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Utilization and Satisfaction of an On-Demand Telemedicine Service in Urban and Rural Communities

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Abstract. Health disparities between urban and rural America have been studied extensively, and findings consistently show many inequities. The objective of this study was to evaluate patient experiences and utilization among patients in North Carolina who use telemedicine. A retrospective cohort study was performed to examine the utilization and satisfaction of patients using a virtual care service at a Southeastern Medical Center in the U.S. Of 1974 telemedicine patients, 1366 (79.3%) were female, 1046(60.7%) were between 35-64 years, 913(53%) had insurance coverage. Statistically significant differences between rural and urban patients in how patients rated both their provider($p<0.01$) and overall telemedicine experience ($p<0.01$). Our findings showed high satisfaction scores among both rural and urban communities in using the telemedicine platform with slightly higher scores among rural patients, which shows the need for on-demand telemedicine to increase health access and patient outcomes among rural communities.

Keywords. Virtual Care, Rural, Satisfaction, Utilization

1. Introduction

Disparities and resulting health inequities have long existed in healthcare. More recently, they have become a national priority because of the costs and poor outcomes associated with them [1]. Disparities can lead to a variety of consequences ranging from differences in mortality among minority groups to geographical differences in overall health. The goal of eliminating health disparities is an overarching goal for the Healthy People objectives of 2030 [2,3]. These are data driven, long-term goals set by the Office of Disease Prevention and Health Promotion in the United States [3]. Despite this push, not every local health department has implemented measures to look at data related to health disparities and a study looking at 2016 data showed that only 59% of local health departments used data to evaluate this national problem [4,5].

In the U.S., there have been 194 rural hospital closures and conversions to limited healthcare since January of 2005 [6]. This is particularly concerning because 46 million Americans, or 15% of the population, live in rural areas [7]. In addition, a provider shortage is estimated to reach 61,800 by 2039 and is already at crisis levels in rural

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communities [8]. Provider retention in rural communities is an issue [9]. Lastly, rural communities often have limited public transportation for accessibility and less healthcare resources overall [9].

Telemedicine is a tool that encountered a significant rise in utilization during the COVID-19 pandemic. Because of its mobility, it can improve healthcare access to rural communities and can bring accessibility to rural communities in the form of specialists, education, and improved quality of care [10]. Rural communities have lower access to smartphones, high speed internet, and other technologies needed to participate in telemedicine [6]. Appropriate broadband access is key to utilization of telemedicine services and it is common for rural communities to have less than 50% of the community with speeds that would support remote visits [2]. Other challenges include interstate licensing complexities. This has made it difficult to expand provider access to rural communities therefore contributing to the provider shortage [2]. Telemedicine integration also relies on the acceptability of rural communities to this service and there are several factors that can affect this, with education being the most important [3]. Age and income are also important along with provider concerns. Provider concerns include proper infrastructure, training, and reimbursement models that sustain remote platforms [3].

Given the aforementioned, there may be disparities in access, utilization, and patient experience using telemedicine in rural versus urban areas. The objective of this study is to evaluate patient experiences and utilization among patients in North Carolina who use telemedicine. This could result in a better understanding of patient satisfaction among telemedicine users and identify ways to improve and expand this form of healthcare.

2. Methods

A retrospective cohort study was performed to examine the utilization and satisfaction of patients using a virtual care service at a Southeastern Medical Center in the U.S. The 24-hour virtual urgent care service was developed to assist individuals with medical needs who may be far from an in-person urgent care, require help when walk-in clinics are closed, or have limited independent mobility. This online, on-demand service is available to the public regardless of their demographics and offers various benefits, such as convenience, cost-effectiveness, and accessibility. Patients can choose to be seen immediately via a video call, or they can schedule a visit for a later date. Patients can also choose to speak with their preferred physician by phone or video call. This flexibility allows patients to choose the option that best meets their needs and preferences.

