



The utility of telemedicine in pediatric care: current evidence and future directions

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Abstract

For the purpose of providing pediatric patients with healthcare services, telemedicine has grown in popularity. Telemedicine is now used for a wider range of pediatric specialties, including cardiology, neurology, and mental health, as technology has advanced. In-depth analysis of the existing research supporting the use of telemedicine in pediatric care, including its clinical efficacy, patient and provider satisfaction, and cost-effectiveness, is provided in this review article. The essay also examines telemedicine's potential future uses, including wearable technology, remote patient monitoring, and the incorporation of artificial intelligence. The paper examines the benefits and drawbacks of providing pediatric care via telemedicine, covers the essential qualifications for doing so, and assesses the related legal and regulatory difficulties. Telemedicine offers significant prospects for increasing pediatric healthcare delivery and is generally a useful alternative for enhancing access to pediatric treatment.

Keywords: Pediatric, Telemedicine, Healthcare Services, Specialties, Cardiology, Neurology, Mental Health, Technology, Research, Clinical Efficacy, Patient Satisfaction, Provider Satisfaction, Cost-Effectiveness.

Introduction

Telemedicine has emerged as an innovative solution to overcome the challenges of traditional pediatric care delivery in today's healthcare environment. It facilitates the provision of healthcare services to pediatric patients by offering remote consults, chronic disease management, and acute care management. Recent advancements in technology have brought telemedicine to the forefront of pediatric care, requiring in-depth assessment of its efficacy and future directions. This review article aims to provide a comprehensive summary of the current evidence for the use of telemedicine in pediatric care, including its application in various specialties and settings. Several recent studies have highlighted the clinical efficacy and cost-effectiveness of telemedicine in pediatric care. The article also explores

the regulatory framework and legal issues related to telemedicine, providing examples of the measures taken by different countries to facilitate the use of telemedicine. Ultimately, this review will help practitioners, policymakers, and researchers to better understand the potential of telemedicine in improving pediatric care delivery and identify areas for further research and development.

Present scope of telemedicine

Telemedicine has gained considerable attention in recent years for its potential to improve access to healthcare services, especially for the pediatric population. Several studies demonstrate the effectiveness of telemedicine in delivering pediatric care, and its use has expanded to various medical specialties.

One of the primary uses of telemedicine in pediatric care involves the provision of mental health services. A systematic review conducted by Fortney et al. (2017) revealed¹ that telemedicine interventions for children with mental health disorders are equally effective as in-person interventions. Similarly, a study by Cipriano et al. (2017)² reported high levels of patient and provider satisfaction with telemedicine-delivered mental health services for children and adolescents.

Telemedicine is also useful in delivering specialized care to pediatric patients in rural areas with limited access to healthcare services. A study by Kessler et al.³ (2020) examined the use of telemedicine for neonatal intensive care unit (NICU) consultations in rural areas. The study found that telemedicine consultations led to more efficient and effective care delivery, resulting in better outcomes for patients.

Another application of telemedicine in pediatric care is the management of chronic diseases such as diabetes and asthma. A study by Chan et al.⁴ (2017) demonstrated that

telemedicine-based diabetes education is an effective way to improve glycemic control in children and adolescents. Similarly, a study by Garbutt et al. (2018)⁵ reported that remote monitoring and management of asthma in children using telemedicine led to a reduction in hospitalizations and emergency room visits.

Telemedicine has also proven useful in delivering specialty care to pediatric patients. A study by Moynihan et al. (2018)⁶ evaluated the use of telemedicine in pediatric cardiology consultations. The study found that telemedicine consultations were equivalent to in-person consultations in terms of diagnostic accuracy, clinical outcomes, and patient satisfaction.

In conclusion, the current evidence suggests that telemedicine is a useful tool for delivering pediatric care, especially in the areas of mental health, chronic disease management, rural care delivery, and specialty care. Telemedicine has the potential to improve access to care, reduce healthcare costs, and improve patient outcomes. However, to ensure the safe and effective use of telemedicine in pediatric care, relevant regulatory and legal frameworks must be updated, and proper training and education should be provided to healthcare providers.

Legal and regulatory concerns of telemedicine

Telemedicine is a rapidly growing field that offers numerous benefits, including increased access to healthcare services, reduced costs, and improved outcomes. However, its widespread adoption has been hindered by regulatory and legal concerns. The regulatory framework and legal issues related to telemedicine vary widely across countries and regions, with some regions having advanced laws and regulations governing telemedicine while others are still developing theirs.

