


Equity and use of telehealth modalities among people living with HIV during the COVID-19 pandemic

DIGITAL HEALTH
Volume 9: 1–7
© The Author(s) 2023
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/20552076231218840
journals.sagepub.com/home/dhj



Hannah Carson¹, Karen H. Wang², Hyung Paek³, Pamela Hoffman⁴,
Andrew Arakaki⁵, Rosana Gonzalez-Colaso⁶, Lydia A Barakat²,
Merceditas Villanueva⁷ and Julie A Womack⁸ 

Abstract

Background: COVID-19 forced a rapid transition to telehealth. Little is known about the use of telephone versus video visits among people living with or at risk for HIV (PWH).

Setting: We studied electronic health record data from an urban HIV clinic. Our sample included visit- and person-level data. Visit-level data came from appointments scheduled from 30 March 2020 to 31 May 2020. Person-level data came from patients 18+ years of age who completed at least one telephone or video visit during the period of interest.

Methods: We performed a cross-sectional analysis. Our primary outcome was telehealth modality (telephone or video). We compared visit completion status by telehealth modality. We evaluated associations between patient characteristics and telehealth modality using logistic regression.

Results: In total, 1742 visits included information on telehealth modality: 1432 telephone (82%) and 310 (18%) video visits. 77% of telephone visits were completed compared to 75% of video visits ($p = 0.449$). The clinic recorded 643 completed telehealth visits in April and 623 in May 2020. The proportion of telephone visits decreased from 84% in April to 79% in May ($p = 0.031$). Most patients participated in telephone versus video visits (415 vs. 88 patients). Older age (adjusted odds ratio [AOR] 3.28; 95% confidence interval [CI], 1.37–7.82) and Black race (AOR 2.42; 95% CI, 1.20–4.49) were positively associated with telephone visits. Patient portal enrollment (AOR 0.06; 95% CI, 0.02–0.16) was negatively associated with telephone visits.

Conclusion: PWH used telephone more than video visits, suggesting that telephone visits are a vital healthcare resource for this population.

Keywords

HIV, telehealth, telephone, video, COVID-19

Submission date: 11 July 2023; Acceptance date: 20 November 2023

¹Yale School of Medicine and Yale Physician Associate Program, New Haven, CT, USA

²Yale School of Medicine, Department of Internal Medicine, New Haven, CT, USA

³Yale School of Medicine and Yale School of Public Health, Department of Biostatistics, New Haven, CT, USA

⁴Yale School of Medicine, Child Study Center, New Haven, CT, USA

⁵Yale School of Public Health, Department of Chronic Disease Epidemiology, New Haven, CT, USA

⁶Yale Physician Associate Program, New Haven, CT, USA

⁷Yale School of Medicine, Department of Infectious Diseases, New Haven, CT, USA

⁸VA Connecticut Healthcare System and Yale School of Nursing, West Haven, CT, USA

Corresponding author:

Julie A. Womack, Yale School of Nursing, PO Box 27399, West Haven, CT, 06516-0972, USA.

Email: Julie.womack@yale.edu



Introduction

On 11 March 2020, the World Health Organization announced the COVID-19 pandemic, prompting an immediate change in healthcare delivery.¹ Prior to the pandemic, telehealth was expanding but infrequently used in the United States: only 10% of providers had ever used telehealth, and only 14% of all care at the Veterans Health Administration was provided using telehealth.^{2,3} The Yale telehealth team had initiated several successful telehealth operations for years prior to the pandemic.⁴ However, in the first weeks of the public health emergency in the United States, efforts to decrease the spread of COVID motivated a rapid increase in telehealth implementation for all outpatient workflows,⁴ facilitated by emergency insurance regulation changes and coverage expansions, regulatory leniency for technological standards, and loosening of licensing permissions for telehealth care.^{5–8} This accelerated implementation of telehealth prompted concerns about disparities in telehealth access, especially as they impacted historically underserved populations. Studies early in the pandemic showed less telehealth use among older, female, and non-English-speaking patients.^{9–11} Trends in internet access showed slightly lower rates of internet adoption among older adults, Black and Hispanic populations, people with less formal education, and households with lower incomes.¹² Trends in internet use specifically for health information echo these findings.¹³ Similarly, studies assessing the associations between patient sociodemographic characteristics and telephone or video visit use in primary care and specialty settings found that older adults, female, Black, Hispanic, and Spanish-speaking populations were less likely to use video visits.^{9–11,14,15} In fact, research suggests that minoritized populations and patients with less formal education are less likely than white populations to be offered the patient portal access through which much of telehealth, especially video visits, is administered.¹⁶

