

Supporting Access to HIV Care for Children and Youth During the COVID-19 Pandemic With Telemedicine and Rideshare

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Background: In response to the COVID-19 pandemic, we scaled up telemedicine and rideshare services for clinic and laboratory visits for pediatric and adolescent patients with HIV.

Setting: HIV subspecialty program for patients aged 0–24 years at Children’s National Hospital, Washington, DC.

Methods: Using the χ^2 and Wilcoxon rank sum tests, we compared demographics, visit and laboratory data, and rideshare usage among patients who scheduled telemedicine at least once (telemedicine) versus those who never scheduled telemedicine (no-telemedicine) during the pandemic (April–September 2020). We compared the number and proportion of scheduled and completed clinic visits before the pandemic (April–September 2019) with those during the pandemic.

Results: We analyzed 178 pediatric and adolescent patients with HIV (median age 17.9 years, 89.3% Black, 48.9% male patients, 78.7% perinatally infected), of whom 70.2% and 28.6% used telemedicine and rideshare, respectively. Telemedicine patients scheduled more visits (236 vs 179, $P < 0.0001$) and completed a

similar proportion of visits (81.8% vs 86.0%, $P = 0.3805$) compared with no-telemedicine patients. Laboratory testing rates (81.3% versus 98.5%, $P = 0.0005$) were lower in telemedicine patients compared with no-telemedicine patients. Rideshare usage (12.4% versus 26.5%, $P = 0.0068$) was lower in telemedicine versus no-telemedicine patients. During the pandemic, most of the patients (81.0%) had HIV RNA <200 copies/mL. The total number of completed visits and the proportion of visits completed were similar before and during the pandemic.

Conclusion: Most of the pediatric and adolescent patients with HIV used telemedicine and maintained HIV RNA <200 copies/mL during the pandemic. Despite rideshare usage, laboratory testing rates were lower with telemedicine compared with in-person visits.

Key Words: telemedicine, HIV, rideshare, COVID-19, children, youth

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INTRODUCTION

Early data on the effects of the COVID-19 pandemic on people living with HIV in the United States indicated interruption of services and potential negative health outcomes.^{1,2} Specifically, youth living with HIV identified challenges, including loss of income and jobs, financial and food insecurity, and poor medication adherence.¹ Since the pandemic, innovations in HIV service delivery were needed to ensure uninterrupted access and utilization of HIV treatment services for children and youth. Most (99%) of the surveyed HIV providers in the United States offered telemedicine during the pandemic, with approximately 47% of visits conducted this way.³ Subsequently, 57% of surveyed patients responded they were more likely to use telemedicine compared with in-person visits for their HIV care.⁴ Telemedicine reduced the need for in-person visits and transportation^{5,6}; however, it required patients to have access to technology, private space, and the ability to complete laboratory testing. Youth living with HIV expressed privacy concerns when using telemedicine,⁷ highlighting that flexibility and tailored options must be considered for this population. In addition, the need for laboratory testing must be addressed with options such as supporting transportation and facilitating access to conveniently located testing sites to ensure timely laboratory testing. To date, there are limited

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data on access to HIV treatment services among children and youth during the COVID-19 pandemic in the United States.

Special Immunology Services (SIS) at Children's National Hospital (CNH) cares for approximately 200 children and youth living with HIV annually in the metropolitan District of Columbia (DC) area. Supported by federal Ryan White (RW) funds,⁸ SIS provides comprehensive HIV medical care, including case management, peer support, nutritional and mental health services, and access to resources such as food and transportation (including rideshare services through Uber Health). Patients are scheduled at 3- to 4-month intervals for routine HIV care and laboratory testing, as per pediatric and adolescent US Department of Health and Human Services (HHS) guidelines.⁹ At the beginning of the pandemic, SIS reduced the number of in-person medical visits and laboratory testing to the minimum needed. With the support of the CNH Telehealth Program,¹⁰ SIS launched and rapidly scaled up telemedicine services in April 2020. We developed a standard operating procedure including provider training and scheduling and visit workflows using the HIPAA-compliant Zoom platform. SIS also scaled up existing rideshare services with institutional and COVID-19 RW support. This study aimed to evaluate the effect of telemedicine on visit completion rates, rideshare usage, and related health outcomes among children and youth living with HIV receiving care at SIS during the pandemic.