Data was collected from the business intelligence server that was HIPAA-compliant, and then processed in MS Excel using functions for extraction, cleaning, and wrangling. Data was gathered from telemedicine visits that occurred between 2018-2022. This study was approved by the institutional review board. Rural and urban categories were defined using the patient's zip code of permanent residence. Rural was defined as a total population of 50,000 people or less residing in the zip code. Matching of zip codes between the urban and rural destination file and the zip code of the patient's primary residence was performed to determine urban or rural nature of the visit. There were 252 visits initially excluded due to the visit and the patient's primary residence being outside of North Carolina. We considered the patient insured if they submitted insurance for the service fee and uninsured if they paid the full cost.

2.1. Outcomes

Utilization and patient satisfaction were the primary outcomes for this analysis. Utilization was determined by average wait time, proportion of phone versus video visits, average duration of the appointment, and if the patients were given a prescription. Patient satisfaction was evaluated by ratings given by patients after their visits. This included a rating of their provider and a rating for overall visit experience.

2.2. Statistical Analysis

We used a t-test to look for differences in wait times or duration between urban and rural visits. A t-test was also used to look for differences in repeat visits in urban versus rural patients. We used a Chi-2 to determine if there was a statistically significant difference between urban and rural persons using telephone versus video appointments. A two-sample test of proportions was also used to determine if there was a statistically significant difference between urban and rural patients who received a prescription. For user satisfaction we looked at two variables that included physician rating and overall experience. For both, providers were scored based off 5 categories and these included poor, fair, good, very good, and excellent. We performed a chi-2 to evaluate both variables.

3. Results

Of 1974 telemedicine patients, 1366 (79.3%) were female, 1046 (60.7%) were between 35-64 years, 913 (53%) had insurance coverage. There were 978 (49.5%) patients residing in rural regions that used the telemedicine platform between February 2018 and December 2022 compared to 744 (37.7%) patients from urban regions. The proportion of patients who had insurance coverage was higher among rural patients (572 [58.4%]) compared to urban patients (341 [45.8%]). There was a higher demand for telemedicine among pediatric patients in rural areas (94[9.6%]) compared to urban areas (39 [5.2%]).

Table 1. Demographic data of patients utilizing the telemedicine service

Name	All (N=1974)	Rural (N=978)	Urban (N=744)
Age			
2-17 years	133 (7.7%)	94 (9.6%)	39 (5.2%)
18-34 years	421 (24.5%)	215 (22.0%)	206 (27.7%)
35-64 years	1046 (60.7%)	601 (61.4%)	445 (59.8%)
Over 65 years	122 (7.1%)	68 (7.0%)	54 (7.3%)
Gender:			
Male	353 (20.5%)	205 (21.0%)	148 (19.9%)
Female	1366 (79.3%)	771 (78.8%)	595 (80.0%)
Non-Binary	3 (0.20%)	2 (0.2%)	1 (0.1%)
Insurance			
Insured	913 (53.0%)	572 (58.4%)	341 (45.8%)
Uninsured	809 (47.0%)	406 (41.6%)	403 (54.2%)

We found a statistical difference of -0.36 minutes with rural visits slightly shorter in length with a P-value of 0.028. A t-test was also used to evaluate patient wait time and showed rural wait times were slightly longer by 0.79 minutes. However, this was not statistically significant with the p-value of the null hypothesis being 0.64 While the length of appointment may have been statistically significant, it may not be clinically

significant as the difference in the means was only 0.36 minutes. For patient wait time, rural visits had a slightly longer wait time of 0.79 minutes. This was not statistically significant and, additionally, is not a clinically meaningful difference. For prescriptions given, the data was evaluated on a binary variable looking at the proportion of patients who received a prescription versus those who did not. There was a non-statistically significant difference between urban and rural patients who received a prescription with a p-value of 0.38. For telephone versus video encounters, there was not a statistically significant difference between urban and rural persons with a resulting p-value of 0.59.

