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Impact of a youth-focused care model on retention and virologic suppression among young adults with HIV cared for in an adult HIV clinic

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Abstract

Background: Young adults with HIV (YAHIV) are less likely to be retained in care or achieve viral suppression when seen in adult clinics. We assessed outcomes of a youth focused care model versus standard of care within a large adult HIV clinic.

Setting: The Accessing Care Early (ACE) program for YAHIV is embedded within an adult clinic. Eligibility for ACE includes age 18–30 years with ≥1 criteria: transfer from pediatric care, mental health diagnosis, substance use, or identified adherence barriers. Ineligible patients receive standard of care (SOC).

Methods: Retrospective analysis of patients entering ACE vs SOC from 2012–2014. Multivariable logistic regression assessed variables associated with retention and viral suppression (VS) < 200 copies/mL, and in separate analysis, clinical services utilization.

Results: 137 YAHIV entered care (2012–2014), 61 ACE and 76 SOC. Despite higher risk factors, ACE YAHIV were less likely to be lost to follow up compared to SOC (16% vs. 37%, p<0.01). At 24 months 49% in ACE vs. 26% in SOC met the retention measure, (p<0.01). In adjusted analysis ACE was associated with retention in care (AOR 3.26 [1.23–8.63]). Of those meeting the retention measure, 60% of ACE versus 89% of SOC had VS (AOR 0.63 [0.35–1.14]). Retention was associated with more frequent social work visits, nurse phone calls, and peer navigator interactions.

Conclusions: Higher risk ACE YAHIV had better retention than SOC YAHIV in an adult clinic. Improved retention did not to lead to improved VS, underscoring the need for additional interventions to optimize VS for YAHIV.

Keywords

Youth-focused care; HIV; retention

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Introduction

Young adults under the age of 30 represent approximately half of all newly diagnosed HIV infections in the United States.[1] Among young adults with HIV (YAHIV) in the US, the majority have non-perinatally acquired HIV (nPHIV), with male-to-male sex the most common risk factor; however, approximately one fifth of YAHIV have perinatally acquired HIV (PHIV) and are aging to adulthood[2]. When compared to older adults, YAHIV are less likely to be retained in care and achieve virologic suppression. [3–5] Both those with perinatally acquired HIV (PHIV) and non-perinatally acquired HIV (nPHIV) face barriers to care that include comorbidities, such as mental health and substance use disorders, as well as structural barriers, including challenges with stable housing, employment, and transportation.[6–8] Currently, there are varying models of care for YAHIV that include care in pediatric, adolescent focused, or adult clinics. [9] When comparing YAHIV treated in pediatric clinics and those treated in adult clinics, it has been shown that those cared for in pediatric clinics are less likely to discontinue antiretroviral therapy (ART) and are more likely to be retained in care.[10–12] In one study that included both pediatric and adult clinics, YAHIV who received care in a clinic with providers trained in providing healthcare to youth were significantly more likely to be retained in care.[13]

There is limited data on youth focused care within the adult clinical setting. As pediatric HIV clinics are limited in size and distribution, in the setting of a large proportion of youth among new HIV diagnoses and the aging of PHIV patients out of pediatric care, there is a need for youth-directed care within the adult clinical setting. The aim of this study was to assess the effectiveness of a youth-focused clinical program embedded within a large urban adult HIV clinic for YAHIV both transitioning from pediatric care and newly entering care who are at high risk for poor retention and nonadherence.

Methods

With the recognition that there were increasing number of youth entering adult care through new diagnoses or transfer from pediatric care, in 2012 the access care early (ACE) clinic was established as an embedded youth focused clinic within the existing HIV clinic at a large urban academic medical center. Care is provided by four physicians with combined internal medicine and pediatric training and therefore have specific training in youth-focused care. The support staff includes a dedicated nurse and social worker with youth focused care enhanced by a pediatric trained social worker and young adult peer navigator, all of whom perform non-ACE roles as well. All ACE patients are routinely reviewed at a coordinated multidisciplinary weekly meeting. The team offers a developmentally and cognitively informed and flexible approach in terms of communication (e.g., texting, direct messaging) and clinic visits (e.g., variable appointment times, schedules) with a goal of meeting the needs of youth.

