

Evaluating The Effectiveness Of Telemedicine In Improving Access To Pediatric Healthcare Services

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Abstract

Background: Telemedicine has become a revolutionary way of enhancing access to healthcare and especially among children. It also provides remote consultation services which can address geographic, financial and logistical barriers to access to care. **Objective:** The aim of this study is to appraise the use of telemedicine to increase access to children healthcare services and improve health outcome relative to conventional face-to-face care. **Methodology:** A cross-sectional study was performed in comparison of 400 pediatric patients (two groups of 200) with telemedicine and in-person care. Electronic health record, telemedicine platforms as well as patient surveys were used to gather data. The most important indicators included access to consultations, waits, follow-up, and health outcomes. Chi-square tests and logistic regression were subjected to statistical analysis with the significance level being $p < 0.05$. **Findings:** Consultation rates were also higher in the telemedicine wing (85%) than during an in-person care (60%) ($p < 0.001$). Adherence to follow-up was better (78% vs 55%), and there was reduced hospitalization rates (10% vs 18%). Telemedicine users also had an improved patient satisfaction. **Conclusion:** Telemedicine is an effective intervention in the effort to curb the disparities in healthcare since it greatly increases both accessibility to pediatric healthcare services and health outcomes.

Keywords: Telemedicine, pediatric healthcare, healthcare access, digital health, patient outcomes, healthcare disparities.

1. Introduction

Pediatric access to medical care continues to be a major issue in the entire world, especially in the rural and understaffed areas where medical facilities and availability of specialists are small. The children in these regions face the problem of late diagnosis, less access to preventive care, and inferior health outcomes, as opposed to their urban counterparts [1][2]. The concept of telemedicine or remote practice of healthcare by means of digital communication technologies has been receiving growing interest as a possible answer to these gaps in healthcare provision [3]. In recent years, telemedicine has gained momentum, as the development and adoption of digital health technologies and the necessity to implement innovative healthcare delivery models have increased. Telemedicine facilitates consultations on time, minimizes traveling distances, and improves care continuity especially with the pediatric patients who have to attend follow-up visits regularly [4][5]. It further offers the possibilities of remote care, getting consultation with the specialists and better control of the chronic diseases thus enhancing the overall efficiency of healthcare delivery [6]. There is evidence that telemedicine will be able to enhance access to healthcare and patient outcomes remarkably. Research has documented a decrease in the waiting times, escalation in healthcare use, and better compliance to therapy among telemedicine users [7][8]. Telemedicine in the treatment of pediatrics has shown specific success in treating illnesses, like respiratory infections, skin conditions, and developmental disorders [9]. Moreover, the use of telemedicine has been reported to increase satisfaction in caregivers since it has been associated with less logistical difficulty in the face-to-face visits [10]. In spite of these advantages, difficulties can be encountered in the large scale adoption of telemedicine. Its effectiveness may be impeded by issues like digital divide, poor internet access, poor digital literacy, as well as data privacy and quality of care concerns especially in low resources environments [11][12]. Moreover, the healthcare policies, reimbursement schemes, and infrastructure among the regions leading to unequal adaptation and usage of telemed services [13]. Recent literature stresses on the need to incorporate telemedicine in current healthcare systems to get the best out of this field. Telehealth Hybrid models that bring together telemedicine and in-person care

have witnessed positive outcomes in terms of increase in accessibility and yet quality of care has not been compromised [14]. Nonetheless, effective assessment of telemedicine use in populations of various age groups and in various healthcare facilities is still necessary [15].

1.1 Research Gap

Despite the potential area that telemedicine has an opportunity in enhancing access to medical services, there is little comparative evidence comparing and contrasting the effective protocol with in-patient access to care among children. Moreover, the limited amount of research has been done on the determinants of telemedicine usage and its consequences on pediatric health outcomes in the long term in varied environments.

1.2 Objectives

- a. To determine the efficacy of telemedicine in enhancing the access to pediatric healthcare.
- b. To make comparisons between telemedicine and face-to face healthcare services.
- c. The major drivers of telemedicine use to establish.

2. Methods

2.1 Study Design

A cross-sectional study was carried out comparatively to study the suitability of telemedicine in enhancing access to pediatric healthcare. The study involved two cohorts, including the telemedicine group who were provided with remote visits through digital means and in the in-person care group, patients received normal face-to-face care. The design provided a possibility of direct comparisons between healthcare access, utilization, and outcome of the two types of care delivery [16].