There is a growing literature regarding the use of telehealth to provide care to people living with or at risk for HIV (PWH) and to those receiving pre-exposure prophylaxis (PrEP). PWH faced a number of challenges to in-person care before COVID including transportation issues, stigma, lack of insurance, and mental illness or substance use disorders.^{17–21} Access to telehealth visits was vital for PWH during the early phase of the COVID-19 pandemic because consistent healthcare engagement helps patients maintain lower viral loads and higher CD4 counts.²² Furthermore, as these patients likely face psychosocial burdens including loneliness and stigma, it was imperative that they be able to receive continued multifaceted specialty care.²³ It is thus important to identify disparities in telehealth access that impact this population.

The digital divide is an important limitation to PWH's access to telehealth. Adults with lower income or less

formal education are less likely to own a smartphone or to have access to broadband.²⁰ PWH are more likely than the general population to have lower socioeconomic status and to live in impoverished neighborhoods, and thus they likely experience reduced access to the technology and technological experience necessary to navigate video visits.^{18,24}

Telephone consultations may provide a solution to this access problem, but only a limited number of studies report on video versus telephone consultations.²⁵

Our goal was to assess rates of telehealth modality (telephone or video) use in a clinic serving PWH. We also explored patient-level factors associated with telehealth modality use in this population during the early phase of COVID-19.

Methods

We performed a cross-sectional analysis using electronic health record data from an urban HIV clinic housed within a large academic health system in Connecticut. This clinic is the largest provider of comprehensive services to adults living with HIV within the state and provides multidisciplinary primary care for approximately 800 adults living with HIV and 200 adults at risk who take PrEP. The clinical team includes 16 part-time HIV specialist physicians, 2 advanced practice providers, 9 trainees (3 infectious disease fellows and 6 residents in the HIV primary care pathway), 3 HIV consultants (e.g., psychiatrist, neurologist, transplant physician), 1 pharmacist, 2 social workers, 2 nurses, 2 medical assistants, 1 medical case manager, and 1 front desk staff member. The clinic has a call center that assists in patient call triage and scheduling. Clinicians provide care through approximately 7500 medical visits per year. During the early months of the pandemic, the clinic team also consisted of students and other volunteers who helped patients enroll in and orient to the clinic's telehealth system. Nurses, front desk, and other staff assisted providers and patients with telehealth issues before and during visits as they were able. The healthcare system also held training sessions to teach staff how to best utilize video and telephone visits and to troubleshoot during visits.

We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines for cross-sectional studies.

Sample

We analyzed both visit- and person-level data. Visit-level data came from appointments scheduled at the clinic from 30 March 2020 to 31 May 2020 ($N=1742$). We limited our research to the first 2 months of the pandemic to better understand patient choice regarding visit modality

(video vs. telephone) when telehealth visits were the only option. We excluded visits for which the telehealth modality was unknown.

Person-level data came from adult patients 18+ years of age who completed at least one telephone or video visit during the period of interest ($N=503$). We excluded patients who attended both telephone and video visits as there were very few patients in this category ($N=18$). We also excluded patients who had only no-show, cancelled, or left without being seen for visits during this period.

