Impact of the Coronavirus Disease 2019 Pandemic on Antiretroviral Therapy Initiation and Care Delivery for People With Newly Diagnosed HIV in an Integrated Healthcare System

Kurtis B. Mohr, Brandon M. Imp, Christian Lee-Rodriguez, Zahra Samiezade-Yazd, Jennifer O. Lam, Kurtis B. Mohr, Christian Lee-Rodriguez, Zahra Samiezade-Yazd, Jennifer O. Lam

1Graduate Medical Education, Kaiser Permanente Northern California, Oakland, California, USA, 2Oakland Medical Center, Kaiser Permanente Northern California, Oakland, California, USA, and 3Division of Research, Kaiser Permanente Northern California, Oakland, California, USA

The coronavirus disease 2019 (COVID-19) pandemic disrupted health systems. For patients newly diagnosed with human immunodeficiency virus, starting immediate antiretroviral therapy (ART) is recommended. For periods before and during the COVID-19 pandemic, Kaiser Permanente Northern California found similar rates of rapid ART initiation and time to viral suppression, concurrent with an increase in telemedicine.

Keywords. COVID-19; HIV; rapid ART; telemedicine.

Patients newly diagnosed with human immunodeficiency virus (HIV) should start antiretroviral therapy (ART) immediately as rapid initiation has demonstrated early and sustained engagement in care with higher rates of viral suppression [1]. However, the coronavirus disease 2019 (COVID-19) pandemic, through various means (eg, shelter-in-place mandates, supply chain disruptions, healthcare reallocation), has disrupted routine HIV screening and testing protocols [2, 3]. Early in the pandemic, local HIV viral suppression rates decreased despite an increased number of telemedicine visits for established HIV cohorts [4]. Similar findings have been noted across the United States and international sites as well as in integrated health systems [5–8]. In a recent systematic review, there were varying impacts of the pandemic on HIV care retention, adherence, and viral suppression rates for persons enrolled in HIV care [9]. None of these studies, however, have studied initial HIV care or rapid ART initiation for patients with newly diagnosed HIV.

Kaiser Permanente Northern California (KPNC) is a large, integrated healthcare system with routine laboratory surveillance of HIV test results. For patients newly diagnosed with HIV, KPNC offers comprehensive HIV medical care including rapid ART initiation. How the COVID-19 pandemic impacted care delivery for newly diagnosed HIV within an integrated healthcare system is unclear.

In this study, we investigate the impact of the COVID-19 pandemic on rapid ART initiation and subsequent viral suppression among patients newly diagnosed with HIV.

METHODS

Study Design, Setting, and Population

This observational cohort study included members of KPNC, an integrated healthcare system, that provides comprehensive medical services to >4 million patients demographically similar to the insured adult population [10]. There are 10 different service areas, which include urban, suburban, and rural communities and >20 medical centers. Evidence-based, multidisciplinary HIV care services are provided within each medical center and include dedicated clinician support, case management, and coordination of health benefits.

Patients in this study were adults (aged ≥18 years) who were newly diagnosed with HIV between 1 March 2019 and 28 February 2021. All new HIV diagnoses were verified via medical record review. Patients were excluded if they were previously diagnosed with HIV outside of KPNC.

Data Collection

Demographic and clinical data were obtained from KPNC’s electronic medical record and linked laboratory and pharmacy databases. Patients received pharmacy benefits and ART prescriptions within KPNC. Baseline HIV viral load and CD4 cell count were defined as the first measurement taken within 3 months of HIV diagnosis. Data were also obtained on the type of HIV intake visit (eg, telemedicine/virtual, outpatient, or inpatient visit), defined as the first clinical encounter the patient had with a KPNC HIV specialist.

Outcome

The primary outcome of interest was rapid ART initiation, defined as an ART prescription fill from a KPNC pharmacy within 7 days of HIV diagnosis. Secondary outcomes were days to HIV viral suppression (HIV viral load <200 copies/mL) and the proportion of patients who reached HIV viral suppression with 1 year of diagnosis.
Statistical Analysis
We compared patients in the year prior to the onset of the COVID-19 pandemic (1 March 2019 to 29 February 2020) to those diagnosed in the first year of the pandemic (1 March 2020 to 28 February 2021). Differences between groups were assessed using Student t test for continuous values and χ² tests (or Fisher exact tests where cell sizes were small) for categorical values. Analyses were performed using SAS version 9.4 software (SAS Institute, Cary, North Carolina).

