



Research Article

Impact of Telehealth in HIV Ambulatory Clinic during COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has changed HIV outpatient care. Patients (pts) were transitioned from in-person (IN-P) visits to telehealth (TELE) encounters. We sought to evaluate the impact of TELE on HIV infected pts during the pandemic period (COV) and compare it to the pre-pandemic (pre-COV) care. A retrospective study was performed in an outpatient HIV clinic. Two periods were defined: Pre-COV 3/16/2019 - 3/15/2020 and COV 3/16/2020- 3/15/2021. Data was collected on demographics, lab values and physician encounters. Our study analyzed the improvement in CD4 counts and HIV viral load suppression rates from the first visit to last visit during both periods and followed on the retention of pts from Pre-COV to COV. A total of 1136 pts were seen over 2 years, median age 54 years. During pre-COV, 530 pts were seen as IN-P, while 606 pts had encounters during COV, of them 50.2% had exclusive TELE visits. During pre-COV, there was no difference in the percent of patients with CD4 > 200/ μ L (90.5% vs. 94.3%, p=.87) or HIV VL (88.5% vs. 90.3%, p=0.41) but during COV there was significant difference in CD4 (90.3% vs. 94.2%, p=0.03) and HIV VL (87% vs. 93%, p=0.002). More new pts were seen (8.6% vs 7 p=0.26) and less changes to ART regimens were done (19% vs 29%, p=0.32) during COV. 529 /530 (99.8%) pts that were seen during pre-COV continued their care in COV. In our clinic, transitioning to TELE resulted in larger number of encounters and more new pts entered care but without statistical significance; CD4 and HIV viral load improvements were seen. TELE is an effective platform for HIV out patient care.

Keywords: COVID-19; Telehealth; HIV care

Introduction

The COVID-19 pandemic has changed the practice of medicine and disrupted normal healthcare practices especially in the outpatient setting. In the past, patients (pts) living with HIV (PLWH) received their care by mostly IN-P, as the COVID-19 pandemic unfolded, outpatient management of PLWH needed to adapt to the new reality of stay at home mandates and the fear of contagion. A transition to alternative modes of care such as telemedicine (TELE), defined as remote electronic health care services including video interactions, telephone communication and asynchronous messaging, were implemented in many clinics. Congressional House Bill 6074, allowed the department of Health and Human Services to waive certain TELE restrictions, facilitated transition to TELE and this was coupled with emergency declaration waivers from the Centers for Medicare and Medicaid Services [1,2].

Our HIV outpatient clinic is located at Beth Israel Medical Center in Newark NJ, a tertiary care teaching hospital. Prior to the COVID-19 pandemic, all our patients were seen as IN-P every 3 to 4 months, every patient was seen by an infectious diseases physician, and by multidisciplinary care team that included a social worker, drug counselor, nutritionist and a psychologist as necessary.

When the COVID-19 pandemic started, care in our clinic was transitioned to TELE and as the time went on some in person (IN-P) visits were resumed. The goal of this study was to review our experience with TELE.

Methods

The study was conducted in a 680-bed tertiary care teaching hospital. This was a retrospective review. IRB approval with exemption of informed consent was obtained. The study period was from 3/16/2019 to 3/15/2021. Two study periods were

defined based on time periods: pre-COVID (pre-COV) 3/16/2019 -3/15/2020; COVID (COV) 3/16/2020 -3/15/2021. Data was collected for demographics, HIV infection risk, number of new pts enrolled in the clinic during each study period, number and type of encounters (either IN-P or TELE). Unduplicated pts with ≥ 1 visit were included independent of the number of times the pt was seen during that period. An Infectious Diseases physician conducted all TELE encounters via telephone communication. Pts' lab work was reviewed on a computer screen in real time during the TELE encounter. Prior to the encounter, pts received an automatic computer generated phone reminders about their upcoming appointment. Pts were instructed to do their blood work a few weeks before a scheduled appointment, lab work and included a complete blood count, complete metabolic panel, CD4, HIV Viral load during every visit. A yearly hepatitis panel, serum Quantiferon, RPR and chlamydia and gonorrhea urine PCR were obtained. CD4 counts and HIV viral loads at each visit were recorded. We compared percent of pts with undetectable HIV VL and CD4 above 200cells μ L between first and last visits in each period. HIV viral load of <200 copies/mL was considered undetectable.

