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## Enhancing Patients' Health Outcomes through Telehealth and Remote Monitoring: Exploring Influential Factors on Patient Perception and Acceptance

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### Abstract

Telehealth and remote monitoring have revolutionized healthcare delivery by providing continuous, real-time patient care beyond traditional clinical settings. These technologies improve access to healthcare services, enhance chronic disease management, and reduce hospitalizations, ultimately contributing to better health outcomes. However, the success of telehealth relies significantly on patient perception and acceptance, which are influenced by multiple factors. This review explores the key determinants that shape patients' willingness to adopt telehealth and remote monitoring solutions, including technological, personal, psychological, and healthcare system-related factors. Ease of use, reliability, and integration with electronic health records (EHR) are critical technological factors affecting patient acceptance. Personal attributes such as age, education, digital literacy, and socioeconomic status also play a crucial role in determining the adoption of telehealth services. Additionally, psychological aspects, including trust in technology and healthcare providers, concerns about data privacy, and readiness for digital health engagement, influence patient perception. From a broader perspective, healthcare policies, insurance coverage, and provider support systems impact the widespread implementation and acceptance of telehealth solutions. Despite the benefits, challenges such as digital accessibility disparities, resistance from both patients and healthcare providers, technical limitations, and privacy concerns hinder the full integration of telehealth into routine care. To address these issues, strategies such as improving digital health literacy, enhancing telehealth platform usability, strengthening cybersecurity measures, and developing supportive policies are essential. This review presents case studies of successful telehealth implementations and discusses best practices for optimizing patient-centered remote care. Findings suggest that improving patient perception and acceptance of telehealth can lead to better adherence, higher patient engagement, and ultimately improved health outcomes. Moving forward, a multidisciplinary approach involving policymakers, healthcare providers, and technology developers is essential to maximize the benefits of telehealth and remote monitoring.

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### 1. Introduction

Telehealth and remote monitoring have rapidly evolved as essential components of modern healthcare, driven by advancements in digital technology, a growing demand for accessible care, and the need to reduce healthcare costs (Adegoke *et al.*, 2022) <sup>[1]</sup>. Telehealth refers to the delivery of healthcare services remotely, utilizing telecommunications technologies, including video

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consultations, remote patient monitoring, and mobile health applications. Remote monitoring involves the use of electronic devices to track patients' vital signs and health conditions outside traditional clinical settings (Malasinghe *et al.*, 2019) [28]. These innovations have revolutionized the way healthcare is delivered, particularly in the context of chronic disease management, elderly care, and mental health support. By allowing healthcare providers to monitor patients' conditions continuously, telehealth improves patient access to care, reduces the need for frequent in-person visits, and enhances healthcare delivery in underserved and rural areas. The COVID-19 pandemic further accelerated the adoption of telehealth, highlighting its potential to maintain continuity of care during times of crisis (Soon *et al.*, 2020) [44].

However, the successful adoption of telehealth depends not only on technological advancements but also on the patients' perceptions and willingness to embrace these new methods of healthcare delivery (Tsai *et al.*, 2019) [47]. Patient acceptance plays a pivotal role in determining the effectiveness and sustainability of telehealth services. Despite the growing availability of telehealth options, patient reluctance, fear of technology, concerns about privacy, and a lack of familiarity with digital health tools can hinder the full integration of telehealth into everyday practice (Palacholla *et al.*, 2019) [35]. The role of healthcare providers in educating patients, ensuring proper training on telehealth platforms, and addressing any concerns about confidentiality and data security is crucial to overcoming these barriers (Cowan *et al.*, 2019; Kaplan, 2020) [9]. Understanding how patients perceive telehealth services is essential to addressing the challenges of adoption and maximizing the benefits of remote care.

The objectives of this review are to explore the current landscape of telehealth and remote monitoring in modern healthcare, to examine the factors influencing patient acceptance and perception of these technologies, and to highlight strategies for improving adoption. By understanding both the potential advantages and challenges associated with telehealth, healthcare systems can better integrate these services into routine practice, ensuring that patients receive high-quality care while promoting positive outcomes for both individuals and healthcare providers. This review will also discuss the policy implications of telehealth adoption, identifying key considerations for future developments and implementation.

## 2.0 Methodology

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology is a widely accepted framework for conducting systematic reviews and meta-analyses, ensuring transparency and consistency. The purpose of this review is to explore the factors that influence patient perception and acceptance of telehealth and remote monitoring in enhancing health outcomes. This methodology outlines the steps followed in the review process to identify, evaluate, and synthesize relevant evidence on the topic.

The first step involved formulating a clear and focused research question: "What are the key factors influencing patient perception and acceptance of telehealth and remote monitoring in healthcare?" This question is designed to explore various factors that affect the willingness of patients to adopt telehealth technologies and their subsequent impact on health outcomes. These factors include technological readiness, usability of telehealth platforms, patient-provider relationships, trust in remote monitoring systems, privacy

concerns, and the perceived effectiveness of telehealth in managing health conditions.