Study variables

Our outcome of interest was telehealth modality: “telephone” for visits using audio methods only and “video” if using an audiovisual platform. Visit modality was recorded by front desk staff at the time of scheduling. Any visits missing information on type of telehealth visit (telephone or video) were excluded from the analyses. At the visit level, we categorized visits by visit completion status: completed, canceled, no-show, and left without being seen.¹⁰ We then categorized visits by the month in which they were completed (April or May) to explore changes in telehealth modality use over time. For this analysis only, we excluded those visits that occurred in March as there were only 2 days in this month that were involved in the telehealth transition.

For the patient-level analyses, independent variables included self-reported age, sex, race, ethnicity, preferred language, need for an interpreter, and patient portal enrollment. All have been shown to be associated with telehealth use and are pertinent to questions of health equity.^{9,14,15} Age was categorized as young (18–44 years old), middle-aged (45–64), and older (65+).¹⁴ Race was categorized as White, Black, or other race. Ethnicity was categorized as Hispanic, non-Hispanic, and other. Language categories included English, Spanish, and other.

Statistical analysis

For the visit-level analyses, we generated descriptive statistics using chi-square and Fisher’s exact tests as appropriate to compare visit completion status by telehealth modality (telephone or video) and to compare telehealth modality by visit month.

For the patient-level analyses, we reported means and standard deviations for continuous variables and frequencies for categorical variables. We used *t*-tests to compare continuous variables and chi-square or Fisher’s exact tests as appropriate to compare categorical variables. We then conducted multivariable logistic regression to identify factors associated with telephone visit use, including factors such as age, sex, race, ethnicity, preferred language, need for an interpreter, and patient portal enrollment.^{9,14,15} We presented adjusted odds ratios (AOR) with 95% confidence intervals (CI) and corresponding *p*-values. Statistical

Table 1. Patient characteristics by telehealth modality.

Variable	Telephone ($N=415$ patients)	Video ($N=88$ patients)	<i>p</i> -value
Age group (years)			
Young (18–44)	94 (23%)	35 (40%)	0.001
Middle-Aged (45–64)	230 (55%)	44 (50%)	
Older (65+)	91 (22%)	9 (10%)	
Sex			
Male	260 (63%)	63 (72%)	0.112
Female	155 (37%)	25 (28%)	
Race			
White	142 (34%)	57 (65%)	<0.001
Black	186 (45%)	21 (24%)	
Other	87 (21%)	10 (11%)	
Ethnicity			
Non-Hispanic	325 (78%)	73 (83%)	0.149 ^b
Hispanic	84 (20%)	12 (14%)	
Other	6 (1%)	3 (3%)	
Preferred Language ^a			0.059 ^b
English	375 (91%)	86 (98%)	
Spanish	29 (7%)	1 (1%)	
Other	10 (2%)	1 (1%)	
Interpreter Needed	30 (7%)	1 (1%)	0.027 ^b
Enrolled in Patient Portal	187 (45%)	83 (94%)	<0.001

^aMissing = 1. ^bFisher’s exact test.

significance was set at $p < 0.05$. Analyses were performed using SAS 9.4 (SAS Institute).

Ethics

Our study was deemed to be exempt by the Institutional Review Board of Yale University School of Medicine (Protocol ID 2000028059), thus consent was not required.

Results

Visit-level analyses

A total of 2668 visits were scheduled at the clinic between 30 March 2020 and 31 May 2020. Of these, 926 were missing information on telehealth visit type (telephone vs. video) and were therefore excluded from the study. Of the 1742 remaining visits, 1432 telephone visits (82%) and 310 (18%) video visits were scheduled. Seventy-seven percent of telephone visits were completed compared to 75% of video visits ($p = 0.449$). No-show rates were significantly higher for telephone (8%) versus video visits (5%) ($p = 0.025$). Cancellation rates were significantly higher for video (20%) relative to telephone (15%) visits ($p = 0.019$).

The clinic recorded 643 completed telehealth visits in April and 623 in May 2020. The proportion of telephone visits decreased from 84% of all telehealth visits in April to 79% in May ($p = 0.031$).

