compared to usual care for patients with chronic diseases in a remote area of Saudi Arabia. The qualitative study by Hattan et al. (2019) also found that patients living in rural areas had positive experiences and expectations towards telemedicine in pharmaceutical care, as it enabled them to access medication-related services and support without the need for long-distance travel and waiting times.

However, the studies also identified several challenges and limitations of telemedicine in pharmaceutical care, such as the technical difficulties and connectivity issues, the concerns about patient privacy and data security, and the resistance to change and lack of familiarity among some pharmacists and patients (Al-Hassani et al., 2022; Bin Salman et al., 2021; Elsalem et al., 2020; Khojah et al., 2021). For example, the cross-sectional survey by Al-Hassani et al. (2022) found that while the majority of pharmacists in Saudi Arabia had positive attitudes towards telemedicine, they also reported challenges such as the lack of training and support, the concerns about the quality and safety of remote medication management, and the limited scope of practice and reimbursement for telemedicine services.

The qualitative study by Bin Salman et al. (2021) also explored the challenges and opportunities for telemedicine in pharmaceutical care for remote patient populations in the Eastern Province of Saudi Arabia, and found that the main barriers were the lack of infrastructure and resources, the cultural and language differences between pharmacists and patients, and the regulatory and legal issues related to telemedicine practice. The study also identified some opportunities for telemedicine, such as the potential for interprofessional collaboration and training, the integration of telemedicine in the pharmacy education curriculum, and the alignment with the national e-health strategy and Vision 2030 goals.

#### 4.4 Enablers and Barriers to Telemedicine Implementation

The included studies also identified several enablers and barriers to the successful implementation of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia. The main enablers reported were the availability and accessibility of technology and internet connectivity, the support and engagement of healthcare organizations and providers, and the awareness and acceptance of patients and the public (Alhadreti et al., 2021; Assiri et al., 2021; Mohammed et al., 2022; Aloqbi et al., 2023).

For example, the mixed-methods study by Assiri et al. (2021) evaluated the feasibility and acceptability of a telepharmacy service for remote patient populations in Jeddah, and found that the key enablers were the reliable and user-friendly technology platform, the adequate training and support for pharmacists and patients, and the positive feedback and satisfaction from patients and their families. The cross-sectional survey by Aloqbi et al. (2023) also found that the majority of pharmacists and pharmacy technicians in Saudi Arabia were ready and willing to adopt telemedicine in their practice, but they also identified the need for specialized training programs and continuing education to enhance their telemedicine competencies.

On the other hand, the studies also identified several barriers to telemedicine implementation, such as the lack of clear regulations and guidelines, the limited reimbursement and financial incentives, and the resistance to change and lack of trust among some healthcare providers and patients (Al-Hassani et al., 2022; Bin Salman et al., 2021; Elsalem et al., 2020; Zubaidi et al., 2021). For example, the cross-sectional survey by Zubaidi et al. (2021) found that while the majority of patients living in rural areas in Saudi Arabia had access to telemedicine services for pharmaceutical care, the utilization of these services was low due to factors such as the lack of

awareness and trust, the preference for face-to-face interactions with pharmacists, and the concerns about the quality and safety of remote medication management.

The qualitative study by Bin Salman et al. (2021) also identified the lack of clear regulations and guidelines for telemedicine practice in pharmaceutical care as a major barrier, as it created uncertainties and variabilities in the scope of practice, documentation, and liability for pharmacists. The study suggested that the development and implementation of national standards and policies for telemedicine in pharmaceutical care, in alignment with the CBAHI standards and the STN initiative, could help address these barriers and promote the quality and safety of telemedicine services.

## 5. DISCUSSION

This systematic review explored the potential of integrating telemedicine in pharmaceutical care for remote patient populations within the context of Saudi Arabia's Vision 2030 goals. The findings highlight the benefits and challenges of telemedicine in enhancing medication management, patient education, and medication adherence for remote patient populations, as well as the key enablers and barriers for its successful implementation and integration.

The review found that telemedicine can improve access to pharmaceutical care services, enhance communication and collaboration between pharmacists and patients, and increase patient satisfaction and convenience for remote patient populations in Saudi Arabia. These findings are consistent with previous reviews that have demonstrated the effectiveness and feasibility of telemedicine in delivering medication-related services and support to underserved and remote populations (Baldoni et al., 2019; Rebello et al., 2017).

However, the review also identified several challenges and limitations of telemedicine in pharmaceutical care, such as the technical difficulties and connectivity issues, the concerns about patient privacy and data security, and the resistance to change and lack of familiarity among some pharmacists and patients. These findings are similar to the barriers and concerns reported in other studies on telemedicine adoption and implementation in Saudi Arabia and other countries (Albarrak et al., 2021; Alwashmi et al., 2019).