A comprehensive search strategy was developed to identify relevant studies. Databases such as PubMed, CINAHL, Scopus, and Google Scholar were systematically searched for articles published in English from 2010 to 2023. Keywords and Medical Subject Headings (MeSH) terms related to telehealth, remote monitoring, patient acceptance, health outcomes, and patient perception were used in various combinations to ensure the broadest possible capture of relevant literature. Studies included in the review were required to meet specific inclusion criteria, including empirical research on patient perceptions and acceptance of telehealth, remote monitoring, or both, and studies that evaluated the impact of these technologies on health outcomes. Articles that focused solely on healthcare provider perspectives, lacked empirical evidence, or did not provide clear data on patient experiences were excluded.

Data extraction was performed independently by two reviewers to ensure consistency and accuracy. Key information from each study was collected, including study design, sample size, patient demographics, intervention types (telehealth and remote monitoring), and the specific factors influencing patient perception and acceptance. Data on health outcomes, such as improvements in chronic disease management, reduction in hospital admissions, and patient satisfaction, were also extracted. Discrepancies between the two reviewers in the selection of studies or data extraction were resolved through discussion, and a third reviewer was consulted when needed.

The quality of the included studies was assessed using standardized tools such as the Critical Appraisal Skills Programme (CASP) checklist for qualitative studies and the Newcastle-Ottawa Scale (NOS) for cohort studies. Studies were appraised for risk of bias, methodological rigor, and relevance to the review question. This assessment helped to determine the reliability of the findings and their contribution to answering the research question.

A narrative synthesis approach was employed to analyze the data due to the diversity of study designs and outcomes. Themes related to patient perception, acceptance, and the influence of telehealth and remote monitoring on health outcomes were identified. Common themes included technological barriers, the role of healthcare provider communication, trust in remote monitoring devices, privacy concerns, and the perceived effectiveness of telehealth in improving health management. These factors were categorized into domains such as technological readiness, trust, usability, communication, and effectiveness. The synthesis of findings provided a comprehensive understanding of how these factors interact to shape patient acceptance and influence health outcomes.

Finally, the review's findings were presented, and implications for future research and practice were discussed. The synthesis revealed that while telehealth and remote monitoring have shown promise in improving health outcomes, patient acceptance is influenced by several factors that require attention, including technological literacy, communication with healthcare providers, privacy concerns, and the perceived effectiveness of telehealth in managing health conditions. The review emphasizes the need for further studies exploring these factors in diverse populations and settings to better understand how to enhance patient acceptance and, consequently, health outcomes through

telehealth and remote monitoring.

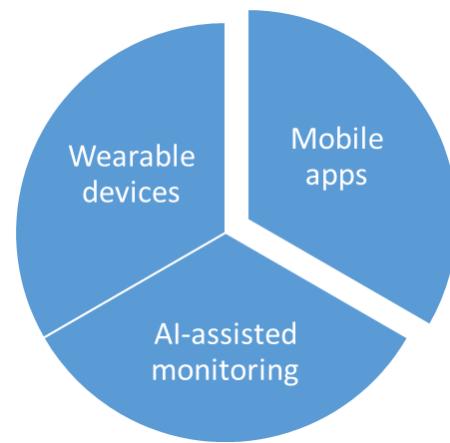
This systematic review contributes to the growing body of evidence on the role of telehealth and remote monitoring in healthcare by providing a comprehensive examination of the factors that influence patient perception and acceptance. The findings can inform the design of patient-centered interventions that promote the adoption of these technologies, ultimately improving patient health outcomes and the overall quality of care.

## 2.1 Telehealth and Remote Monitoring: Definition and Scope

Telehealth and remote monitoring represent a transformative shift in healthcare delivery, enabled by advancements in technology (Vesselkov *et al.*, 2018) <sup>[49]</sup>. Telehealth refers to the use of digital communication technologies to deliver healthcare services and information at a distance. It encompasses a wide range of services, including virtual consultations, remote patient monitoring, telemedicine, and health education. Remote monitoring, a subset of telehealth, specifically involves the use of technology to collect patient data and transmit it to healthcare providers for continuous assessment and management, often in real-time. Together, these approaches enhance access to healthcare, particularly for patients in remote areas or those with mobility issues, and are increasingly recognized for their ability to improve health outcomes.

Key concepts in telehealth and remote monitoring include the delivery of healthcare through telecommunications technologies, ensuring that patients can access care remotely. This approach breaks down geographic, economic, and logistical barriers to healthcare access, making it a valuable tool for patients living in rural or underserved areas. Additionally, telehealth offers the advantage of enhancing continuity of care, as it facilitates ongoing monitoring and communication between patients and healthcare providers outside of traditional clinic settings (Sasangohar *et al.*, 2020) <sup>[40]</sup>. Remote monitoring plays a crucial role by continuously tracking physiological parameters such as blood pressure, heart rate, glucose levels, and oxygen saturation, offering real-time insights into a patient's health status and enabling timely interventions when necessary (Kalid *et al.*, 2018; Shao *et al.*, 2020) <sup>[20]</sup>.

