

# The Effectiveness of Telehealth in Managing Chronic Diseases During the COVID-19 Pandemic

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## Keywords

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## ABSTRACT

*The emergence of the COVID-19 pandemic in early 2020 disrupted traditional healthcare delivery systems, particularly in managing chronic diseases like diabetes, hypertension, and cardiovascular diseases. Telehealth swiftly emerged as a vital solution to bridge the gap, offering remote access to healthcare services through digital platforms. This research article evaluates the effectiveness of telehealth in managing chronic diseases during the pandemic, focusing on patient outcomes, satisfaction levels, and healthcare delivery efficiency. Through a mixed-methods approach, including longitudinal cohort studies, meta-analyses, and qualitative interviews, the study explores the impact of telehealth interventions on clinical outcomes, patient experiences, and healthcare resource utilization. Findings indicate significant improvements in key health parameters among patients engaged in telehealth, highlighting the potential of remote monitoring and virtual consultations to enhance chronic disease management. Moreover, qualitative insights underscore positive patient and provider attitudes towards telehealth, despite challenges such as digital literacy and privacy concerns. The study concludes that telehealth offers a promising avenue for ensuring continuity of care and improving healthcare resilience in the face of future public health crises.*

## 1 Introduction

The emergence of the COVID-19 pandemic in early 2020 triggered an unprecedented global health crisis, profoundly impacting healthcare delivery systems worldwide. As healthcare providers grappled with the dual challenge of managing the surge in COVID-19 cases and continuing to care for patients with chronic diseases, traditional in-person medical consultations became fraught with risks and logistical hurdles. Chronic diseases such as diabetes, hypertension, and cardiovascular diseases require regular monitoring and timely interventions, which were severely disrupted by lockdowns, social distancing mandates, and the reallocation of healthcare resources to combat the pandemic.

In response to these challenges, telehealth—defined as the use of digital information and communication

technologies to access health services remotely—rapidly transitioned from a supplementary service to a cornerstone of healthcare delivery. This shift was driven by the necessity to minimize physical contact, reduce the burden on overwhelmed healthcare facilities, and ensure that patients continued to receive essential care. Telehealth encompasses a broad array of services including virtual consultations, remote monitoring, and mobile health applications, all of which facilitate patient-provider interactions without the need for physical presence.

The integration of telehealth into routine medical practice during the pandemic presented a unique opportunity to assess its effectiveness in managing chronic diseases. Chronic conditions, which account for a significant portion of global morbidity and mortality, typically require a consistent and proactive approach to care. The traditional model of frequent in-person visits

to healthcare facilities became impractical, if not impossible, under the constraints of the pandemic. Telehealth offered a viable alternative, providing a platform for continuous patient engagement, remote monitoring of health parameters, and timely medical advice.

This research article aims to evaluate the effectiveness of telehealth in managing chronic diseases during the COVID-19 pandemic. It explores whether telehealth services could sustain or improve the quality of care for chronic disease patients in the absence of regular face-to-face interactions. By examining patient outcomes, satisfaction levels, and healthcare delivery efficiency, this study seeks to provide a comprehensive understanding of telehealth's role in chronic disease management during a global health crisis.

The article begins with an overview of the challenges faced by chronic disease management during the pandemic and the rapid adoption of telehealth as a response. It then delves into specific chronic conditions, analyzing how telehealth interventions were implemented and their impacts on patient health outcomes. The study also considers the patient and provider experiences with telehealth, highlighting areas of success and identifying potential barriers to its widespread adoption. Finally, it discusses the implications of these findings for the future of healthcare delivery in a post-pandemic world, where telehealth is likely to remain an integral part of the healthcare landscape.

In summary, the COVID-19 pandemic catalyzed a significant transformation in healthcare delivery, with telehealth emerging as a critical tool for managing chronic diseases. This article evaluates the effectiveness of telehealth during this period, providing valuable insights into its potential to enhance chronic disease management and improve healthcare resilience in the face of future public health emergencies.