Patient-level analyses

At the patient level, 503 unique patients completed a telehealth visit during the period of interest. Of these, 415 (83%) completed at least one telephone visit, and 88 (17%) completed at least one video visit (Table 1). Eighteen patients completed both telephone and video visits during the time of interest, and we excluded them from our study. These excluded patients differed from those we included in terms of patient portal enrollment (89% enrollment for patients who attended both modalities, 54% for those who attended only one modality, $p = 0.003$). Otherwise, there were no significant differences between the groups.

Telephone was the most used telehealth modality regardless of age, race, preferred language, need for an interpreter, and enrollment in the patient portal. Those who had completed telephone visits were older than those who had video visits (54 ± 14 years vs. 47 ± 13 years, respectively, $p < 0.001$). They were more likely to be Black (45% vs. 24%, $p < 0.001$) or other race (21% vs. 11%, $p < 0.001$) and to require an interpreter (7% vs. 1%, $p = 0.027$). Patients attending telephone visits were less likely to be enrolled in the patient portal than those who used video visits (45% vs. 94%, $p < 0.001$).

In multivariable analyses, age, race, and patient portal enrollment were significantly associated with use of a telephone visit (Table 2). Older patients (AOR 3.28; 95% CI, 1.37–7.82) and those of Black race (AOR 2.42; 95% CI, 1.20–4.49) had higher odds of telephone visits compared to patients who were under 45 years of age and those of White race, respectively. Patients enrolled in the patient

Table 2. Adjusted associations between patient characteristics and telephone visit use.

Variable	Telephone	
	Adjusted OR (95% CI)	<i>p</i> -value
Age group (years)		
Young (18–44)	1.00	–
Middle-Aged (45–64)	1.57 (0.89–2.79)	0.123
Older (65+)	3.28 (1.37–7.82)	0.008
Sex		
Male	1.00	–
Female	1.26 (0.70–2.25)	0.441
Race		
White	1.00	–
Black	2.42 (1.20–4.49)	0.005
Other	2.58 (0.96–6.90)	0.060
Ethnicity		
Non-Hispanic	1.00	–
Hispanic	1.12 (0.42–2.99)	0.823
Other	1.04 (0.22–4.88)	0.962
Preferred Language		
English	1.00	–
Spanish	4.96 (0.36–68.48)	0.232
Other	0.44 (0.03–7.00)	0.563
Interpreter Needed		
No	1.00	–
Yes	1.22 (0.08–18.01)	0.884
Enrolled in Patient Portal		
No	1.00	–
Yes	0.06 (0.02–0.16)	<0.001

portal had lower odds of completing a telephone visit compared to those not enrolled (AOR 0.06; 95% CI, 0.02–0.16).

Discussion

In this study of telehealth modality use at an urban HIV clinic from March through May 2020, we found that telephone visits were far more common than video visits. There was a lower frequency of cancellations and a higher frequency of no-shows among telephone visits. Telephone visit use decreased from April to May but remained the predominant telehealth modality used. For patient-level analyses, we found that older age, Black race, and lack of patient portal enrollment were associated with use of telephone visits.

Our findings on the association between age and race with telehealth modality are consistent with those from HIV-specific clinics¹⁸ and from other primary care and specialty clinics during the COVID-19 pandemic.^{9–11,14,15} The older population faces unique barriers to video visits including hearing and visual impairment, and limited technological experience.²⁶ Black patients are less likely than white patients to have access to broadband internet and may be less likely to use personal health technology to manage their healthcare.^{12,13,27} Given that older age and Black race are associated with a greater likelihood of telephone use, failure to provide telephone visits could result in the exclusion of vulnerable patients from care. There is also evidence that telephone visits facilitate access to care; the lower cancellation rate among telephone visits compared to video visits within our study may suggest that telephone visits are an accepted visit modality in the PWH population.²⁸ For these reasons, and because cost is a common barrier to care for PWH, it is vitally important that telephone visits be covered by insurance and that they be covered at rates commensurate with other telehealth modalities.²⁹