Several technologies and tools support telehealth and remote monitoring. Wearable devices, such as fitness trackers, smartwatches, and medical-grade wearables, are central to this space (Revathi *et al.*, 2019) <sup>[38]</sup>. These devices monitor various health parameters like heart rate, physical activity, sleep patterns, and more. The data collected by these devices is often transmitted wirelessly to healthcare providers, allowing for the remote monitoring of patients in real time. Mobile applications (apps) also play a significant role by facilitating communication between patients and healthcare providers, tracking symptoms, managing medications, and providing health education (Qudah and Luetsch, 2019) <sup>[37]</sup>. These apps are integrated with wearable devices to collect patient data and provide insights into health trends, enabling personalized care. Furthermore, artificial intelligence (AI) and machine learning are increasingly utilized in telehealth to enhance monitoring accuracy, detect early signs of health deterioration, and even predict potential health events. AI-driven algorithms can analyze large amounts of health data to identify patterns and provide actionable recommendations for healthcare providers, improving the overall quality of care.



**Fig 1:** Tools used in telehealth and remote monitoring

The benefits of telehealth for patients and healthcare providers are multifaceted. For patients, telehealth increases access to healthcare services, particularly in areas with a shortage of healthcare providers (Kearly *et al.*, 2020) <sup>[22]</sup>. It reduces the need for travel, saving time and expenses while improving convenience, especially for individuals with chronic conditions who require regular follow-ups. Additionally, telehealth fosters greater patient engagement by offering easy access to healthcare providers and enabling personalized, timely care. Patients with chronic diseases, such as diabetes or hypertension, can be continuously monitored through remote technologies, which allows for the detection of potential complications before they require emergency intervention (Mohammed *et al.*, 2019) <sup>[33]</sup>. This approach not only improves patient outcomes but also reduces healthcare costs associated with hospitalizations and emergency care.

For healthcare providers, telehealth enhances the efficiency and scalability of services. It reduces the burden on healthcare facilities by allowing patients to be monitored remotely, thus freeing up resources for more complex cases that require in-person visits. Remote monitoring also enables providers to track a patient's health progress over time, facilitating more informed decision-making and proactive care (Chen *et al.*, 2020) <sup>[8]</sup>. Furthermore, telehealth can help healthcare systems reach more patients, even in underserved or rural areas, ensuring that healthcare access is equitable (Leath *et al.*, 2018) <sup>[25]</sup>. Providers also benefit from telehealth tools that allow them to offer consultations, diagnostics, and follow-ups remotely, thus increasing their ability to manage large patient populations and improving overall productivity. In addition to these individual benefits, telehealth and remote monitoring contribute to healthcare system-wide improvements. By reducing hospital readmissions and unnecessary visits to emergency rooms, these technologies can alleviate strain on healthcare infrastructure. The integration of telehealth into healthcare systems can also result in cost savings, as it reduces travel costs, hospital stays, and time spent on non-critical appointments. This, in turn, enables healthcare systems to allocate resources more effectively and deliver better care at a lower cost. Telehealth also promotes preventive care by providing healthcare providers with continuous access to patient data, allowing for the identification of early signs of health deterioration and prompt interventions.

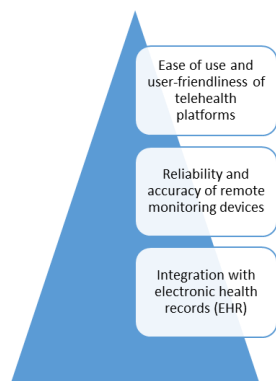
Telehealth and remote monitoring are revolutionizing the healthcare landscape by offering greater access to care,

enhancing patient outcomes, and improving healthcare efficiency. The integration of advanced technologies such as wearable devices, mobile apps, and AI-driven algorithms into telehealth platforms ensures that patients and healthcare providers can engage in continuous, real-time communication (Aggarwal *et al.*, 2020) [2]. These tools are empowering patients to take a more active role in managing their health while providing healthcare providers with the tools necessary to offer personalized, proactive care. As technology continues to advance, the potential for telehealth and remote monitoring to transform healthcare delivery is vast, and their integration into healthcare systems holds the promise of more accessible, efficient, and effective care for all (Gopal *et al.*, 2019; Kelly *et al.*, 2020) [14].

## 2.2 Impact of Telehealth on Patients' Health Outcomes

Telehealth has significantly impacted patients' health outcomes by transforming the way healthcare services are delivered. As a growing field within modern medicine, telehealth facilitates remote communication between patients and healthcare providers through digital technologies, which has become especially beneficial in enhancing access to care, improving chronic disease management, reducing hospital readmissions, and encouraging increased patient engagement. The evolution of telehealth has not only increased the reach of healthcare services but also improved patient outcomes across a broad spectrum of medical conditions, particularly chronic diseases (Standing *et al.*, 2018) [45].

One of the most significant benefits of telehealth is its ability to improve access to healthcare services, particularly for populations that face barriers to in-person visits. Rural and underserved communities, where healthcare providers may be scarce or geographically distant, benefit significantly from telehealth as it removes the necessity for travel. Patients in these areas can receive timely consultations, follow-up care, and health assessments without the burden of long trips to medical facilities. Moreover, telehealth offers convenience for patients with mobility issues, older adults, or individuals with chronic conditions who require frequent medical attention (Kruse *et al.*, 2020) [24]. Virtual consultations enable patients to receive medical advice and guidance from the comfort of their homes, thereby enhancing healthcare accessibility, reducing wait times, and lowering the risk of delayed treatment due to geographic or logistical constraints.