Mental health services are located within the clinic as well, though they are not specifically youth-focused. Patients newly entering care at the facility are evaluated through a nurse intake and directed to the ACE clinic if they are 18–30 years and meet one of the following

criteria: transferring from pediatric care, history of mental health diagnosis, history of substance use, or known adherence issues within the standard adult clinic. Patients who are 18–30 but do not meet the above criteria enter the general adult HIV clinic and are provided the standard of care (SOC). SOC is provided by physicians with internal medicine training as well as nurse practitioners and physician assistants with nurse case management, social work, and mental health services available within the clinic. Patients in both clinics received automated appointment reminders, however, ACE patients received additional appointment reminders (phone or text message bi-directional communication) from the peer navigator. An extended definition of young adult to the age of 30 was used to allow for a more gradual transition to adulthood for higher- risk patients whose development may be negatively impacted by social determinants of health.

A retrospective cohort study was performed of all patients 18–30 years newly entering care in the ACE clinic compared to the standard adult clinic between 2012 and 2014. The primary outcomes were retention in care and HIV virologic suppression. Lost to follow up was a secondary outcome. A separate analysis was performed with clinic services utilization as the outcome. Retention was measured using the United States Health and Human Services Health Resources and Services Administration (HRSA) HIV/AIDS Bureau Performance Measure for HIV medical visit frequency, which is at least one medical visit in each 6-month period of a 24 month period with a minimum of 60 days between the first medical visit in the prior 6-month period and the last medical visit in the subsequent 6-month periods.[14] HIV viral suppression was defined as HIV viral load < 200 copies/mL. Lost to follow up (LTFU) was defined as no provider visit for at least one year without re-engagement during the study period and no documentation of transfer of care. Those not LTFU were defined as in care, unless transfer of care, relocation, administrative discharge, or incarceration was documented. Per clinic policy, administrative discharge was reserved for persistent behavioral disruptions in the clinic. Patients who entered the SOC group during the study period, but then transferred to ACE were analyzed in the SOC group. For the second analysis, Clinical services utilization within the first year of entering the clinic was determined for each patient and consisted of the number of completed nursing visits, nursing telephone calls, social work visits, and psychiatry visits. Categorical variables were used to define clinical services utilization in the first year. Nursing and social work visits were defined as 0–1, 2–3, ≥4 visits in the first year; nursing phone calls as 0–5, 6–10, ≥10; psychiatry visits defined as 0, 1–2, ≥3. Bidirectional communication with the peer navigator was defined as a telephone or electronic message conversation between the patient and the peer navigator. Unidirectional conversation was defined as a telephone or electronic message left by the peer navigator without documented patient response to the message.

Data was obtained through review of electronic medical records. A standard data extraction tool was created and used by the two reviewers (D.G and JS). A quality assessment of the collected data was performed to ensure consistency between reviewers. A minimum of 2 years of data was obtained for each patient. Data collection included demographic and baseline clinical characteristics, clinic utilization data, including provider, nurse, and social work encounters, and laboratory values (viral load and CD4 cell count. Clinical and demographic characteristics were defined at baseline. Substance use was defined as use of illicit drugs, including marijuana. Unstable housing was defined as a lack of permanent

residence per patient report. Mental health disorder was defined as documented depression, anxiety, bipolar disorder, or psychiatric disorder. The study was approved by the institutional review board at Johns Hopkins University.