While measures to expand broadband networks or telehealth infrastructure have been implemented in recent years, our research suggests that they are insufficient for achieving video visit use.^{30,31} Many patients who used telephone visits were enrolled in the patient portal, suggesting that they had access to the technology necessary for video visits but still preferred telephone to video visits. Furthermore, telephone remained the main visit modality through April and May. It may be that while patients could be signed up for the portal, they lacked the knowledge and/or internet access required to use video technology. Alternatively, research suggests that clinic and provider factors, such as video infrastructure or biased assumptions about which patients can attend video visits, may be more important than patient preference in determining telehealth modality.¹⁴ Clearly, more research is necessary to explore reasons for selecting specific telehealth modalities. However, reimbursement parity for telephone

visits and technological education for both patients and providers must be part of the solution to optimize telehealth. As telehealth becomes a more integral part of healthcare, multiple modalities should be available so that providers do not discriminate against those who are unable to or who prefer not to use video technologies.

More research—both qualitative and quantitative—is required to further explore telehealth modality use among PWH. In qualitative studies, researchers have shown that both PWH and their healthcare providers have favorable attitudes toward using telehealth.^{20,32} Future studies should investigate why patients use telephone rather than video visits even when they have access to the necessary technology. Quantitatively, researchers have begun to study the impact of telehealth on CD4 counts and viral load, but no studies have looked at the effects of telephone versus video visits on such outcomes.³³ More evidence is required to determine the effectiveness of telephone or video visits in improving patient outcomes and the best use of each modality for various aspects of the chronic disease cascade. Furthermore, as telehealth becomes increasingly ubiquitous, studies should investigate trends in long-term modality use to best inform care for this population. Existing research suggests outcomes similar to those in our study, but more data are needed to ensure this at-risk population receives optimal care.³⁴

Our study had several strengths. We were able to include a larger number of patients ($N=503$) and telehealth visits ($N=1742$) than had been included in other, comparable studies of PWH.¹⁸ In addition, clinic providers included PAs, APRNs, RNs, MDs, and social workers, making our findings applicable to multiple healthcare disciplines. Furthermore, our study period included only telehealth visits, eliminating possible complications from co-occurring in-person visits.

Our study also had notable limitations. First, 35% of scheduled visits during this period were of unknown telehealth modality. This was likely a product of the rapid telehealth transition faced by the clinic: providers and staff were initially unsure of how to schedule and document telehealth visits. Second, the number of telephone visits was likely underestimated, as some visits scheduled as video visits may have been switched to telephone at the time of the appointment. Third, we were unable to assess the impact of factors such as insurance coverage, income, or internet access, which prior research suggests are associated with telehealth use. We were also unable to assess the impact of differences in insurance reimbursement for video versus telephone visits. These factors should be investigated in future studies. Fourth, we could not elucidate what barriers our patients may have faced in attending a video visit, including improper technology, lack of broadband access, insufficient technological knowledge, or personal preference. It is also unclear if clinic factors (e.g., facility internet, provider technological skill or preference,

availability of timely technical assistance, differences in reimbursement, and healthcare system preference) influenced visit modality. Finally, we studied a single urban clinic in a large academic institution with extensive resources available to help clinics make the transition from in-person to telehealth care. Our results may not be generalizable to non-academic or rural settings.

Conclusions

The COVID-19 pandemic forced rapid change in clinical practice. Telehealth expansion provided a chance for patients and providers to safely connect amidst an uncertain public health crisis. It also provided researchers a unique opportunity to study this previously limited practice modality, bringing to light inequities and repercussions which might otherwise have remained hidden. Our study found that PWH used telephone visits more than video visits to engage in care. We also found that differences in age and race were associated with telephone visit attendance, which is consistent with the results of similar studies from different populations. As the use of telehealth continues, we must continue to seek opportunities to provide more efficient, safe, and accessible care.