**Fig 2:** Technological factors influencing patient perception and acceptance of telehealth

Telehealth has also been particularly impactful in enhancing chronic disease management. Diseases such as diabetes,

hypertension, and cardiovascular diseases require continuous monitoring and management to prevent complications, including hospitalization and premature death (Bruemmer and Nissen, 2020) [6]. With telehealth, patients can be remotely monitored through wearable devices that track vital signs like blood pressure, glucose levels, and heart rate. This data is transmitted to healthcare providers, who can adjust treatment plans in real-time based on the patient's health status. In the case of diabetes, telehealth tools allow patients to monitor their blood glucose levels and receive immediate feedback from their healthcare provider, thus improving glycemic control. Similarly, patients with hypertension can benefit from regular monitoring of their blood pressure, enabling early detection of irregularities and proactive management (Burnier and Egan, 2019) [7]. For cardiovascular patients, remote monitoring tools track heart rate variability and ECG readings, providing early warning signs for potential cardiac events. By enhancing ongoing monitoring, telehealth promotes better management of chronic conditions, leading to improved health outcomes and reduced complications.

Another significant benefit of telehealth is the reduction in hospital readmissions and emergency visits (Bhatt *et al.*, 2019) [5]. For patients with chronic diseases or those recovering from surgery or acute illness, telehealth offers a mechanism for continuous follow-up care. Healthcare providers can monitor recovery progress remotely, offer advice, and intervene early if complications arise, thereby reducing the need for emergency visits or hospital readmissions. Studies have shown that telehealth interventions, such as remote monitoring programs for heart failure or chronic obstructive pulmonary disease (COPD), significantly decrease the frequency of hospital admissions. By keeping patients out of the hospital through regular virtual consultations and monitoring, healthcare systems can reduce the strain on emergency departments and inpatient facilities, all while maintaining the quality of care (Uppal *et al.*, 2020) [48]. The ability to manage conditions proactively and avoid emergency interventions leads to better patient outcomes and lowers healthcare costs associated with emergency care and readmissions.

Telehealth has also contributed to increased patient engagement and self-management of health. By enabling patients to monitor their health continuously and share their results with healthcare providers in real-time, telehealth empowers individuals to take a more active role in managing their health. The integration of mobile health applications and wearable devices facilitates the tracking of key health metrics such as exercise, nutrition, medication adherence, and symptom reporting (McConnell *et al.*, 2018) [29]. This information provides healthcare providers with valuable insights into the patient's health behaviors, which can then be used to offer personalized feedback and recommendations. Telehealth also enables patients to communicate directly with their healthcare providers via secure messaging or video calls, which fosters a sense of involvement and control over their care. Studies have shown that when patients are actively engaged in their care, they are more likely to adhere to treatment plans, make healthier lifestyle choices, and experience better outcomes. The use of digital health tools in telehealth encourages a more collaborative and patient-centered approach, resulting in improved self-management of chronic conditions and a greater sense of responsibility for one's own health (Öberg *et al.*, 2018; Dadgar and Joshi, 2018)

[33].

Increased patient engagement through telehealth also plays a critical role in preventing the progression of diseases. For example, telehealth programs targeting weight management, smoking cessation, and physical activity offer patients support and accountability from healthcare providers, improving adherence to preventive measures. In turn, this proactive engagement helps prevent the development of more serious complications, such as diabetic neuropathy or cardiovascular disease progression. Patients using telehealth tools are also more likely to adopt positive health behaviors, such as medication adherence and regular physical activity, which contribute to better disease management (Rush *et al.*, 2018) [39].

Despite the clear benefits, some challenges remain in fully realizing the potential of telehealth in improving patient outcomes. These include issues related to technology access, health literacy, and reimbursement policies. For patients without access to the internet or smartphones, telehealth can create barriers to participation. Furthermore, not all patients are comfortable with or proficient in using digital tools, making education and training an essential aspect of successful telehealth adoption. Additionally, reimbursement for telehealth services remains inconsistent across different healthcare systems, which may limit its widespread use.

Telehealth and remote monitoring have made significant strides in improving health outcomes for patients, particularly those with chronic diseases. By improving access to healthcare services, enhancing chronic disease management, reducing hospital readmissions, and fostering greater patient engagement, telehealth has demonstrated its potential to transform healthcare delivery (Gupta *et al.*, 2019) [16]. As technology continues to evolve, telehealth will likely play an even more integral role in providing personalized, patient-centered care. Ensuring equitable access to these technologies and addressing challenges related to digital literacy and reimbursement will be key to maximizing the benefits of telehealth and remote monitoring in the future.

### 2.3 Factors Influencing Patient Perception and Acceptance of Telehealth

Patient perception and acceptance of telehealth are influenced by various factors, which span technological, personal, psychological, and healthcare system-related aspects. Understanding these factors is essential for the successful adoption of telehealth services, as they play a critical role in determining whether patients feel comfortable using digital health technologies for their healthcare needs.