## **2 Background**

Chronic diseases, including diabetes, hypertension, and cardiovascular diseases, are among the most prevalent and costly health conditions globally, representing leading causes of morbidity and mortality. Effective management of these chronic conditions requires regular monitoring, timely medical interventions, and consistent patient engagement. Traditional healthcare models rely heavily on in-person consultations and hospital visits, which allow healthcare providers to

perform physical examinations, conduct diagnostic tests, and adjust treatment plans based on real-time assessments. However, the COVID-19 pandemic introduced significant barriers to this conventional approach, compelling the healthcare industry to rethink and innovate new methods of delivering care.

The onset of the COVID-19 pandemic in early 2020 brought about drastic changes in daily life and healthcare practices. Governments worldwide implemented strict lockdowns, social distancing measures, and travel restrictions to mitigate the spread of the virus. These measures, while necessary to control the pandemic, inadvertently restricted access to routine healthcare services. Hospitals and clinics were overwhelmed with COVID-19 patients, leading to the postponement of elective procedures and routine check-ups. For patients with chronic diseases, the inability to attend regular medical appointments posed a substantial risk, potentially leading to uncontrolled disease progression and increased complications.

In this context, telehealth emerged as a pivotal solution to ensure continuity of care. Telehealth is a broad term encompassing the use of telecommunications technologies to provide healthcare services and information remotely. It includes a variety of modalities such as video conferencing, phone consultations, remote monitoring devices, and mobile health applications. These technologies enable healthcare providers to remotely assess, diagnose, and manage patients, thereby reducing the need for physical visits. The rapid adoption of telehealth during the pandemic was facilitated by temporary regulatory changes, including the relaxation of telehealth reimbursement policies and licensure requirements, which previously hindered its widespread use.

The potential benefits of telehealth for chronic disease management are manifold. Telehealth can enhance access to care, particularly for patients in remote or underserved areas who might face challenges in visiting healthcare facilities. It can also reduce the burden on healthcare systems by minimizing the need for hospital admissions and emergency room visits through early intervention and continuous monitoring. Moreover, telehealth can improve patient engagement and self-management by leveraging digital tools and resources that empower patients to take an active role in their health.

Despite its advantages, the transition to telehealth during the COVID-19 pandemic was not without challenges. The sudden shift required significant adjustments from

both patients and healthcare providers. Technological barriers, such as lack of access to reliable internet and digital devices, posed obstacles for some patients. Additionally, digital literacy varied widely among the patient population, with older adults and those from socioeconomically disadvantaged backgrounds being particularly affected. Healthcare providers also faced a learning curve, needing to adapt to new technologies and workflows rapidly. Concerns regarding data security and patient privacy further complicated the telehealth landscape.

To assess the effectiveness of telehealth in managing chronic diseases during the COVID-19 pandemic, it is essential to evaluate multiple dimensions, including clinical outcomes, patient satisfaction, and healthcare delivery efficiency. Clinical outcomes provide insights into whether telehealth can maintain or improve health parameters, such as blood glucose levels in diabetes or blood pressure in hypertension. Patient satisfaction surveys offer valuable feedback on the convenience, accessibility, and overall experience of using telehealth services. Healthcare delivery efficiency can be measured by examining metrics such as appointment adherence rates, resource utilization, and cost savings.

In conclusion, the COVID-19 pandemic catalyzed a significant shift in healthcare delivery, with telehealth playing a crucial role in ensuring the continuity of care for patients with chronic diseases. While the initial transition posed several challenges, the potential benefits of telehealth for chronic disease management are substantial. This background sets the stage for a comprehensive evaluation of telehealth's effectiveness during the pandemic, providing insights that can inform future healthcare practices and policies. As we move towards a post-pandemic world, understanding the strengths and limitations of telehealth will be critical in integrating it as a permanent fixture in chronic disease management.

### 3 Literature Review

The COVID-19 pandemic has highlighted significant vulnerabilities in traditional healthcare delivery systems, prompting a surge in the adoption of telehealth solutions. A growing body of literature has explored the impact of telehealth on managing chronic diseases during this period, focusing on various aspects such as clinical outcomes, patient satisfaction, healthcare

delivery efficiency, and the challenges faced by both patients and healthcare providers.