METHODS

This was a retrospective cohort study of patients aged 0–24 years who received care at SIS. From patients seen during April–September 2020 (described as “during the pandemic”), data were collected from electronic medical records: demographics (age at the end of study period, sex, and race), HIV acquisition mode, time since HIV diagnosis at the end of study period, scheduled and completed medical visit information (telemedicine, in-person), rideshare usage (to attend in-person visits or to complete laboratory testing at CNH or local laboratory sites for those who attended telemedicine visits), laboratory testing completion for each medical visit, time between laboratory testing and medical visit, and laboratory test results if obtained for each visit (HIV RNA and CD4 count). During the pandemic, patients were advised to alternate in-person and telemedicine visits when feasible, and antiretroviral therapy refills were not contingent on medical visits. The type of visit scheduled was based on patient preference and not on clinical or laboratory criteria. Demographics, visit information, rideshare usage, and laboratory outcomes were compared between patients who scheduled telemedicine at least once during the study period (classified as “telemedicine”) versus those who never scheduled telemedicine (classified as “no-telemedicine”). The χ^2 and Wilcoxon rank sum tests were used to compare categorical and continuous variables, respectively.

To examine the relationship of the pandemic with visit completion, we compared medical visit information of patients seen during the pandemic versus patients seen during the same period in 2019 (April–September 2019, described as “prepandemic”). We used paired *t* tests to compare the

number and proportion of visits completed during the 2 periods. SAS Studio was used for analysis (SAS Institute, Cary, North Carolina). This study was approved by the CNH Institutional Review Board, with informed consent waived.

RESULTS

We analyzed data for 178 individual patients (median age 17.9 years, 89.3% Black, 48.9% male patients, 78.7% perinatally infected) who scheduled visits during the pandemic. Of the 125 (70.2%) telemedicine patients, 72 (57.6%) scheduled only telemedicine visits (i.e. no in-person visits), whereas the remaining scheduled a combination of telemedicine and in-person visits (data not shown). Telemedicine patients were of a similar age (median 18.0 years; IQR 15.5, 20.4) compared with no-telemedicine patients (median 17.1 years; IQR 13.2, 20.7; $P = 0.4910$). There was a non-significant higher proportion of perinatally infected children and youth in the telemedicine group compared with the no-telemedicine group (82.4% versus 69.8%, $P = 0.0609$) (Table 1).

A total of 315 visits were scheduled by all patients, half of which were telemedicine ($n = 171$, 54.3%). Visit completion rates were high for all visits (82.9%), telemedicine visits only (83.0%), and in-person visits only (83.0%). Telemedicine patients scheduled more visits ($n = 236$; 1.9 visits per patient) compared with no-telemedicine patients ($n = 79$; 1.5 visits per patient; $P < 0.0001$), with most (72.5%) of their scheduled visits being telemedicine visits. Telemedicine and no-telemedicine patients had similar proportions of completed visits (all visits 81.8% versus 86.0%, $P = 0.3805$; in-person visits only 78.5% versus 86.1%, $P = 0.2300$) (Table 1).