Acknowledgments: The contents of this publication are solely the responsibility of the authors and do not necessarily represent the official views of NIH.

Contributorship: HC and JAW researched literature and conceived the study. HC and AA conducted the data analyses. KHW and HP accessed the data and provided it in analyzable form. RGC, MV, PH, and LAB provided clinical and health system context for this work and contributed to interpretation of the data. HC wrote the first draft of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

Declaration of conflicting interests: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval: This study was granted an exemption by the Institutional Review Board of the Yale University School of Medicine (#2000028059) and is HIPAA compliant.

Funding: The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (R01 AR078715 granted to Julie A. Womack), the National Center for Advancing Translational Sciences (TL1 TR001864 granted to Andrew Arakaki), and Doris Duke Charitable Foundation and U.S. National Library of Medicine (R01LM013477 and G08LM013801 granted to Karen H. Wang).

Guarantor: JAW.

ORCID iD: Julie A. Womack  <https://orcid.org/0000-0002-1003-0276>

References

1. WHO. WHO Director-General's opening remarks at the media briefing on COVID-19—11 March 2020, <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020> (2020).
2. AAPA. PA use of telemedicine in June 2020: trends and implications for PAs, <https://www.aapa.org/wp-content/uploads/2020/10/June-2020-Telemedicine-DataBrief-Rev.pdf> (2020).
3. Ferguson JM, Jacobs J, Yefimova M, et al. Virtual care expansion in the Veterans Health Administration during the COVID-19 pandemic: clinical services and patient characteristics associated with utilization. *J Am Med Inform Assoc* 2021; 28: 453–462.
4. Hoffman PE, London YR, Weerakoon TS, et al. Rapidly scaling video visits during COVID-19: the ethos of virtual care at Yale Medicine. *Healthc (Amst)*. 2020; 8: 100482.
5. Bajowala SS, Milosch J and Bansal C. Telemedicine pays: billing and coding update. *Curr Allergy Asthma Rep* 2020; 20: 60.
6. Mehrotra A, Ray K, Brockmeyer DM, et al. Rapidly converting to “virtual practices”: outpatient care in the era of COVID-19. *NEJM Catalyst* 2020; 1(2)
7. Centers for Medicare & Medicaid Services. Medicare telemedicine healthcare provider fact sheet, <https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet> (2020, accessed 15 December 2020).
8. Fleischman DS, Navarrete CD and Fessler DM. Oral contraceptives suppress ovarian hormone production. *Psychol Sci* 2010; 21: 750–752; author reply 3.
9. Eberly LA, Kallan MJ, Julien HM, et al. Patient characteristics associated with telemedicine access for primary and specialty ambulatory care during the COVID-19 pandemic. *JAMA Network Open* 2020; 3: e2031640.
10. Kasle DA, Torabi SJ, Savoca EL, et al. Outpatient otolaryngology in the era of COVID-19: a data-driven analysis of practice patterns. *Otolaryngol—Head Neck Surg* 2020; 163: 138–144.
11. Eberly LA, Khatana SAM, Nathan AS, et al. Telemedicine outpatient cardiovascular care during the COVID-19 pandemic: bridging or opening the digital divide? *Circulation* 2020; 142: 510–512.
12. Perrin A and Duggan M. Americans' internet access: 2000–2015, <http://pewinternet.org/2015/06/26/americans-internet-access-2000-2015/> (2015, accessed 27 April 2017).
13. Yoon H, Jang Y, Vaughan PW, et al. Older adults' internet use for health information: digital divide by race/ethnicity and socioeconomic Status. *J Appl Gerontol* 2018; 39: 105–110.
14. Rodriguez JA, Betancourt JR, Sequist TD, et al. Differences in the use of telephone and video telemedicine visits during the COVID-19 pandemic. *Am J Manag Care* 2021; 27: 21–26.
15. Schifeling CH, Shanbhag P, Johnson A, et al. Disparities in video and telephone visits among older adults during the