Technological Factors play a pivotal role in patient acceptance of telehealth services. The ease of use and user-friendliness of telehealth platforms is one of the most significant factors affecting patient perception. Patients are more likely to adopt telehealth if the platforms are intuitive, easy to navigate, and accessible, with minimal technical issues. Complex interfaces or technical difficulties can create frustration, leading to reluctance in using these services. The reliability and accuracy of remote monitoring devices also impact patient confidence in telehealth. Devices used for remote monitoring, such as wearable health trackers or blood pressure cuffs, must provide accurate and consistent data to ensure trust in the information being shared with healthcare providers (Albahri *et al.*, 2018) [3]. If patients perceive these tools as unreliable, they may be hesitant to fully embrace telehealth. Furthermore, the integration with Electronic

Health Records (EHR) is critical for seamless communication between patients and healthcare providers. Telehealth platforms that are well-integrated with EHR systems can ensure that patient data is updated in real-time, facilitating efficient care coordination and enhancing the overall patient experience.

Personal and Demographic Factors also significantly influence patient perceptions. Age, education, and digital literacy are key determinants of how comfortable patients are with using telehealth services. Older adults or individuals with lower levels of education and digital literacy may face challenges in navigating telehealth platforms, which can affect their willingness to adopt such technologies (Triana *et al.*, 2020) [46]. For these patients, healthcare providers may need to offer additional training or support to facilitate adoption. Additionally, socioeconomic status and accessibility to technology are critical. Patients in lower-income households may lack access to the necessary technology, such as smartphones, computers, or reliable internet connections, to use telehealth services effectively. In this regard, ensuring equitable access to digital devices and high-speed internet is essential for broadening the reach of telehealth services. Moreover, a patient's health condition and perceived need for telehealth services can influence their acceptance. Patients with chronic conditions that require frequent monitoring or those living in remote areas may perceive telehealth as an essential tool for managing their health, thus increasing their acceptance of the technology.

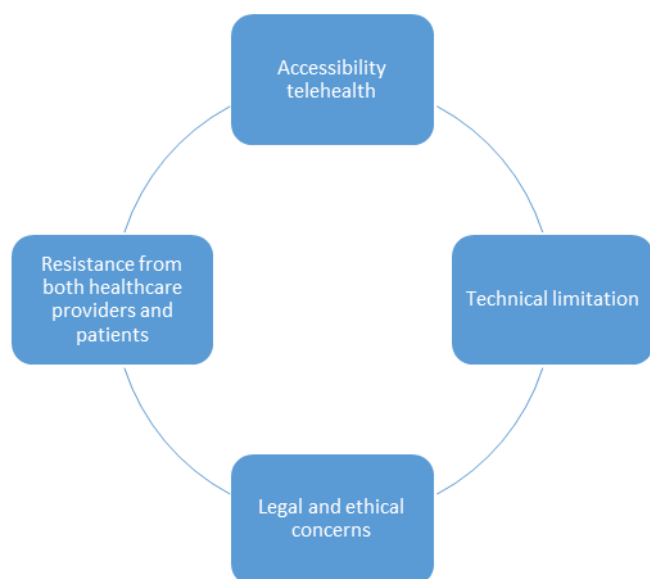
Psychological and Behavioral Factors are also important in shaping patient perception and acceptance. Trust in technology and healthcare providers is crucial for patient confidence in telehealth services. Patients need to feel assured that the telehealth platform is secure, the technology works as intended, and their healthcare provider is experienced in using telehealth (Ding *et al.*, 2020) [11]. If patients lack trust in any of these areas, they may be reluctant to adopt telehealth as a primary mode of care. Concerns about data privacy and security are another critical factor that can affect patient willingness to engage with telehealth services. Given that telehealth involves the sharing of sensitive personal health information, patients must trust that their data will be protected and that privacy regulations are in place to safeguard their information. As a result, healthcare providers must ensure robust security measures are in place and clearly communicate these protections to patients. Lastly, a patient's readiness for digital health adoption is influenced by their personal attitudes toward technology. Individuals who are more comfortable with technology or who have had positive experiences with digital tools in other areas of life may be more willing to embrace telehealth.

Healthcare System and Policy Factors also play a significant role in the acceptance of telehealth services. Insurance coverage and reimbursement policies are among the most important factors influencing patient access to telehealth. Inconsistent reimbursement policies or lack of coverage for telehealth services can create financial barriers that deter patients from using telehealth, even if they are willing to try it. Clear and comprehensive reimbursement policies are necessary to encourage both patients and healthcare providers to fully embrace telehealth. Additionally, provider training and support for telehealth implementation is essential for effective patient care. Healthcare providers must be trained in using telehealth platforms and equipped with the knowledge to troubleshoot technical issues, engage with patients

remotely, and ensure a smooth telehealth experience (Paterson *et al.*, 2020) <sup>[36]</sup>. If providers are not sufficiently trained or supported in telehealth adoption, patients may perceive the technology as unreliable or ineffective. Lastly, regulatory and ethical considerations are critical factors that influence the deployment and acceptance of telehealth. Patients need assurance that telehealth practices adhere to established healthcare regulations and ethical standards. Patient perception and acceptance of telehealth are influenced by a variety of factors, including technological capabilities, personal demographics, psychological readiness, and healthcare system and policy elements. Understanding these factors is crucial for the successful implementation of telehealth programs and for ensuring that patients feel confident in using digital health technologies for their care. By addressing these factors, healthcare systems can enhance patient engagement, increase adoption rates, and ultimately improve health outcomes through the widespread use of telehealth (Lyles *et al.*, 2020) <sup>[27]</sup>.