Most patients completed laboratory testing (85.8%) around the time of their visit (median 0 days; IQR 0, 11). Laboratory testing was completed by fewer telemedicine patients (81.4%) compared with no-telemedicine patients (98.5%, $P = 0.0005$), and there was a longer time between laboratory tests and the visit in telemedicine patients (median 2 days; IQR 0, 19) compared with no-telemedicine patients (median 0 days; IQR 0, 0; $P < 0.0001$). Thirty-four patients (19.1%) used rideshare to attend in-person visits or to complete laboratory testing at CNH or local laboratory sites. Patients used rideshare services for 13.3% of all completed visits (including rideshare for in-person visits and laboratory testing for telemedicine visits). Rideshare usage to complete visits and/or laboratory testing (12.4% vs 26.5%, $P = 0.0068$) was lower in telemedicine versus no-telemedicine patients. During the pandemic, most of the children and youth living with HIV had HIV RNA <200 copies/mL (81.0%) and CD4 count ≥ 500 cells/mm³ (79.7%). The HIV RNA and CD4 count were similar between telemedicine and no-telemedicine children and youth living with HIV (Table 1).

There were more patients seen during the pandemic compared with prepandemic (178 versus 163), and we did not observe a trend in declined visits during the months preceding the pandemic (data not shown). There was no significant difference in the number of completed visits (261 versus 281; $P = 0.2483$) and in the proportion of completed visits during

TABLE 1. Patient Characteristics and Outcomes by Telemedicine Use During the Pandemic Study Period (April 2020 to September 2020)

	All (n = 178)	Telemedicine (n = 125)	No-telemedicine (n = 53)	P
Patient characteristics*				
Median age at the end of study period, years (IQR)	17.9 (15.0, 20.5)	18.0 (15.5, 20.4)	17.1 (13.2, 20.7)	0.4910
Race/ethnicity, n (%):				
Black	159 (89.3)	114 (91.2)	45 (84.9)	
White	4 (2.3)	3 (2.4)	1 (1.9)	
Hispanic	9 (5.1)	3 (2.4)	6 (11.3)	0.1381
Asian	4 (2.3)	3 (2.4)	1 (1.9)	
Other/unknown	2 (1.1)	2 (1.6)	0 (0.0)	
Current sex, n (%):				
Male†	87 (48.9)	62 (49.6)	25 (47.2)	0.7668
Female	91 (51.1)	63 (50.4)	28 (52.8)	
HIV acquisition mode, n (%):				
Perinatal	140 (78.7)	103 (82.4)	37 (69.8)	0.0609
Nonperinatal	38 (21.3)	22 (17.6)	16 (30.2)	
Median years since HIV diagnosis at the end of study period (IQR)	11.9 (4.2, 16.2)	13.0 (5.1, 16.2)	7.1 (3.0, 15.4)	0.0461
Visits*				
Total scheduled visits, n	315	236	79	<0.0001
Scheduled telemedicine visits, n (%)	171 (54.3)	171 (72.5)	NA	NA
Proportion of completed visits, n (%):				
All visits	261 (82.9)	193 (81.8)	68 (86.0)	0.3805
Telemedicine only	142 (83.0)	142 (83.0)	NA	NA
In-person only	119 (82.6)	51 (78.5)	68 (86.1)	0.2300
Completed laboratory testing for completed visit, n (%)	224 (85.8)	157 (81.4)	67 (98.5)	0.0005
Median days between laboratory testing and visit (IQR)	0 (0, 11)	2 (0, 19)	0 (0, 0)	<0.0001
Number of rideshare users, n (%)‡	34 (19.1)	21 (16.8)	13 (24.5)	0.2304
Visits completed where rideshare was used, n (%)	42 (13.3)	24 (12.4)	18 (26.5)	0.0068
Laboratory outcomes				
HIV RNA, n (%):§				
<20 copies/mL	125 (57.9)	93 (61.6)	32 (49.2)	0.2405
20–200 copies/mL	50 (23.1)	32 (21.2)	18 (27.7)	
>200 copies/mL	41 (19.0)	26 (17.2)	15 (23.1)	
CD4 cell count, n (%):§				
<200 cells/mm ³	11 (5.0)	9 (5.8)	2 (3.0)	0.2468
200–499 cells/mm ³	34 (15.3)	27 (17.4)	7 (10.4)	
≥500 cells/mm ³	177 (79.7)	119 (76.8)	58 (86.6)	

Bold values are considered statistically significant with a *P*-value <0.05.