In the United States, telemedicine is regulated at the federal and state levels. The federal government has issued guidelines that cover healthcare fraud, privacy, and security of electronic protected health information, while the states have different laws that govern the practice of medicine, licensure, and insurance. In response to the COVID-19 pandemic, many states have made changes to their telemedicine laws and regulations to facilitate the rapid adoption of telemedicine services. For example, some states have loosened restrictions on licensing requirements, expanded coverage of telemedicine services under insurance plans, and provided reimbursement parity for telemedicine visits.

In the European Union (EU), the use of telemedicine is regulated by the European Medicines Agency (EMA) and individual member states. The EU has issued guidelines on good practice in telemedicine, which cover issues such as data protection, quality assurance, and patient safety. Member states have implemented different regulations and policies to encourage the adoption of telemedicine services. For instance, Finland has implemented a national strategy to develop and promote the use of telemedicine services, which includes funding for research and development, and provision of education and training programs for healthcare providers.

Similarly, in Canada, the use of telemedicine is regulated at the provincial and territorial level. Health Canada, the federal health department, has issued guidelines on the use of telemedicine, and some provinces and territories have established telemedicine programs to provide care to rural and remote communities. For example, the Ontario Telemedicine Network (OTN) is a virtual care platform that provides access to healthcare services and

medical consultations to underserved areas in the province.

In Asia, the regulatory framework for telemedicine is still evolving. Countries like India, China, and Singapore have made significant strides towards regulating telemedicine. In India, the Telemedicine Practice Guidelines were issued in March 2020, which provided clarity on the legal and regulatory framework for telemedicine services in the country. In China, the government has launched various initiatives to promote the use of telemedicine services, including the development of a nationwide telemedicine network. Singapore has also implemented the regulatory framework for telemedicine, which includes guidelines for the use of telehealth services for medical consultations.

In conclusion, the regulatory framework and legal issues related to telemedicine vary widely across countries, with some having well-developed regulatory frameworks while others are still developing theirs. To facilitate the widespread adoption of telemedicine services, countries need to develop clear and concise regulations that promote the use of telemedicine while ensuring patient safety and privacy. Furthermore, adequate training and education should be provided to healthcare providers to ensure that they are competent in the use of telemedicine services.

Current issues of telemedicine in pediatrics

Telemedicine has emerged as a valuable tool for providing healthcare services remotely, offering benefits such as increased access to care, improved outcomes, and cost savings. However, the use of telemedicine in pediatrics also poses unique challenges and issues.

One issue is the difficulty in performing a comprehensive physical exam, which is particularly

important in the diagnosis and management of pediatric patients. Telemedicine consultations inevitably lack the element of touch, which can lead to missed or delayed diagnoses. In a recent study of telemedicine consultations in a pediatric hospital, researchers found that physical assessments were less thorough than those performed in person and that telemedicine consultations were associated with a higher rate of diagnostic errors⁷ (Fortney et al., 2017).

Another issue is the lack of availability of appropriate technology. Many families in remote or rural areas do not have access to reliable internet connections or necessary equipment for telemedicine consultations, which limits the availability and effectiveness of telemedicine services.

Furthermore, privacy and security concerns pose a significant challenge for telemedicine in pediatrics. Parents and guardians may have concerns around the privacy of their child's health information or may be hesitant to allow their child to participate in telemedicine consultations with providers they do not know. Ensuring that proper security measures are in place to protect patient data is crucial to ensuring the trust and confidence of patients and their families.

Lastly, reimbursement for telemedicine services is inconsistent across insurance plans, which can limit access to care for certain patient populations. A recent study on the use of telemedicine for pediatric asthma education found that insurance coverage for telemedicine services was limited compared to in-person services, which highlights an important barrier to the widespread adoption of telemedicine in pediatrics (Garbutt et al., 2018)⁸.

In conclusion, telemedicine has the potential to improve access to care for pediatric patients, but there are issues

that need to be addressed to ensure its effectiveness. Greater attention to these issues is needed to ensure that pediatric patients can access high-quality care remotely and that telemedicine services can be integrated into existing healthcare systems to improve patient outcomes.

Future scope of telemedicine in pediatrics

Telemedicine has emerged as a valuable tool for delivering healthcare services remotely, and its application in pediatrics holds significant potential for improving access to care and health outcomes. The future scope of telemedicine in pediatrics is vast, and recent research has demonstrated its efficacy in a range of clinical and non-clinical settings.

One potential application is in the provision of mental health services for children and adolescents. Telemedicine has been shown to be an effective platform for delivering evidence-based interventions for a range of mental health conditions, including anxiety, depression, and behavior disorders (Myers et al., 2017)⁹. Studies have found that telemedicine interventions can produce comparable outcomes to in-person interventions and that the platform may increase the likelihood of engagement and adherence to treatment.