Table 2. Differences in telemedicine utilization factors with 95% Confidence Interval and P-value

Name	All (N=1974)	Rural (N=978)	Urban (N=744)	P-Value
Wait Time	13.02[11.37, 14.68]	13.37 [11.17, 15.56]	12.57 [10.05,15.10]	0.64
Duration .Enc	5.89 [5.70,6.10]	5.73 [5.51,5.95]	6.09 [5.78,6.40]	0.06
Phone (%)	1,369 (79.5%)	782 (80.0%)	587 (78.9%)	0.59
Prescription	0.82 [0.80,0.83]	0.82 [0.80-0.85]	0.81 [0.78-0.83]	0.38
Repeat Visit	0.23 [0.21,0.25]	0.25 [0.22-0.27]	0.20 [0.18-0.23]	0.04*

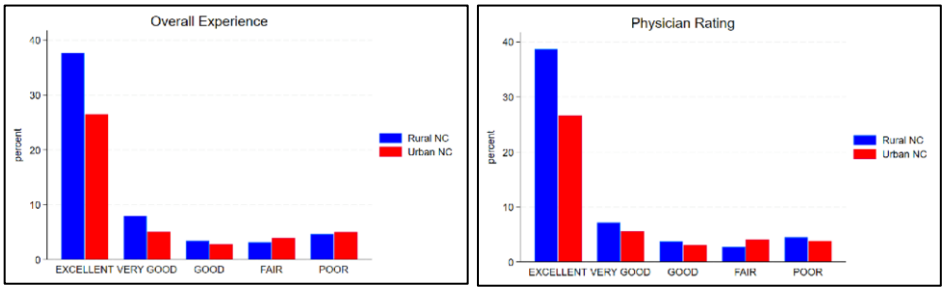

Figure 1. Graph on Left showing distribution of scores for Overall Experience, Graph on Right showing distribution of scores for Physician Rating

There were statistically significant differences between rural and urban patients in how patients rated both their provider and overall experience of the telemedicine visit. Provider satisfaction ratings were statistically significant among urban and rural patients (P-value = 0.002). The distribution showed that patients had a higher satisfaction rating of their providers compared to urban patients, figure 1. Overall experience also showed a statistically significant difference between rural and urban patients (P-value = 0.003). The number of repeat visits showed a small but statistically significant difference in the number of people having repeat visits with a P-value of 0.044.

4. Discussion

In this retrospective analysis, we found statistically significant differences in physician rating and overall experience that trended towards higher scores in the rural population. We report that the trend towards higher scores for both provider rating and overall experience was significantly higher among rural patients. This indicates that the rural patients in our study had positive experiences using the telemedicine platform. Contrarily, there were small and not clinically relevant differences in both wait time and duration of visits between urban and rural patients. These differences trended towards longer wait times and shorter encounter duration in the rural population. This could have resulted in lower ratings given these trends, but this does not appear to be the case. In addition, there was a small but statistically significant increase in the number of repeat visits in rural

patients versus urban patients. This could reflect better utilization of telemedicine among the rural group. This data also showed a considerable proportion of both groups using phone over video services. This could be due to an error in reporting in the electronic health record. Lastly, the proportion of people paying full cost for the service and not using insurance was higher than the national average in both groups and particularly high in the urban population and the reason for this could again be a reporting error.

One limitation of this study is that data looking at ethnicity and comorbidities was not gathered and therefore could not be included in the analysis. Another limitation is that the data was only taken from the state of North Carolina and may not be generalizable to other locations. In addition, the data could not be tied to emergency room visits to verify effectiveness of telehealth visits. Finally, this data does not allow for evaluation of technological issues such as slow internet or issues with devices. Additionally, there is a significant difference in the total number of rural and urban patients using the telemedicine services with a total of 978 rural and 744 urban patients in our study. However, the demographic data that was included shows that the two groups do appear to be similar.

Although subjective, our findings show high satisfaction scores among both rural and urban communities in using the telemedicine platform with slightly higher scores among rural patients. Therefore, the current results show promise that the rural community has a positive experience using telemedicine services. In conclusion, this study showed high satisfaction scores among both rural and urban communities in using the telemedicine platform with slightly higher scores among rural patients, which demonstrates the need for on-demand telemedicine services to increase healthcare access and improve patient outcomes among rural communities.

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