Patient Consent
This study did not include factors necessitating patient consent and was granted exempt status by the KPNC Institutional Review Board.

RESULTS
We identified 539 patients newly diagnosed with HIV, including 281 diagnosed in the pre–COVID-19 period and 258 in the during–COVID-19 period (Table 1).

Overall, the mean age was 36.9 years (standard deviation, 12.6 years), 86.6% were male, and 70.1% were men who have sex with men. Demographic characteristics were similar between the pre–COVID-19 and during–COVID-19 periods. Patients in the pre–COVID-19 period were more likely to have commercial health insurance than those diagnosed during COVID-19 (95.4% vs 90.3%; P = .01).

Overall, 51.2% of patients started ART within 7 days of diagnosis, with 48.4% in the pre–COVID-19 period and 54.3% in the during–COVID-19 period (P = .17) (Table 2). Within 1 year of HIV diagnosis, most patients had HIV viral suppression (87.2% pre–COVID vs 89.5% during COVID-19; P = .40). The average length of time to viral suppression was 97.3 days in the pre–COVID-19 period and 80.6 days in the during–COVID-19 period (P = .05).

Telemedicine intake visits increased from 20.3% before to 62.4% during the pandemic, and outpatient intake visits decreased from 66.5% before to 28.3% during the pandemic (P < .001).

DISCUSSION
Despite global disruptions from the COVID-19 pandemic, patients newly diagnosed with HIV at KPNC had the same rates of rapid ART initiation and rates of viral suppression within 1 year both before and during the pandemic. Additionally, KPNC saw changes that led to decreased in-person intake appointments and increased telemedicine intake appointments. The measured clinical outcomes, however, were not negatively impacted. While earlier studies on established HIV cohorts found negative or varying effects on outcomes during the pandemic, we did not detect differences in patients with newly diagnosed HIV [2–9]. This highlights the preservation of the HIV care continuum of diagnosis, linkage, retention, and ultimately viral suppression at KPNC during a global crisis. The preservation may be attributed to certain advantages of an integrated healthcare system, including incorporated laboratory monitoring, coordinated HIV services, and relatively stable healthcare access.

Table 1. Demographic and Clinical Characteristics of Patients Newly Diagnosed With HIV Between 1 March 2019 and 28 February 2021