#### 3.1 Clinical Outcomes

Several studies have investigated the clinical effectiveness of telehealth in managing chronic diseases during the pandemic. For instance, a meta-analysis conducted by Omboni and McManus (2021) examined the role of telehealth in hypertension management. The study found that telehealth interventions, particularly remote blood pressure monitoring, were associated with significant reductions in systolic and diastolic blood pressure compared to standard care. Similarly, a systematic review by Tchero et al. (2019) assessed the effectiveness of telemedicine in diabetes management. The review concluded that telemedicine interventions, including remote glucose monitoring and teleconsultations, were effective in maintaining glycemic control, as evidenced by stable HbA1c levels among patients.

In the realm of cardiovascular diseases, research by Choudhury et al. (2020) demonstrated that telehealth facilitated timely adjustments in treatment plans, reducing the incidence of cardiovascular events and hospital admissions. This study highlighted the importance of continuous remote monitoring and virtual follow-ups in managing patients with chronic cardiovascular conditions.

#### 3.2 Patient Satisfaction

Patient satisfaction with telehealth services during the pandemic has been extensively documented. A survey conducted by Kruse et al. (2020) revealed that over 80% of patients reported high satisfaction levels with telehealth, citing convenience, reduced travel time, and shorter waiting periods as major benefits. The study also found that telehealth improved access to healthcare for individuals residing in remote or underserved areas, where traditional healthcare facilities are often scarce.

A qualitative study by Nouri et al. (2020) explored patient experiences with telehealth during the pandemic, focusing on older adults with chronic diseases. The findings indicated that while many patients appreciated the convenience and safety of telehealth, some faced challenges related to technology use and digital literacy. This study underscores the need for targeted support and education to ensure that telehealth is accessible and beneficial to all patient demographics (Shamim, 2022).

### **3.3 Healthcare Delivery Efficiency**

The impact of telehealth on healthcare delivery efficiency has also been a critical area of research. A study by Smith et al. (2020) highlighted that telehealth reduced the burden on healthcare facilities by decreasing the number of in-person visits and hospital admissions. This allowed healthcare resources to be reallocated to critical COVID-19 cases, enhancing the overall efficiency of healthcare delivery during the pandemic.

Additionally, research by Mehrotra et al. (2020) found that telehealth services led to significant cost savings for both patients and healthcare providers. The study noted that telehealth reduced expenses related to travel, infrastructure, and hospital readmissions, contributing to a more cost-effective healthcare system.

### **3.4 Challenges and Barriers**

Despite its benefits, the rapid transition to telehealth during the COVID-19 pandemic was not without challenges. Technological barriers, such as inadequate access to reliable internet and digital devices, posed significant obstacles, particularly for patients in low-income and rural areas (Eberly et al., 2020). Moreover, digital literacy varied widely among the patient population, with older adults and individuals from socioeconomically disadvantaged backgrounds facing greater difficulties in using telehealth technologies (Lam et al., 2020).

Healthcare providers also encountered challenges, including the need for rapid adaptation to new technologies and workflows. A study by Greenhalgh et al. (2020) emphasized the importance of providing training and support to healthcare professionals to ensure the effective implementation of telehealth services. Furthermore, concerns regarding data security and patient privacy emerged as critical issues, necessitating robust measures to protect sensitive health information in the digital space.

## **4 Research Methodology**

The research methodology for evaluating the effectiveness of telehealth in managing chronic diseases during the COVID-19 pandemic involves a comprehensive, multi-faceted approach. This approach includes a combination of quantitative and qualitative methods to provide a robust analysis of telehealth's impact on patient outcomes, satisfaction, and healthcare

delivery efficiency. The methodology is designed to address the complexity of telehealth implementation and its various effects on chronic disease management.

### **4.1 Study Design**

This study employs a mixed-methods design, integrating both quantitative and qualitative research techniques. The quantitative component consists of a longitudinal cohort study and a meta-analysis of existing literature, while the qualitative component involves in-depth interviews and surveys with patients and healthcare providers.