*Proportions were calculated based on the relevant denominator for the variable (e.g.: denominator used for “telemedicine visits completed” was “scheduled telemedicine visits” for that column; denominator used for “number of patients who used rideshare” was “number of unique patients” for that column).

†Includes one transgender male patient

‡Includes in-person visits where rideshare was used and telemedicine visits where rideshare was used to complete laboratory testing.

§Laboratory testing was completed at 224 visits by patients living with HIV. There were missing data for 8 HIV RNA and 2 CD4 counts.

the pandemic compared with prepandemic (82.9% versus 83.4%, *P* = 0.8774) (Fig. 1).

DISCUSSION

Our study reports sustained number of visits and retention in care during the COVID-19 pandemic among predominantly Black children and youth living with HIV in metropolitan DC. The COVID-19 pandemic posed a significant health burden to the lives of Black people, who are also disproportionately affected by the HIV epidemic in the United States.^{5,11,12} Providing telemedicine with rideshare helped to

address access to care, transportation barriers, and infection control requirements associated with the pandemic.

Although some US-based clinics caring for people living with HIV reported an increase in delayed or postponed visits during the pandemic,^{2,13} we report similar volumes of visits during the pandemic study period. Telemedicine patients had a nonsignificant lower visit completion rate for their in-person visits compared with no-telemedicine patients. This is likely multifactorial, including telemedicine patient's experience of easy replacement of a missed in-person visit with a telemedicine visit and telemedicine patients potentially experiencing more transportation and logistical barriers at

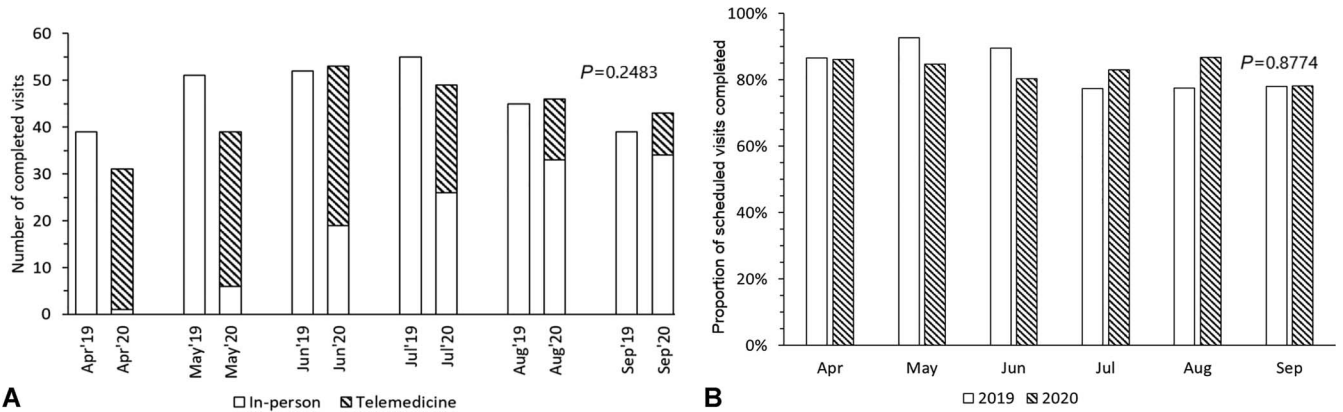


FIGURE 1. A, Number of completed visits and (B) proportion of scheduled visits completed at Special Immunology Services in Children’s National Hospital during April–September 2019 and April–September 2020.

baseline that lead to more missed in-person visits. Despite the high proportion of completed telemedicine visits (83%) during the pandemic, we did not observe the low no-show rates for telemedicine (4%–6%), as reported among adult infectious diseases, adult HIV, and general adolescent clinics in the United States.^{14,15} This may be attributed to differences in logistical and technological barriers associated with the use of telemedicine,^{5,16,17} patient privacy concerns,^{7,18} and differences in baseline patterns of engagement in care.