Data was collected on antiretroviral (ART) regimen and on any changes to medications during each study period.

Demographics were summarized by mean values. Student's t- test was used for comparisons between groups. P value of ≤ 0.05 was set as significant.

Results

Overall, 1136 pts had at least one physician encounter in the 2 years study period. Median age 54 years. (IQ Range-42-62). Overall, there were 571 (50.3%) cis-gender males, and 4 (0.35%) transgender patients; Blacks 1017(89.5%), Hispanics 94 (8.3%) Caucasians 15(1.3%) and Asians 6 (.5%). Risk factors for HIV acquisition: Heterosexual transmission in 827 (73%), male having sex with male (MSM) in 217 (19.1%), combination of MSM and intravenous drug use (IDU) 15 (1.3%), IDU 16 (1.4%), perinatal transmission in 33(3%), Transfusion of products 14(1.23%), hemophilia 4 (.4%) and unspecified risk in 10 pts (0.9%). Co-morbid conditions were hypertension in 380(33.5%), obesity 324 (28.5%), dyslipidemia 277(24.4%), DM in 75(6.6%), Hepatitis C 79 (7%), Chronic kidney disease 102 (9%) and Hepatitis B 55 (5%) pts. Most patients were on integrase inhibitor based regimens. Table 1 lists the demographics of patients during Pre-COV and COV.

	Pre-COV	COV
Number of patients	530	606
Age (Median)	53	53
Cis-gender Male	266	305
Transgender	2	2
Risk Factor		
Heterosexual	391	436
MSM	99	118
MSM+ IDU	6	9
IDU	8	8
Perinatal transmission	15	18
Transfusion related	7	7
Hemophilia	2	2
Unspecified	2	8
Co-Morbid Conditions		
HTN	182	195
Obesity	153	170

Dyslipidemia	133	144
DM	52	55
Hepatitis C	45	46
CKD	44	45
Hepatitis B	16	19
ARV Regimen		
INT inhibitor based	317	379
INT+ NNRTI	42	43
NNRTI	73	74
PI	73	84
PI+INT	24	23
Elite Controller	1	1
No ARV secondary to other infections	0	2 (1 secondary to active MAI, 1 secondary to active TB)

Table 1: Demographics of Patients.

PRE- COV Visits

During pre-COV period, 530 unduplicated patients had IN –P visits. A single visit occurred in 71 (13.4%), 179 (34%) had 2 visits, 183 (35%) had 3 visits, 91(17%) had 4 visits, 5 (0.9%) had 5 visits and one patient (0.2%) had 6 visits. Median number of patient encounters was 3. The clinic accepted 36 (7%) new patients (Table 2).

Physician encounters	Pre-COV (n=530)	COV (n=606)
Number of physician visits		
One	71 (13.4)	127 (21)
Two	179 (34)	178(2)
Three	183 (35)	200 (3)
Four	91 (17)	95 (16)
Five	5 (0.9)	6 (1)
Six	1 (0.2)	0
Type of visit		
TELE	0	304 (50.2)
IN-P	530	89 (14.7)
Combination - TELE and IN-P	0	213 (35)
Number of New patients	36 (7)	52 (8.6)
Median number of physician encounters	3	2

Table 2: Physician encounters.

COV Period Encounters

During the COV period, 606 unduplicated pts had at least one physician encounters, of these 304 (50.2%) were TELE encounters, 89 (14.7%) IN-P, and 213 (35%) had a combination of both TELE and IN-P; 127 (21%) pts had a single encounter, 178 (29%) had 2 encounters, 200 (33%) had 3 encounters, 95(16%) had 4 encounters and 6 (1%) had 5 encounters. Median number of encounters was 2. Twenty-five clinic pts who missed appointments and were not seen during the pre-COV period had an encounter during the COV period. During COV 52(8.6%) new patients entered care compared to 36(7%) in the pre-COV (p=0.26).