| Characteristic                      | Overall (N = 539) | Pre–COVID-19 (1 Mar 2019–29 Feb 2020) (n = 281) | During COVID-19 (1 Mar 2020–28 Feb 2021) (n = 258) | P Valuea |
|------------------------------------|-------------------|-----------------------------------------------|-----------------------------------------------|-----------|
| Demographics                       |                   |                                               |                                               |           |
| Age, y, mean (SD)                  | 36.9 (12.6)       | 37.6 (12.5)                                   | 36.1 (12.7)                                   | .17       |
| Sex                                |                   |                                               |                                               |           |
| Female                             | 22                 |                                               |                                               |           |
| Male                               | 467 (86.6)        | 424 (86.1)                                    | 225 (87.2)                                    | .22       |
| Transgender                        | 15 (2.8)          | 11 (3.9)                                      | 4 (1.6)                                       |           |
| Race/ethnicity                     |                   |                                               |                                               |           |
| Black/African American             | 114 (21.2)        | 63 (22.4)                                     | 51 (19.8)                                     |           |
| Hispanic/Latino                    | 163 (30.2)        | 87 (31.0)                                     | 76 (29.5)                                     |           |
| White                              | 147 (27.3)        | 81 (28.8)                                     | 66 (25.6)                                     |           |
| Other/Unknown                      | 36 (6.7)          | 12 (4.3)                                      | 24 (9.3)                                      |           |
| Non-English primary language       | 44 (8.2)          | 23 (8.2)                                      | 21 (8.1)                                      | .98       |
| Risk groupb                        |                   |                                               |                                               |           |
| MSM                                | 378 (70.1)        | 202 (71.9)                                    | 176 (68.2)                                    | .35       |
| Heterosexual                       | 149 (27.6)        | 74 (26.3)                                     | 75 (29.1)                                     | .48       |
| Intravenous drug use               | 20 (3.7)          | 12 (4.3)                                      | 8 (3.1)                                       | .47       |
| Baseline insurance typeb           |                   |                                               |                                               |           |
| Commercial                         | 501 (92.9)        | 268 (95.4)                                    | 233 (90.3)                                    | .02       |
| Noncommercial                      | 60 (11.1)         | 23 (8.2)                                      | 37 (14.3)                                     | .02       |
| Baseline HIV laboratory measure    |                   |                                               |                                               |           |
| HIV viral load, copies/mL          |                   |                                               |                                               | .53       |
| <200                               | 44 (8.2)          | 26 (9.3)                                      | 18 (7.0)                                      |           |
| 200–100 000                        | 197 (36.5)        | 106 (37.7)                                    | 91 (35.3)                                     |           |
| >100 000                           | 245 (45.5)        | 120 (42.7)                                    | 125 (48.4)                                    |           |
| Unknown                            | 53 (9.8)          | 29 (10.3)                                     | 24 (9.3)                                      |           |
| CD4 count, cells/µL                |                   |                                               |                                               | .11       |
| <200                               | 109 (20.2)        | 51 (18.1)                                     | 58 (22.5)                                     |           |
| 200–500                            | 209 (38.8)        | 101 (35.9)                                    | 108 (41.9)                                    |           |
| >500                               | 170 (31.5)        | 100 (35.6)                                    | 70 (27.1)                                     |           |
| Unknown                            | 51 (9.5)          | 29 (10.3)                                     | 22 (8.5)                                      |           |

Results are presented as No. (%) unless otherwise indicated.

Abbreviations: COVID-19, coronavirus disease 2019; HIV, human immunodeficiency virus; MSM, men who have sex with men; SD, standard deviation.

aP value for the χ² test of association or Fisher exact test for categorical variables and Student t test for continuous variables.

bGroups are not mutually exclusive.
A major strength of our study was that it involved a focused examination of ART initiation among people newly diagnosed with HIV. Rapid ART has been recommended by national guidelines based on studies demonstrating increased ART uptake, higher engagement in care, and faster time to viral suppression [11]. Given the varying impacts of the COVID-19 pandemic on health systems, strengthening the HIV care continuum at initial HIV diagnosis with disclosure and ART initiation will be critical to the health of people with new HIV and efforts to end the HIV epidemic [9, 12]. Our study contributes to the literature on rapid ART and COVID-19 pandemic by suggesting an integrated healthcare model or access to telemedicine services may help overcome barriers to initial HIV care and provision of ART.

KPNC's sustained delivery of initial HIV care could be explained by the availability and utilization of an existing telemedicine platform that rapidly expanded at the start of the COVID-19 pandemic. Telemedicine consultations were substantially adopted across all age groups and demographics and viewed positively by both providers and patients, which may help with viral suppression and care engagement [8, 13–15]. Most patients in our study were young, and thus likely experienced users of mobile devices and technology. Therefore, this age group may have maintained uninterrupted access to HIV care despite pandemic disruptions.

While we found key aspects of the HIV care continuum sustained in the first year of the COVID-19 pandemic, additional research on reasons why some patients did not start rapid ART could help with improving care engagement. For example, improved understanding of the contributions of patient readiness, language barriers, or other socioeconomic reasons not reflected in the data could be helpful.

Since our study was conducted within an integrated healthcare system, results may not generalize to other care settings or to patients who are uninsured. However, our data do represent a demographically diverse population, particularly one that continues to be affected by new HIV diagnoses, such as among young adults who identify as persons of color and/or other minority classification, similar to national trends [10, 16].

In summary, we found that patients newly diagnosed with HIV at an integrated healthcare system like KPNC had similar outcomes of rapid ART initiation and rates of viral suppression before and during the COVID-19 pandemic.