#### 2.4 Barriers and Challenges in Telehealth Adoption

Telehealth has emerged as a revolutionary approach to delivering healthcare, offering the potential for more accessible, efficient, and patient-centered care. However, its adoption is not without barriers. A range of challenges, including issues related to accessibility, resistance from both healthcare providers and patients, technical limitations, and legal and ethical concerns, must be addressed to fully realize the potential of telehealth in modern healthcare systems.



**Fig 3:** Barriers and challenges in telehealth adoption

One of the most significant barriers to telehealth adoption is the digital divide and accessibility issues. The digital divide refers to the gap between individuals who have access to modern information and communication technology (ICT) and those who do not. This divide is particularly pronounced in rural areas, low-income populations, and older adults who may lack access to the necessary technology, such as high-speed internet, smartphones, or computers. In these regions, patients may not be able to access telehealth services, limiting the reach of digital healthcare initiatives. Furthermore, limited digital literacy among certain populations such as older adults or those with lower education levels can prevent

individuals from effectively using telehealth platforms. Healthcare providers must address these gaps by ensuring that telehealth services are accessible to all patients, regardless of their socioeconomic background, geographic location, or technological expertise (Hilty *et al.*, 2020) <sup>[18]</sup>. Solutions may include subsidized access to technology, educational programs, and the provision of support services for patients who struggle with digital tools.

Resistance from healthcare providers and patients also poses a significant challenge to the widespread adoption of telehealth. Healthcare providers may be resistant to telehealth due to concerns over the effectiveness and quality of remote care, as well as the perceived complexity of integrating telehealth platforms into existing workflows. Providers may feel uncomfortable with the technology or may worry that it will disrupt their relationships with patients (Gordon *et al.*, 2020) <sup>[15]</sup>. Additionally, some providers may lack the necessary training or support to effectively use telehealth platforms, making them hesitant to adopt these technologies. On the other hand, patients may resist telehealth due to concerns about the lack of in-person interaction with their healthcare providers or a perceived lack of personalized care. Older patients, in particular, may be unfamiliar with telehealth technologies and reluctant to trust digital platforms for their healthcare needs. To overcome this resistance, both patients and providers need to be educated on the benefits of telehealth, and training programs should be implemented to ensure healthcare providers are equipped to use telehealth technologies effectively.

Another major challenge is technical limitations and connectivity issues. Telehealth services rely heavily on internet connectivity and digital devices to function properly. In areas with unstable or slow internet connections, telehealth consultations can be disrupted, leading to frustration for both patients and providers. Poor video quality, dropped calls, or delays in communication can undermine the effectiveness of remote consultations, making them less reliable than in-person visits. Additionally, some telehealth platforms may not be compatible with all devices, further complicating access for certain patients. To address these technical challenges, investment in infrastructure is essential, particularly in rural or underserved areas. Ensuring robust internet access and developing telehealth platforms that are compatible with a wide range of devices can help mitigate these issues (Ortega *et al.*, 2020) <sup>[34]</sup>. Remote monitoring involves the collection and transmission of patient data, which raises important issues related to patient privacy, data security, and informed consent. Patients may be reluctant to adopt telehealth services if they have concerns about the security of their personal health information, particularly given the increasing prevalence of cyberattacks targeting healthcare organizations. Moreover, regulatory frameworks for telehealth are still evolving, and there may be uncertainties about the legal implications of remote consultations, such as liability for misdiagnoses or the provision of care across state or national borders. Ethical considerations, such as ensuring equitable access to telehealth services and maintaining the quality of care, are also critical. Policymakers and healthcare providers must work together to develop clear guidelines and regulations that protect patients' privacy, ensure data security, and uphold the quality and safety of remote care. Comprehensive training in ethical practices and legal considerations will also be essential for healthcare providers who are adopting telehealth

technologies. While telehealth has the potential to transform healthcare delivery, several barriers hinder its widespread adoption. The digital divide and accessibility issues, resistance from both patients and healthcare providers, technical limitations, and legal and ethical concerns must be addressed to ensure equitable and effective telehealth services. By investing in infrastructure, providing education and training for both patients and providers, and developing comprehensive regulatory frameworks, the healthcare system can overcome these challenges and fully embrace the benefits of telehealth. With continued innovation and collaboration, telehealth can become a cornerstone of modern healthcare, improving access, quality, and patient outcomes across diverse populations.