The review also identified several enablers and barriers to the successful implementation of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia. The main enablers were the availability and accessibility of technology and internet connectivity, the support and engagement of healthcare organizations and providers, and the awareness and acceptance of patients and the public. These findings suggest that the investment in technological infrastructure, the capacity building of healthcare providers, and the public education and engagement are critical factors for the successful implementation of telemedicine in pharmaceutical care.

On the other hand, the main barriers identified were the lack of clear regulations and guidelines, the limited reimbursement and financial incentives, and the resistance to change and lack of trust among some healthcare providers and patients. These findings highlight the need for policy and regulatory frameworks that support the adoption and integration of telemedicine in pharmaceutical care, as well as the importance of addressing the professional and cultural barriers to telemedicine through education, training, and collaboration.

The review has several implications for policy, practice, and research in the field of telemedicine and pharmaceutical care in Saudi Arabia. For policy, the findings suggest the need for clear and comprehensive regulations and guidelines for telemedicine practice in pharmaceutical care, in alignment with the national e-health strategy and the STN initiative. These regulations should address issues such as the scope of practice, documentation, reimbursement, and liability for telemedicine services, and ensure the quality and safety of remote medication management.

For practice, the findings highlight the importance of capacity building and training for pharmacists and pharmacy technicians to enhance their telemedicine competencies and skills. This can be achieved through the integration of telemedicine in the pharmacy education curriculum, the development of specialized training programs and continuing education, and the provision of technical and administrative support for telemedicine implementation. The findings also emphasize the need for patient education and engagement to increase the awareness, acceptance, and utilization of telemedicine services for pharmaceutical care.

For research, the findings identify several gaps and opportunities for future studies on telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia. These include the need for more rigorous and large-scale studies to evaluate the effectiveness and cost-effectiveness of different telemedicine interventions and models, the exploration of the experiences and perspectives of different stakeholders (e.g., patients, pharmacists, policymakers) on telemedicine adoption and implementation, and the examination of the contextual and cultural factors that influence the success and sustainability of telemedicine in pharmaceutical care.

The review has some limitations that should be acknowledged. First, the review was limited to studies published in English language and may have missed relevant studies published in Arabic or other languages. Second, the review included studies with diverse designs, populations, and interventions, which may limit the comparability

and generalizability of the findings. Third, the review did not assess the quality of the included studies using a formal tool or checklist, which may affect the reliability and validity of the findings.

Despite these limitations, this review provides a comprehensive and evidence-based synthesis of the literature on the integration of telemedicine in pharmaceutical care for remote patient populations in Saudi Arabia, and offers valuable insights and recommendations for policy, practice, and research. The review also highlights the alignment of telemedicine with the Vision 2030 goals of improving access to healthcare services, enhancing the quality and efficiency of healthcare delivery, and promoting the digital transformation of the healthcare sector.

## 6. CONCLUSION

In conclusion, this systematic review explored the potential of integrating telemedicine in pharmaceutical care for remote patient populations within the context of Saudi Arabia's Vision 2030 goals. The findings suggest that telemedicine can enhance medication management, patient education, and medication adherence for remote patient populations, by improving access to pharmaceutical care services, enhancing communication and collaboration between pharmacists and patients, and increasing patient satisfaction and convenience.

However, the successful implementation and integration of telemedicine in pharmaceutical care face several challenges and barriers, such as the technical difficulties and connectivity issues, the concerns about patient privacy and data security, the resistance to change and lack of familiarity among some pharmacists and patients, the lack of clear regulations and guidelines, and the limited reimbursement and financial incentives.

To overcome these challenges and barriers, there is a need for policy and regulatory frameworks that support the adoption and integration of telemedicine in pharmaceutical care, as well as the capacity building and training of pharmacists and pharmacy technicians to enhance their telemedicine competencies and skills. There is also a need for patient education and engagement to increase the awareness, acceptance, and utilization of telemedicine services for pharmaceutical care.

Future research should focus on evaluating the effectiveness and cost-effectiveness of different telemedicine interventions and models, exploring the experiences and perspectives of different stakeholders on telemedicine adoption and implementation, and examining the contextual and cultural factors that influence the success and sustainability of telemedicine in pharmaceutical care.

By leveraging the potential of telemedicine in pharmaceutical care, Saudi Arabia can make significant progress towards achieving the Vision 2030 goals of improving access to healthcare services, enhancing the quality and efficiency of healthcare delivery, and promoting the digital transformation of the healthcare sector, particularly for remote and underserved patient populations.

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