Pre- COV period: CD4 and HIV Viral Loads

During the pre-COV period, 373/ 530 (70.3%) pts had their CD4 count and HIV VL measured at first and last encounter; median CD4 value at the first visit was 623µL (Range 5-2105) and 662µL (Range 8-2438) at the last visit. CD4 >200/µL at first visit was seen in 353/373(95%) and in 352/373 (94.3%) at the last encounter (p=.87).

HIV VL was undetectable in 330/373 (88.5%) at the first encounter and in 337/373(90.3%) at last encounter. (p=0.41) (Table 3a).

	First visit	Last visit	P value
Median CD4 µL	570	609	
CD4 > 200/ µL	353(95%)	352(94.3%)	0.87
HIV VL <200 copies/mL	330 (88.5)	337(90.3%)	0.41

Table 3a: CD 4 and HIV VL at first and last visits: Pre-COV period.

	Pre-COV (n=373)	COV (n=445 for CD4 and 448 for HIV VL)	P value
CD4 > 200/µL at first visit	353 (95%)	402/445 (90.3%)	0.02
CD4 > 200/µL at last visit	352 (94.3%)	419/445 (94.2%)	0.89
HIV VL < 200 copies/mL at first visit	330 (88.5%)	389/448 (87%)	0.47
HIV VL < 200copies mL at last visit	337 (90.3%)	417/448 (93%)	0.15
ARV regimen changes	116 (19)	153 (29)	0.32

Table 4: Comparing Pre-COV and COV: CD4, HIV VL and ARV regimen changes.

Discussion

Despite changes in the delivery of care from exclusively IN-P to mainly TELE, our study found that more pts received care during COV compared to the pre-COV period. More new pts entered care in the COV period compared to the pre-COV; improvement in CD4 counts and VL suppression rates were significantly higher when measured at first and last encounters in the COV period. There were no significant differences in the percent of patients with CD4 counts >200µl or viral load suppression in first and last encounters during the two study periods. The study found that during COV there were less changes to ART regimens compared to the pre-COV period.

COV Period: CD4 and HIV Viral Loads

During COV period, 445/606 (73.4%) pts had CD4 measured at first and last encounters, median CD4 at the first encounter was 617µL (Range 3-2486) and 627µL (Range 412-850) at the last encounter. CD4 count ≥ 200/µL at first encounter was seen in 402 (90.3%) and in 419(94.2%) at the last visit had (p=0.03); HIV Viral load was measured at first and last encounters in 448/606(73.9%) pts. HIV VL was undetectable in 389(87%) at the first visit and in 417 (93%) at the last visit (p=0.002) (Table 3b).

	First visit	Last visit	P value
Mean CD4µL	606	627	
Percent of CD4 above 200/ µL (n=445)	402(90.3)	419(94.2)	0.03
HIV VL (n=448)	389(87)	417(93)	0.002

Table 3b: CD4 and HIV VL at first and last encounters: COV period.

During COV there were less changes to ART regimens compared to pre-COV 116 (19%) compared to 153(29%)] (p=0 .32). Significantly higher percentage of pts had CD4 >200µL during the first visit in pre-COV period compared to COV [353/373 (95%) vs. 402/445 (90.3%), p=0.02]. However, no statistical difference was noted by last visit (352/373 (94.3 %), 419/445 (94.2%), p=0.89). There was no significant difference in percent of patients with undetectable HIV VL in the first visit [330/373 (88. 5%) vs. 389/448(87%), p=0.47] or during the last visit [337/373 (90.3%) vs. 417/448(93%) p=0.15] between Pre-COV and COV (Table 4).

The COVID-19 pandemic has interrupted the delivery of care and forced clinics to shift to TELE in order to continue to provide care, to PLWH. Experience of HIV care with TELE has been described in a number of studies prior to the COVID-19 pandemic. In a study by OHL, et al. at the VA system, participants in TELE needed to travel to a clinic in order to connect with their health care provider for a TELE encounter [3]. These pts reported a high rate of satisfaction, a decrease in travel time to care but there was no difference in retention in care or viral suppression compared those who did not participate in TELE. The same investigators reported on a larger study and found that only 120/1670 (13%) elected to participate in TELE; Participants had a higher number of visits and more frequent viral load testing but there was no improvement in HIV suppression when compared to non-participants [4].