## 2.5 Strategies to Improve Patient Acceptance and Engagement

Telehealth has the potential to revolutionize healthcare delivery by improving access, reducing costs, and enhancing patient engagement (Snoswell *et al.*, 2020) <sup>[43]</sup>. However, its widespread adoption and effectiveness depend heavily on patient acceptance and engagement. To optimize the benefits of telehealth, it is crucial to implement strategies that address barriers to acceptance and foster positive patient experiences. Several key strategies can improve patient acceptance and engagement with telehealth, including enhancing digital health literacy, improving platform usability, strengthening data privacy and security measures, and developing policies that support widespread adoption.

Enhancing digital health literacy and patient education is foundational to improving patient engagement in telehealth. A significant barrier to telehealth adoption, particularly among older adults, low-income populations, and those with limited technological experience, is a lack of digital health literacy. Patients who do not understand how telehealth works or how to use digital health tools may be reluctant to engage with them. To address this, healthcare systems must invest in patient education programs that teach patients how to use telehealth platforms, navigate digital health tools, and understand the benefits of remote care. These programs can include tutorials, user guides, and one-on-one sessions with healthcare professionals to ensure that patients feel comfortable using telehealth technologies. In addition, healthcare providers should proactively assess a patient's digital literacy and provide tailored support based on their individual needs (Hemsley *et al.*, 2018) <sup>[17]</sup>. Promoting digital health literacy ensures that patients are not left behind due to technological barriers and are better equipped to engage in telehealth.

Improving Telehealth Platform Usability and Accessibility is another critical strategy to enhance patient engagement. For telehealth to be successful, the platforms used for remote consultations must be user-friendly and accessible to a wide range of patients. The usability of telehealth platforms can significantly impact patient satisfaction and willingness to adopt these services. Platforms that are complicated to navigate or prone to technical issues can frustrate patients and hinder their overall experience. To enhance usability, platforms should be designed with the patient in mind, featuring simple interfaces, intuitive navigation, and clear instructions for use. Accessibility is also a key concern, particularly for patients with physical disabilities, hearing or vision impairments, or limited internet access. Telehealth platforms should be compatible with a variety of devices,

including smartphones, tablets, and computers, and should be optimized for low-bandwidth settings to ensure that patients in rural or underserved areas can access services (Wootton *et al.*, 2020) <sup>[50]</sup>. Additionally, language barriers should be considered by providing multi-language support or real-time translation services to accommodate diverse populations. Strengthening Data Privacy and Security Measures is essential for gaining patient trust and ensuring the successful adoption of telehealth. As telehealth involves the transmission of sensitive personal health information, patients must feel confident that their data is secure and protected from unauthorized access. Concerns about data privacy and security can deter patients from using telehealth services, particularly in light of high-profile cyberattacks and data breaches in the healthcare sector. To address these concerns, healthcare organizations must implement robust cybersecurity protocols, including end-to-end encryption, secure data storage, and strict access controls. It is also crucial to ensure compliance with regulations such as the Health Insurance Portability and Accountability Act (HIPAA) to safeguard patient information (Edemekong *et al.*, 2018) <sup>[13]</sup>. Furthermore, healthcare providers must clearly communicate to patients the measures in place to protect their data and ensure privacy. Transparency regarding data security can help alleviate patient concerns and foster trust in telehealth services.

Developing Policies to Support Widespread Telehealth Adoption is a critical step toward ensuring that telehealth becomes an integral part of healthcare delivery. Government agencies, insurance companies, and healthcare organizations must work together to create policies that encourage the use of telehealth services (Sklar and Robertson, 2020) <sup>[42]</sup>. One of the primary policy barriers to telehealth adoption is the inconsistency in insurance coverage and reimbursement policies. In many cases, telehealth services are not reimbursed at the same rate as in-person visits, which can deter healthcare providers from offering telehealth services and limit patient access to care. To address this, policies should be developed to ensure that telehealth services are reimbursed equitably, incentivizing providers to offer these services and making them more accessible to patients. Additionally, regulatory frameworks must be adapted to account for the unique nature of telehealth, including licensure across state lines and the provision of care to patients in remote areas. Policymakers should also support telehealth infrastructure development, particularly in underserved regions, to ensure that patients have access to the necessary technology and broadband internet to participate in telehealth consultations (Drake *et al.*, 2019; Bauerly *et al.*, 2109) <sup>[12]</sup>.

Improving patient acceptance and engagement in telehealth requires a multifaceted approach. By enhancing digital health literacy and patient education, improving the usability and accessibility of telehealth platforms, strengthening data privacy and security measures, and developing supportive policies, healthcare organizations can create an environment that fosters patient trust and engagement. These strategies can help overcome barriers to telehealth adoption, ensuring that patients can access high-quality care remotely and improve their overall health outcomes. As telehealth continues to evolve, the continued development of these strategies will be critical for ensuring the long-term success and effectiveness of digital healthcare services.

## 2.6 Case Studies and Best Practices

Telehealth and remote patient monitoring (RPM) have rapidly evolved as essential tools in modern healthcare, offering innovative ways to deliver care, enhance patient engagement, and improve health outcomes. Successful implementation of telehealth programs across different healthcare systems provides valuable insights into the effectiveness and potential of these technologies. By analyzing case studies and best practices, we can identify key lessons learned and anticipate future trends in telehealth and RPM.