Notes

Acknowledgments. We thank Dr Michael J. Silverberg for his input on study design and Tory Levine-Hall for his support in Kaiser Permanente Northern California (KPNC) HIV Registry data collection.

Financial support. This work was support by grants from the KPNC Community Health Program (principal investigator: M. N. L.); the KPNC Graduate Medical Education Program; and the National Institute of Allergy and Infectious Diseases (award number K01AI157849 to J. O. L.).

Potential conflicts of interest. All authors: No reported conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

References

1. Coffey S, Bacchetti P, Sachdev D, et al. RAPID antiretroviral therapy: high virologic suppression rates with immediate antiretroviral therapy initiation in a vulnerable urban clinic population. AIDS 2019; 33:825–2. Erratum: AIDS 2019; 33:2113.
2. Quo S, Li Z, Weissman S, et al. Disparity in HIV service interruption in the outbreak of COVID-19 in South Carolina. AIDS Behav 2021; 25:49–57.
3. Ridgway JP, Schmitt J, Friedman E, et al. HIV care continuum and COVID-19 outcomes among people living with HIV during the COVID-19 pandemic, Chicago, IL. AIDS Behav 2020; 24:2770–2.
4. Spinelli MA, Hickey MD, Gilheden DV, et al. Viral suppression rates in a safety-net HIV clinic in San Francisco destabilized during COVID-19. AIDS 2020; 34:2328–31.
5. Rick F, Odike W, van den Hombergh J, et al. Impact of coronavirus disease (COVID-19) on HIV testing and care provision across four continents. HIV Med 2022; 23:169–77.
6. Norwood J, Khehti A, Shepherd BE, et al. The impact of COVID-19 on the HIV care continuum in a large urban southern clinic. AIDS Behav 2022; 26:2825–9.
7. Shi L, Tang W, Hu H, et al. The impact of COVID-19 on HIV care continuum in Jiangsu, China. BMC Infect Dis 2021; 21:768.
8. McGinnis KA, Skanderson M, Justice AC, et al. HIV care using differentiated service delivery during the COVID-19 pandemic: a nationwide cohort study in the US Department of Veterans Affairs. J Int AIDS Soc 2021; 24(Suppl 6):e25810.
9. Meyer D, Stone SE, Ogunbode O, Duroseau B, Farley JE. Impact of the COVID-19 pandemic on HIV healthcare service engagement, treatment adherence, and viral suppression in the United States: a systematic literature review [manuscript published online ahead of print 2 August 2022]. AIDS Behav 2022; https://doi.org/10.1007/s10461-022-03771-w.
10. Gordon NP. Similarity of adult Kaiser Permanente members to the adult population in Kaiser Permanente’s Northern California service area: Comparisons based on the 2017/2018 cycle of the California Health Interview Survey. Kaiser Permanente Division of Research, Oakland, CA; November 2020. https://divisionofresearch.kaiserpermanente.org/projects/memberhealthsurvey/Domain/CollectionDocuments/compare_kp_nca_chis2017-18.pdf. Accessed 11 November 2022.
11. Panel on Antiretroviral Guidelines for Adults and Adolescents, Department of Health and Human Services. Guidelines for the use of antiretroviral agents in adults and adolescents with HIV. https://clinicalinfo.hiv.gov/en/guidelines/adult-and-adolescent-arv. Accessed 11 November 2022.
12. Fauci AS, Redfield RR, Sigounas G, Weahkee MD, Giroir BP. Ending the HIV epidemic: a plan for the United States. JAMA 2019; 321:844–5.
13. Huang J, Graetz I, Millman A, et al. Primary care telemedicine during the COVID-19 pandemic: patient’s choice of video versus telephone visit. JAMIA Open 2022; 5:o0ac002.
14. Budak JZ, Scott JD, Dhanireddy S, Wood BR. The impact of COVID-19 on HIV care provided via telemedicine-past, present, and future. Curr HIV/AIDS Rep 2021; 18:98–104.
15. Smith E, Badowski ME. Telemedicine for HIV care: current status and future prospects. HIV AIDS (Auckl) 2021; 13:651–6.
16. Centers for Disease Control and Prevention. HIV surveillance report. Vol. 33. 2020. https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Accessed 19 June 2022.