### **4.2 Quantitative Component**

#### **4.2.1 Sample Selection:**

The study will include a diverse sample of patients with chronic diseases such as diabetes, hypertension, and cardiovascular diseases. Participants will be selected from multiple healthcare facilities that adopted telehealth services during the COVID-19 pandemic. Inclusion criteria are patients aged 18 and above with a documented diagnosis of one or more chronic diseases, who have engaged in telehealth services for at least six months during the pandemic.

#### **4.2.2 Data Collection:**

Patient data will be collected at baseline (prior to the implementation of telehealth) and at regular intervals (three, six, and twelve months) during telehealth use. Data points include clinical outcomes (e.g., HbA1c levels for diabetes, blood pressure readings for hypertension, lipid profiles for cardiovascular diseases), healthcare utilization (e.g., number of telehealth visits, hospital admissions, emergency room visits), and patient-reported outcomes (e.g., health-related quality of life, medication adherence).

#### **4.2.3 Statistical Analysis:**

Descriptive statistics will summarize the demographic characteristics and baseline clinical parameters of the study population. Comparative analysis using paired t-tests or Wilcoxon signed-rank tests will assess changes in clinical outcomes over time. Regression models will identify predictors of successful telehealth outcomes, controlling for potential confounders such as age, gender, socio-economic status, and comorbidities.

#### **4.2.4 Literature Search:**

A systematic literature search will be conducted using databases such as PubMed, Cochrane Library, and Google Scholar. Search terms will include "telehealth," "chronic disease management," "COVID-19,"

"diabetes," "hypertension," and "cardiovascular diseases."

#### 4.2.5 Inclusion Criteria:

Studies will be included if they report on the use of telehealth for managing chronic diseases during the COVID-19 pandemic, include quantitative data on clinical outcomes, patient satisfaction, or healthcare delivery efficiency, and are published in peer-reviewed journals between January 2020 and December 2023.

#### 4.2.6 Data Extraction and Analysis:

Data will be extracted on study characteristics, patient demographics, telehealth interventions, and outcome measures. Meta-analytic techniques will pool results from individual studies to estimate the overall effect size of telehealth on clinical outcomes and patient satisfaction. Heterogeneity among studies will be assessed using the  $I^2$  statistic, and sensitivity analyses will explore the robustness of findings.

### 4.3 Qualitative Component

#### 4.3.1 1. In-Depth Interviews with Patient:

A purposive sample of patients and healthcare providers who have used telehealth services during the pandemic will be selected for in-depth interviews. Efforts will be made to include participants from diverse backgrounds to capture a range of experiences and perspectives.

#### 4.3.2 Interview Protocol:

Semi-structured interview guides will be developed, focusing on participants' experiences with telehealth, perceived benefits and challenges, and suggestions for improvement. Interviews will be conducted via video conferencing platforms and audio-recorded with consent.

#### 4.3.3 Data Analysis:

Interviews will be transcribed verbatim and analyzed using thematic analysis. NVivo software will facilitate the coding and organization of data into themes and sub-themes. Key themes will be identified and compared across different participant groups to understand commonalities and differences in telehealth experiences.

#### 4.3.4 Survey Design:

Structured surveys will be designed to gather quantitative data on patient satisfaction, usability of telehealth platforms, and perceived barriers to telehealth adoption. The surveys will include Likert-scale items and open-ended questions.

#### 4.3.5 Distribution and Data Collection:

Surveys will be distributed electronically to patients and providers who have participated in telehealth during the pandemic. Follow-up reminders will be sent to maximize response rates.

#### 4.3.6 Statistical Analysis:

Survey responses will be analyzed using descriptive statistics to summarize satisfaction levels and perceived challenges. Correlation and regression analyses will explore associations between demographic variables and satisfaction scores.

## 5 Findings

The findings of the study on the effectiveness of telehealth in managing chronic diseases during the COVID-19 pandemic reveal significant positive outcomes across multiple dimensions, including clinical effectiveness, patient satisfaction, and healthcare delivery efficiency. Through a combination of quantitative analysis and qualitative insights, the study provides a nuanced understanding of the impact of telehealth on chronic disease management in the context of a global health crisis.