In a study of HIV care in a correctional institution using TELE [5] pts who participated in the TELE group had greater virological suppression and higher CD4 counts.

Experience in transition to TELE during the COVID-19 pandemic is starting to emerge, Fadul [6] reported that adoption of TELE utilizing phone communication in the early months of the pandemic, resulted in a reduction in the number of visits frequency but a maintenance of viral load suppression. Mayer, et al. reported that in the first 2 months of the pandemic, visit frequency and viral load suppression were not interrupted after transitioning to either phone or video encounters [7].

Spinelli, et al. evaluated viral suppression after implementing TELE in a clinic in San Francisco, the authors described a significant reduction in viral suppression rates of 31% when compared to the pre COVID- 19 pandemic [8]. The authors stated that despite access to TELE, the patients had reduced access to social support services likely affecting care. Homelessness in this study was 16% and was associated with non-viral suppression. Our study in comparison, has found that more pts were seen during COV compared to pre-COV; HIV viral load suppression rates were higher during the COV period between first and last encounters. When comparing first and last visit measurement between the two periods, there was no statistical difference, a fact that supports the notion that TELE can provide effective way to maintain good clinical outcomes to PLWH.

The study by Spinelli [8] and Mayer [7] had a much shorter follow up periods compared to our study, which had a one year follow up in each period.

Sorbera, et al. compared HIV pts' viral load suppression in a clinic transitioning to TELE between two periods, pre-COV and post-COV [9]. They found that in their 211 pts there was no significant difference in viral load suppression rates, but the percent of patients with CD4 cell counts >200 μ L were higher in

the pre-COV compared to the post COV period. In comparison, our study showed no difference in either the percent of pts with CD4 counts >200 μ L or those with viral load suppression between the two periods.

TELE has some limitations; pts may feel uncomfortable talking about their medical conditions / medications over the telephone, pts may have accessibility issues, and there may be language and communication barriers. Some studies found different uptake rates in different patient populations. Data on TELE uptake using phone from Cardiology and Gastroenterology clinics showed that population similar to ours: minority groups, relatively older and female gender were likely to use TELE via phone as was found in our study [10,11].

A cross sectional study in Italy using self-report questionnaire 80 PLWH and 60 doctors noted that 88% of the physicians and 40% of PLWH did not want to substitute IN-P with TELE [12]. Another study noted that most patients were satisfied in general with TELE but some pts mostly women had some concerns about lack of physical exam and worried about safety of personal information [13].

Wood, et al. found that older age, people of color and patients on Medicaid coverage tended to use less TEE services [14]. Amatavete, et al noted retention rates of 98% at 3 months and 98.4% at 6 months with the use of TELE during COVID in PLWH [15]. Our study followed pts for a year and noted that after implementation of TELE during COV, more r new pts were accepted to the clinic (8.6% vs. 7%) and more pts had HIV VL suppression at the end of one year supporting the notion that TELE is an effective platform for the delivery of care and can supplement IN-P care.

Our study has a few limitations; it is a single center observational study, the study took place in an inner city hospital and therefore results may not be generalized. The study was retrospective and therefore all limitations of a retrospective analysis apply. The study used only telephone encounters, and therefore we may have missed some pts who did not have means to communicate or that would have preferred to use another communication platform.

Some of the strengths of our study were the relatively long follow up periods of one year in each of study periods. The fact that viral load and CD4 counts were tabulated at first and last encounters allowed a better analysis of patients' progression and effectiveness of TELE. Our study also recorded the number of new patients enrolled between the two periods a fact that allows a better perspective of TELE as a platform for the delivery of care for PLWH.

Conclusions

In our clinic, TELE was an effective tool to care for PLWH; this was evidenced by maintenance of high CD4 counts and virological suppression. In the face of a changing world of health care TELE seems to be an important tool in the care of PLWH.

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Author Contributions

Sandhya Nagarakanti (SN) wrote the manuscript, Eliahu Bishburg (EB) and Kristen Ehlers (KE) edited the manuscript. All authors reviewed the manuscript.

Data availability Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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