More than half of scheduled visits during the pandemic in our study were telemedicine visits, likely due to the ease of scheduling and attending those visits compared with in-person visits.^{4,18} Telemedicine also allowed for interventions such as video directly observed therapy and enhanced adherence counseling in home settings. Interestingly, many patients chose to schedule only in-person visits or only telemedicine visits during the pandemic, reflecting the importance of acknowledging patient preference when scheduling in-person or telemedicine visits.

Many of our patients and their families reside in DC neighborhoods that have been affected by high rates of COVID-19,¹⁹ further demarcating existing and COVID-19–related health, social, and economic disparities. As with other areas in the United States, public transportation in DC was heavily scaled back from March 2020; stay-at-home orders came into effect from April 2020 through June 2020.²⁰ During this period, in addition to facilitating access to services for patients who attended in-person visits, rideshare became an important facilitator for telemedicine patients who required transportation support to complete laboratory testing.

Despite rideshare usage, we identified drawbacks of using telemedicine, including lower rates of laboratory testing completion and longer time between laboratory testing and visits. Other clinics observed similar challenges in obtaining laboratory testing and opted to extend the HHS recommendation of 3- to 4-month intervals for routine HIV testing⁹ to longer intervals for stable virologically suppressed patients.¹⁸ However, this is less desirable for immunocompromised patients living with HIV and people who have significant adherence issues or comorbidities. Reassuringly, the 2-day delay in laboratory testing completion among telemedicine

patients is unlikely to negatively affect their clinical management. It is unclear whether a further scale-up of rideshare would be adequate to improve laboratory testing completion rates for patients using telemedicine. In conjunction with rideshare, we plan to evaluate the use of mobile health interventions for timely laboratory testing completion; the utilization of mobile health interventions has proven successful in increasing engagement of care for people with HIV and is an effective communication modality for youth.^{21–23}

Most importantly, during the pandemic, most of the children and youth living with HIV (telemedicine and no-telemedicine patients) in our study maintained HIV RNA <200 copies/mL. In contrast to adult studies that have shown that a transition to telemedicine resulted in either improved^{24,25} or worsened²⁶ virologic suppression rates, our study showed similar rates of HIV RNA <200 copies/mL in telemedicine and no-telemedicine patients. Recently updated HHS pediatric HIV guidelines highlight the role of telemedicine in caring for the pediatric HIV population.⁹ We have now incorporated telemedicine and rideshare within our package of routine HIV prevention and care services.

Our study had a small sample size and was limited to a single center that received supplemental COVID-19 RW funding and may not be generalizable to the general population. Furthermore, technological and transportation barriers and patient use of mental health services were not included in this study. Despite these limitations, our study is the first to show the effectiveness of telemedicine and rideshare for maintaining access to HIV services among children and youth living with HIV in the United States. In addition to our ongoing studies on the relationship between telemedicine and rideshare to the adherence and virologic outcomes, we are conducting a study on the acceptability of the telemedicine for mental health services among our patients.

CONCLUSIONS

Digital health equity is essential to achieving overall health equity,^{16,27} and telemedicine has the potential to bridge pediatric health care gaps.²⁸ Telemedicine combined with

rideshare support ensured uninterrupted access to HIV care among pediatric and adolescent patients with HIV at SIS. Most of the patients remained in care, used telemedicine, and maintained HIV RNA <200 copies/mL during pandemic. Despite rideshare usage, laboratory testing rates were lower with telemedicine visits compared with in-person visits. Future research is essential to optimize HIV prevention and care through telemedicine and to explore innovative service delivery models for children and youth living with HIV.

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