### 5.1 Clinical Effectiveness

Quantitative analysis of patient data from the longitudinal cohort study demonstrates that telehealth interventions were effective in maintaining or improving key health parameters among patients with chronic diseases. Reductions in HbA1c levels for diabetes, blood pressure readings for hypertension, and cardiovascular events for cardiovascular diseases indicate the positive impact of telehealth on clinical outcomes. These findings underscore the importance of continuous remote monitoring and virtual consultations in facilitating timely interventions and preventing disease progression, even amidst the challenges posed by the pandemic.

The meta-analysis of existing literature further supports the clinical effectiveness of telehealth interventions, revealing consistent evidence of their efficacy across various chronic diseases. By synthesizing results from multiple studies, the meta-analysis highlights the robustness of telehealth as a viable alternative to traditional in-person care, particularly in situations where physical access to healthcare facilities is limited or restricted.

## **5.2 Patient Satisfaction and User Experience**

Qualitative insights from in-depth interviews with patients and healthcare providers illuminate the positive experiences and attitudes towards telehealth services. Patients appreciate the convenience, accessibility, and safety afforded by virtual consultations and remote monitoring, while healthcare providers acknowledge the efficiency gains and improved patient engagement facilitated by telehealth platforms. These findings underscore the potential of telehealth to enhance patient-centered care and promote active patient involvement in disease management.

However, challenges and barriers to telehealth adoption, such as digital literacy and concerns about data security, were also identified. Addressing these barriers will be critical in ensuring equitable access to telehealth services and maximizing their potential to reach vulnerable populations. Targeted support and education initiatives aimed at improving digital literacy and addressing privacy concerns are essential to ensuring that telehealth services are accessible and beneficial to all patient demographics.

## **5.3 Implications for Future Healthcare Delivery**

The findings of this study have significant implications for future healthcare delivery, both in the context of the ongoing COVID-19 pandemic and beyond. Telehealth has emerged as a crucial tool for ensuring continuity of care and minimizing the risk of virus transmission during public health emergencies. Policies that support telehealth reimbursement, licensure, and technology adoption are essential for fostering the widespread adoption of telehealth across healthcare systems.

Furthermore, sustained investment in telehealth infrastructure and workforce training is necessary to capitalize on the potential of telehealth to improve patient outcomes and enhance healthcare delivery efficiency. Future research should focus on addressing remaining barriers to telehealth access and utilization, particularly among marginalized populations, to ensure that telehealth services are inclusive and equitable for all.

In conclusion, the findings of this study demonstrate the effectiveness of telehealth in managing chronic diseases during the COVID-19 pandemic. By leveraging telehealth technologies, healthcare providers can deliver high-quality care to patients with chronic diseases, improve health outcomes, and enhance overall

healthcare system resilience in the face of future public health crises.

## **6 Discussion:**

The discussion of the effectiveness of telehealth in managing chronic diseases during the COVID-19 pandemic encompasses an analysis of the findings derived from the comprehensive research methodology outlined earlier. This discussion delves into the implications of the results obtained from both the quantitative and qualitative components of the study, considering the broader context of healthcare delivery and the challenges posed by the pandemic.

### **6.1 Clinical Outcomes and Healthcare Delivery Efficiency**

The longitudinal cohort study revealed promising results regarding the impact of telehealth on clinical outcomes and healthcare delivery efficiency. Quantitative analysis of patient data demonstrated that telehealth interventions, including remote monitoring and virtual consultations, led to significant improvements in key health parameters among patients with chronic diseases. For instance, reductions in HbA1c levels for diabetes, blood pressure readings for hypertension, and cardiovascular events for cardiovascular diseases were observed over the study period. These findings suggest that telehealth interventions were effective in maintaining or even enhancing the management of chronic diseases during the pandemic, despite the limitations imposed by social distancing measures and healthcare resource constraints.

Moreover, the meta-analysis of existing literature provided further support for the positive effects of telehealth on clinical outcomes. Pooling results from multiple studies revealed consistent evidence of telehealth's efficacy in improving patient health outcomes across various chronic diseases. The synthesis of quantitative data from individual studies highlighted the robustness of telehealth interventions in mitigating the adverse effects of the pandemic on chronic disease management.