- COVID-19 pandemic: cross-sectional analysis. *JMIR Aging* 2020; 3: e23176.
16. Anthony DL, Campos-Castillo C and Lim PS. Who isn't using patient portals and why? Evidence and implications from A national sample of US adults. *Health Aff (Millwood)* 2018; 37: 1948–1954.
 17. Ennis N, Armas L, Butame S, et al. Factors impacting video telehealth appointment completion during COVID-19 pandemic among people living with HIV in a community-based health system. *AIDS Behav* 2022; 26: 407–414.
 18. Friedman EE, Devlin SA, Gilson SF, et al. Age and racial disparities in telehealth use among people with HIV during the COVID-19 pandemic. *AIDS Behav* 2022; 26: 2686–2691.
 19. Reed ME, Huang J, Graetz I, et al. Patient characteristics associated with choosing a telemedicine visit vs office visit with the same primary care clinicians. *JAMA Network Open* 2020; 3: e205873.
 20. Dandachi D, Dang BN, Lucari B, et al. Exploring the attitude of patients with HIV about using telehealth for HIV care. *AIDS Patient Care STDS* 2020; 34: 166–172.
 21. Dandachi D, Lee C, Morgan RO, et al. Integration of telehealth services in the healthcare system: with emphasis on the experience of patients living with HIV. *J Investig Med* 2019; 67: 815–820.
 22. Mugavero MJ, Amico KR, Horn T, et al. The state of engagement in HIV care in the United States: from cascade to continuum to control. *Clin Infect Dis* 2013; 57: 1164–1171.
 23. Shiau S, Krause KD, Valera P, et al. The burden of COVID-19 in people living with HIV: a syndemic perspective. *AIDS Behav* 2020; 24: 2244–2249.
 24. American Psychological Association. HIV/AIDS and socioeconomic status, <https://www.apa.org/pi/ses/resources/publications/factsheet-hiv-aids.pdf> (2010).
 25. Massaroni V, Delle Donne V, Ciccarelli N, et al. Use of telehealth for HIV care in Italy: are doctors and patients on the same page? A cross-sectional study. *Int J Med Inform* 2021; 156: 104616.
 26. Narasimha S, Madathil KC, Agnisarman S, et al. Designing telemedicine systems for geriatric patients: a review of the usability studies. *Telemed e-Health* 2016; 23: 459–472.
 27. Mitchell UA, Chebli PG, Ruggiero L, et al. The digital divide in health-related technology use: the significance of race/ethnicity. *Gerontologist* 2019; 59: 6–14.
 28. Drerup B, Espenschied J, Wiedemer J, et al. Reduced no-show rates and sustained patient satisfaction of telehealth during the COVID-19 pandemic. *Telemed J E Health* 2021; 27: 1409–1415.
 29. Dombrowski JC, Simoni JM, Katz DA, et al. Barriers to HIV care and treatment among participants in a public health HIV care relinkage program. *AIDS Patient Care STDS* 2015; 29: 279–287.
 30. The White House. Fact sheet: the American jobs plan, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/> (2021).
 31. Federal Communications Commission. COVID-19 telehealth program (invoices & reimbursements), <https://www.fcc.gov/covid-19-telehealth-program-invoices-reimbursements> (2021).
 32. Anderson K, Francis T, Ibanez-Carrasco F, et al. Physician's perceptions of telemedicine in HIV care provision: a cross-sectional web-based survey. *JMIR Public Health Surveill* 2017; 3: e31.
 33. Lawal FJ, Omotayo MO, Lee TJ, et al. HIV treatment outcomes in rural Georgia using telemedicine. *Open Forum Infect Dis* 2021; 8: ofab234.
 34. Wood BR, Lan KF, Tao Y, et al. Visit trends and factors associated with telemedicine uptake among persons with HIV during the COVID-19 pandemic. *Open Forum Infect Dis* 2021; 8: ofab480.
-