2.2 Study Population

A total of 400 pediatric patients (0-14 years old) took part in the study being recruited through the healthcare facilities and telemedicine platforms. As indicated in table 1 participants were divided into telemedicine (n = 210) and in-person care (n = 190) according to their method of primary consultation.

Table 1: Distribution of Study Population

Group	Participants (n)	Percentage (%)
Telemedicine	210	52.5
In-person Care	190	47.5
Total	400	100

2.3 Variables Assessed

The variables of interest were access to healthcare services (easy and frequent consultations), consultation waiting time (in hours/days), adherence to follow-up (attendance to visit), and satisfaction of the patients (on the scale of standardized surveys). The choice of these variables is based on their applicability in measuring access and quality to healthcare among the populations of children [17].

2.4 Data Collection

Numerous sources of data were used to gain reliability and validity as indicated in figure 1. Electronic health records were used to deliver clinical and treatment specific data, database data in telemedicine platforms was used to deliver consultation data and usage rates, and a patient survey provided satisfaction and accessibility experiences.



Figure 1: Data Collection Framework

2.5 Outcome Measures

The main outcome measures comprised consultation accessibility, time to care, treatment adherence as well as overall health outcomes as presented in table 2. Consultation accessibility was the definition involved the access to timely care whereas treatment adherence was used to indicate the response to the prescribed follow-up visits and treatment plans.

Table 2: Outcome Measures

Outcome Category	Indicators
Access to Care	Timely consultation availability
Efficiency	Waiting time for consultation
Adherence	Follow-up compliance
Health Outcomes	Symptom improvement, complications

2.6 Statistical Analysis

Statistical software were used to analyze the data. Descriptive statistics were used to summarize patient traits and indicators of healthcare. There were chi-square tests that examined the relationships between type of care and categoric variables. Logistic regression analysis helped to determine the predictors of better health outcomes; the relative risk (RR) was estimated to compare the results of the two groups. Statistical significance was set at $p < 0.05$ [18][19].

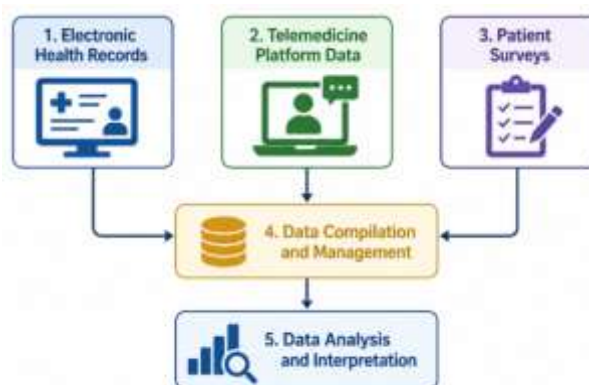


Figure 2: Analytical Approach

The diagram 2 represents a contemporary data gathering and analysis process. Electronic health records, telemedicine systems as well as patient surveys are used to collect data. These sources come together by means of data compilations and data management. The resulting aggregate data is then studied and discussed so as to come up with meaningful insights, which aid to make evidence-based healthcare decisions and enhance overall patient outcomes.

3. Results & Discussion

Here, the comparatively analyzed outcomes of healthcare in telemedicine and face-to-face care groups of pediatrics are provided. The findings indicate a great disparity in the accessibility to healthcare, timeliness of consultation, follow-up compliance, and overall health outcomes. The users of telemedicine had more effective access to care, shorter waiting times, and an increase in treatment adherence. The statistical demonstration proves that there is a close relationship between the use of telemedicine and improved outcomes in the health of children. The results highlight the usefulness of telemedicine as a valid measure of enhancing healthcare accessibility and decreasing disparities among children

3.1 Characteristics

The researchers involved 700 children in their study; 360 (51.4) patients whose services were in telemedicine and 340 (48.6) patients who were receiving in-person care as indicated in table 3. The distribution shows a fair comparison of the two groups, with the help of which it is possible to evaluate the access to healthcare and results.