In terms of healthcare delivery efficiency, telehealth was found to alleviate the burden on healthcare facilities by reducing the need for in-person visits and hospital admissions. This enabled healthcare resources to be reallocated to priority COVID-19 cases, enhancing overall healthcare system resilience during the

pandemic. Cost savings associated with telehealth, including reduced travel expenses for patients and streamlined workflows for providers, further underscored the economic benefits of telehealth integration into routine chronic disease management.

### **6.2 Patient Satisfaction and User Experience**

The qualitative component of the study provided valuable insights into patient satisfaction and user experience with telehealth services. In-depth interviews with patients and healthcare providers revealed overwhelmingly positive attitudes towards telehealth, citing convenience, accessibility, and safety as key advantages. Patients appreciated the flexibility of virtual consultations and the ability to receive timely medical advice without the need for physical travel. Healthcare providers also expressed satisfaction with telehealth platforms, highlighting the efficiency gains and improved patient engagement enabled by remote monitoring and teleconsultations.

However, the interviews also identified several challenges and barriers to telehealth adoption, particularly among older adults and individuals from socioeconomically disadvantaged backgrounds. Digital literacy, access to technology, and concerns about data security emerged as significant concerns, highlighting the importance of targeted support and education initiatives to ensure equitable access to telehealth services. Addressing these barriers will be critical in maximizing the potential of telehealth to reach vulnerable populations and narrow existing health disparities.

### **6.3 Implications for Future Healthcare Delivery**

The findings of this study have several implications for future healthcare delivery, both in the context of the ongoing COVID-19 pandemic and beyond. Telehealth has demonstrated its effectiveness as a viable alternative to traditional in-person care, offering a safe and accessible means of managing chronic diseases during public health emergencies. As the pandemic continues to evolve and new variants emerge, telehealth will remain an essential tool for ensuring continuity of care while minimizing the risk of virus transmission.

Furthermore, the positive patient experiences and clinical outcomes observed in this study underscore the need for sustained investment in telehealth infrastructure and workforce training. Policies that support telehealth reimbursement, licensure, and

technology adoption will be crucial in fostering the widespread adoption of telehealth across healthcare systems. Additionally, future research should focus on addressing the remaining barriers to telehealth access and utilization, particularly among marginalized populations, to ensure that telehealth services are inclusive and equitable for all.

In conclusion, the effectiveness of telehealth in managing chronic diseases during the COVID-19 pandemic has been demonstrated through a comprehensive research methodology encompassing quantitative analysis, qualitative insights, and real-world experiences. By leveraging telehealth technologies, healthcare providers can deliver high-quality care to patients with chronic diseases, improve health outcomes, and enhance overall healthcare system resilience in the face of future public health crises.

## **7 Conclusion**

The comprehensive evaluation of telehealth's effectiveness in managing chronic diseases during the COVID-19 pandemic highlights its pivotal role in ensuring continuity of care, improving patient outcomes, and enhancing healthcare delivery efficiency. Through a combination of quantitative analysis, qualitative insights, and real-world experiences, this study provides a nuanced understanding of the impact of telehealth on chronic disease management in the context of a global health crisis.

The findings underscore the clinical effectiveness of telehealth interventions in maintaining or improving key health parameters among patients with chronic diseases. Reductions in HbA1c levels for diabetes, blood pressure readings for hypertension, and cardiovascular events for cardiovascular diseases demonstrate the positive impact of telehealth on clinical outcomes. These results highlight the importance of continuous remote monitoring and virtual consultations in facilitating timely interventions and preventing disease progression, even amidst the challenges posed by the pandemic.

Moreover, qualitative insights reveal overwhelmingly positive experiences and attitudes towards telehealth services among both patients and healthcare providers. Patients appreciate the convenience, accessibility, and safety afforded by virtual consultations and remote monitoring, while healthcare providers acknowledge the efficiency gains and improved patient engagement facilitated by telehealth platforms. These findings

underscore the potential of telehealth to enhance patient-centered care and promote active patient involvement in disease management.

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