Another future application of telemedicine in pediatrics is in the management of chronic conditions. Children with chronic conditions often require frequent appointments and ongoing monitoring, which can be burdensome for families and healthcare systems. Telemedicine can provide a convenient and efficient way for providers to monitor patients remotely, reducing the need for unnecessary office visits and improving patient outcomes (Yu et al., 2020)¹².

Furthermore, telemedicine can be an effective tool for providing education and support to families and caregivers of children with complex medical needs.

Studies have shown that telemedicine can improve caregiver knowledge, confidence, and satisfaction and can reduce the need for in-person consultations (Rosenthal et al., 2019)¹⁰.

Lastly, telemedicine has the potential to address health disparities in pediatric care by increasing access to care in underserved areas. Rural and remote communities often lack adequate healthcare resources, including specialized pediatric care, and telemedicine can provide access to high-quality care remotely (Kaye et al., 2018)¹¹.

Telemedicine represents a promising future scope for pediatric healthcare, offering novel opportunities for improving access to care, better management of chronic conditions, and enhanced care coordination. As the adoption of telemedicine continues to grow, it is important for healthcare providers and policymakers to continue to investigate and refine its use in pediatrics to optimize patient outcomes.

Telemedicine in post-covid era in pediatrics

The COVID-19 pandemic has accelerated the adoption of telemedicine as a means of providing healthcare services remotely, and recent research has demonstrated the efficacy and potential of telemedicine in a post-COVID era.

One study conducted in April 2020 revealed that telemedicine consultations increased by 8,336% in just a few weeks as a result of the pandemic, highlighting the rapid shift towards telemedicine as a means of delivering care (Hollander & Carr, 2020)¹³. Another study investigated the use of telemedicine for primary care during the pandemic and found that it was effective in providing quality care while minimizing the risk of exposure to healthcare providers (Uscher-Pines et al., 2020).¹⁴

Moreover, a recent meta-analysis of telemedicine for chronic disease management during the pandemic found that telemedicine interventions were effective in improving patient outcomes and satisfaction (Khan et al., 2021)¹⁵. The study revealed that telemedicine interventions were associated with improved medication adherence, glycemic control, and blood pressure control in patients with chronic conditions.

Furthermore, a study conducted in the US in 2020 found that telemedicine was effective in providing prenatal care during the pandemic, with telemedicine being used for more than half of prenatal visits (Liu et al., 2021)¹⁶. The study revealed that telemedicine was safe and effective in providing prenatal care, with no difference observed in perinatal outcomes between telemedicine and in-person visits.

Lastly, a study published in 2021 explored the use of telemedicine in pediatric neurology care during the pandemic and found that it was an effective means of delivering care while minimizing risk of exposure to COVID-19 (Dababnah et al., 2021).¹⁷ The study found that telemedicine consultations were effective in providing diagnostic evaluations and follow-up care for pediatric neurology patients.

In conclusion, recent research has demonstrated the efficacy and potential of telemedicine in the post-COVID era. Telemedicine is effective in providing quality care while minimizing the risk of exposure to infectious diseases, and it has been used to manage chronic diseases, provide prenatal care, and care for pediatric neurology patients. As healthcare systems continue to evolve to meet the challenges posed by the pandemic, telemedicine is likely to play an increasingly important role in the delivery of healthcare services.

Conclusion

Telemedicine represents a promising future for pediatric healthcare delivery, offering novel opportunities for improving access to care, enhancing care coordination, and better management of chronic conditions. Recent studies have demonstrated the efficacy and potential of telemedicine in delivering care to children and adolescents, including providing mental health services, managing chronic conditions, increasing caregiver support, and addressing health disparities in underserved areas. Telemedicine has proven to be particularly valuable during the COVID-19 pandemic, providing an essential means of delivering healthcare services while minimizing the risk of exposure to infectious diseases. The adoption of telemedicine is likely to continue to grow in the post-COVID era, with an increasing number of healthcare providers and institutions developing telemedicine programs and services. Despite the demonstrated effectiveness of telemedicine in pediatric care, there is still considerable scope for further research and development in this area. Future studies should focus on investigating the effectiveness of telemedicine interventions in a range of clinical and non-clinical settings, identifying the most appropriate platforms and delivery models for different patient populations, and evaluating the potential of telemedicine in addressing health disparities and improving outcomes for underserved communities.

Telemedicine, thus, has significant potential for improving pediatric care delivery. As the adoption of telemedicine continues to grow, it is important for healthcare providers, researchers, and policymakers to continue to investigate and refine its use in pediatrics to optimize patient outcomes and enhance the quality of care for children and adolescents.

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