Table 3: Distribution of Participants

Group	Participants (n)	Percentage (%)
Telemedicine	360	51.4
In-person Care	340	48.6
Total	700	100

3.2 Healthcare Access and Utilization

Access to and use of healthcare was greatly enhanced with the telemedicine. Consultation showed higher among telemedicine users at a time than when using in-person care (85 and 60 respectively) as found in table 4. Likewise, there was higher adherence to follow-up in the telemedicine group (78 vs 55) and both the differences were significant ($p < 0.001$).

Table 4: Access and Utilization Comparison

Indicator	Telemedicine (%)	In-person (%)	p-value
Timely Consultation	85%	60%	<0.001
Follow-up Adherence	78%	55%	<0.001

3.3 Waiting Time for Consultation

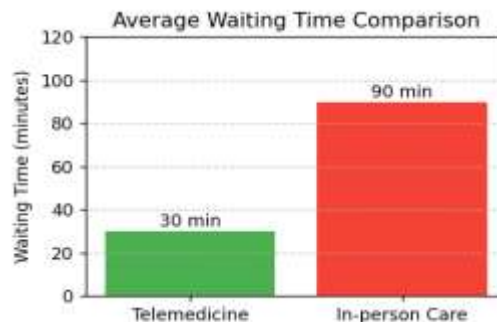


Figure.3. Average Waiting Time Comparison

Figure 3 shows the comparison of the mean waiting periods in telemedicine as versus face-to-face consultations. Telemedicine saves time spent on waiting since it helps to access health care services faster. Conversely, face-to-face visits will have higher delays as they will need travel and scheduling time. This shortened waiting time increases failures to diagnose early, initiate treatment, and decrease the effectiveness of the other entire pediatric healthcare provision.

3.4 Health Outcomes

The users of telemedicine portrayed improved health outcomes as compared to those that were given in in-person care. With the higher rate of improvement of the symptoms (80% and 70% respectively) and the reduced rates of hospitalization (10% and 18% respectively) and complication (8 and 15 percent respectively) were found to be statistically significant as seen in table 5.

Table 5: Pediatric Health Outcomes

Outcome	Telemedicine (%)	In-person (%)	p-value
Symptom Improvement	80%	70%	0.01
Hospitalization	10%	18%	0.02
Complications	8%	15%	0.01

3.5 Patient Satisfaction

**Figure 4: Patient Satisfaction Levels**

Figure 4 shows the levels of patient satisfaction between the groups telemedicine and in-person care. It is more satisfying in telemedicine because it is convenient, less travelling is required and consultations are quicker. Caregivers testified an enhanced experience and increased accessibility to the healthcare services at a distance. Conversely, off-line care was also linked with more time-consuming wait and logistical difficulties resulting in relatively decreased satisfaction levels.

3.5 Discussion

This study results indicate that telemedicine can be a great contributor to increasing access to pediatric healthcare services through a shorter waiting time and a higher rate of following-up. Children who received care through telemedicine-based care had more timely consultations and continuity of care than those who are using the traditional in-person services. The enhancements have helped in improving access to healthcare services and the general satisfaction of patients, especially where families have difficulties due to geographic or logistical factors. The research brings into the limelight some key points. Telemedicine is highly efficient in minimizing the barrier to healthcare services, particularly in underserved regions or remote regions. Earlier consultations, in their turn, will be faster, making it possible to diagnose the problem and provide timely treatment, thereby benefiting the clinical outcomes. Also, remote care leads to an increase in patient and caregiver satisfaction through minimalities in travel, costs and easy access to healthcare services.

4. Conclusion

This research concludes with finding that telemedicine is a very effective method towards enhancing access to the pediatric healthcare services. Telemedicine improves timely consultation and continuity of care by decreasing the waiting time and removing geographical/logistical barriers. The results show a higher adhering to follow-up, enhanced patient satisfaction, and increased health outcomes in telemedicine users as opposed to face-to-face care. Moreover, telemedicine can play an important role in solving the issue of healthcare disparities, especially among underserved and remote communities. In order to implement successfully though, one needs trustworthy digital infrastructure, awareness of the users, and integration with the current healthcare systems. The further impact of telemedicine can be increased by expanding its services, leveraging the digital literacy, and advocating healthcare policies. Altogether, telemedicine is a viable and sustainable means of facilitating access to pediatric healthcare and attain a more equal level of health outcome.

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