Successful Implementation of Telehealth Programs in Different Healthcare Systems has been demonstrated in various settings, from urban hospitals to rural clinics. A prominent example of a successful telehealth program is the Veterans Health Administration's (VHA) telehealth initiative, which provides remote care to veterans across the United States (Lum *et al.*, 2020) [26]. This program has been particularly beneficial for patients living in rural areas, where access to healthcare providers is limited. By offering video consultations and remote monitoring of chronic conditions, the VHA has improved access to care, reduced travel time, and enhanced patient satisfaction. In another example, the Estonian healthcare system has leveraged telemedicine to provide comprehensive care, including remote consultations, diagnostic testing, and monitoring of chronic diseases like diabetes and hypertension. Estonia's success lies in its advanced digital health infrastructure, which integrates telehealth services with the country's national electronic health records (EHR) system, ensuring that patient information is readily accessible to healthcare providers. These case studies underscore the importance of leveraging digital infrastructure and ensuring that telehealth solutions are tailored to meet the needs of diverse patient populations.

Lessons Learned from Patient-Centered Approaches to Remote Monitoring highlight the significance of prioritizing patient needs and preferences in telehealth programs. One important lesson is the value of personalizing telehealth services to improve patient engagement and satisfaction. Programs that take into account individual health conditions, technology preferences, and socio-economic barriers have shown higher levels of patient adherence and better health outcomes. Programs that emphasize two-way communication and ongoing support lead to more successful outcomes, as patients feel empowered to take an active role in managing their health (Melvin *et al.*, 2020) [30]. Additionally, patient education about the benefits and functionality of telehealth tools is crucial in overcoming initial reluctance and enhancing long-term engagement. Healthcare providers who offer clear instructions, provide training materials, and offer assistance through dedicated helplines have observed improved acceptance and utilization of telehealth services.

Future trends in telehealth and remote patient monitoring are promising and continue to evolve rapidly as technology advances. One notable trend is the integration of artificial intelligence (AI) into telehealth platforms to enhance decision-making and predictive capabilities. AI algorithms can analyze large datasets from remote monitoring devices, such as wearable sensors, to predict health deterioration or detect early signs of complications (Muthu *et al.*, 2020) [32]. This integration can not only improve the accuracy of diagnoses but also enable proactive care, reducing the need for emergency interventions. Another trend is the expansion of remote monitoring for post-acute care. Telehealth is

increasingly used to monitor patients after surgery or hospital discharge, allowing healthcare teams to track recovery, manage medications, and prevent complications such as infections or re-hospitalizations. Additionally, wearable devices are becoming more sophisticated, with sensors capable of measuring a wider range of health metrics, including blood pressure, oxygen levels, and sleep patterns. As the technology becomes more advanced, we can expect these devices to be incorporated into everyday healthcare practices, providing patients with continuous monitoring of their health status.

Successful implementation of telehealth programs in diverse healthcare systems has demonstrated the effectiveness of remote care in improving access, reducing costs, and enhancing patient outcomes. Lessons learned from patient-centered approaches highlight the importance of personalization, patient education, and ongoing support in ensuring the success of telehealth initiatives. Looking ahead, AI, enhanced wearable technologies, and expanded remote monitoring for post-acute care are expected to shape the future of telehealth and RPM, providing more proactive, efficient, and personalized care (Jones *et al.*, 2020) [19]. As these trends evolve, healthcare systems must continue to invest in infrastructure, training, and policies to maximize the benefits of telehealth and improve patient outcomes on a global scale.

## 3. Conclusion

In conclusion, telehealth and remote monitoring have proven to be transformative forces in modern healthcare delivery, improving patient access to care, enhancing chronic disease management, and reducing healthcare costs. Key findings from this review highlight the positive impact of telehealth on healthcare systems, especially in increasing accessibility for underserved populations and improving patient outcomes in chronic disease management. Remote monitoring technologies, such as wearable devices and mobile applications, have demonstrated their potential to enhance patient engagement, reduce hospital readmissions, and facilitate real-time health monitoring, offering a more personalized and efficient approach to care.

The role of telehealth in transforming healthcare delivery is undeniable. By facilitating remote consultations, continuous monitoring, and providing patients with the tools to manage their health proactively, telehealth can bridge the gaps in traditional healthcare systems, especially in rural and underserved areas. It allows healthcare providers to reach patients who otherwise might have limited access to care, fostering a more inclusive and equitable healthcare environment. Moreover, telehealth has become an essential tool in reducing strain on healthcare facilities, particularly during public health emergencies such as the COVID-19 pandemic.

Looking ahead, the future of telehealth hinges on improving patient perception and acceptance of these technologies. Factors such as digital literacy, technological reliability, and data privacy concerns play a significant role in how patients perceive and embrace telehealth services. Addressing these factors through enhanced education, robust cybersecurity measures, and user-friendly interfaces will be crucial in promoting widespread adoption. Furthermore, healthcare providers and policymakers must continue to support the integration of telehealth into mainstream healthcare, ensuring

that regulatory frameworks, reimbursement policies, and training programs are in place to facilitate the expansion of these services. By addressing these challenges, telehealth has the potential to redefine the future of healthcare, making it more accessible, efficient, and patient-centered.

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