Statistical analysis

Demographic and clinical factors for ACE and SOC were compared using Chi-square analysis for categorical variables and Wilcoxon rank sum for continuous variables with $p<0.05$ as the level of significance. Univariate and multivariable logistic regression was used to assess retention in ACE versus SOC. The multivariable model included age, gender, race/ethnicity (African American, white, other), HIV acquisition risk, baseline CD4 cell count (< 200 cells/mm^3, 200–249 cells/mm3, 250–499 cells/mm^3, and ≥500 cells/mm^3), baseline viral load (less than or greater than 200 copies/mL), mental health diagnosis (depression, anxiety, bipolar, psychotic disorder), and substance use. HIV viral load suppression was defined as < 200 copies/mL. Univariate and multivariable logistic regression using a generalized estimating equation model was used to assess viral load suppression. In the multivariable model the same variables listed above were included. Univariate and multivariable logistic regression was used to assess for retention and virologic suppression based on clinical services utilization within the first year. The multivariable model adjusted for clinic type (ACE versus SOC).

Results

Demographics

A total of 137 patients presented for care during the study period, 61 in the ACE and 76 in the standard of care (SOC) (Table 1). ACE patients were younger compared to SOC with a higher proportion in the 18–25 year range ($p=0.001$) and a median age of 25 versus 27 years ($p=0.002$). There was no difference in gender or race/ethnicity between the two groups, with males and African Americans making up the majority of each group, respectively. The groups differed in terms of HIV risk factor, specifically, while male-to-male sex was the most common risk factor in both groups; 23% in ACE had perinatal HIV risk factor versus 3% in the SOC. There was no difference in viral load or CD4 count, though ACE patients were more likely to be on ART at the time of entry in care. Fifteen (25%) ACE patients transitioned directly from pediatric care compared to four (5%) in SOC. Fifteen (25%) patients enrolled in ACE as transfers from SOC in the same adult clinic and 31 (50%) of ACE patients and 72 (95%) SOC patients enrolled as newly entering care or newly transferring care from another site.

ACE patients were more likely than SOC to be unemployed or have any substance use, though the difference was not statistically significant. ACE patients were more likely to use marijuana ($p=0.05$). The two groups differed significantly in terms of education, with 37% of ACE not completing high school and none with a college degree versus 13% and 36% in the SOC group ($p<0.001$). ACE patients were more likely to be diagnosed with a mental health disorder. Within ACE, 42% had depression, 15% bipolar, 3% anxiety, 2% psychotic disorder. ACE patients were more likely to have a history of incarceration, 10 patients versus 4 patients ($p=0.035$).

Loss to follow up

ACE patients were less likely to be lost to follow up compared to SOC patients (16% versus 37%, p<0.001). During the study period, 18% of ACE and 9% of SOC transferred care or relocated. Five patients were transferred from SOC to ACE for poor adherence. Two ACE patients were administratively discharged and 3 patients in ACE were incarcerated. There were no SOC patients that were administratively discharged or incarcerated.

Retention

During the 24-month study period 18 patients transferred care or moved. Of the 109 remaining patients, at 24 months 49% (25/51) in ACE meet the retention measure, versus 26% (18/68) in SOC (P<0.01). In a univariate model, ACE patients were more likely to be retained in care compared to patients in SOC [odds ratio (OR) 2.67, 95% Confidence Interval (CI):1.23–5.76] (Table 2). No other variables tested were associated with retention in univariate analysis. No transgender patients (n=3 in ACE, n=2 in SOC) were retained. In a multivariable model adjusting for age, gender, race/ethnicity, HIV risk factor, baseline viral load, baseline CD4 count, mental health and substance use disorders, ACE was associated with retention in care [adjusted odds ratio (AOR) 3.26, CI: 1.23–8.63]. Additionally, female gender was associated with retention in the adjusted model (AOR 5.70, CI:1.07–30.21).

When restricted to only those 18–25 (ACE n=35, SOC n=26), excluding those who transferred care, ACE was associated with retention in care in both univariate and multivariable logistic regression models controlling for the factors above (OR 3.22, CI:1.08–9.61); AOR 8.21, CI:1.5–44.18).

Virologic Suppression

The last HIV viral load measured in the study period was suppressed in 56% (30/54) of ACE and 69% (44/64) of SOC (p=0.14). There were three patients in ACE and 10 patients in SOC that did not have follow up viral load measurements after enrollment. For those patients who met the retention measure, 60% (15/25) of ACE versus 89% (16/18) of SOC were virologically suppressed (P=0.04). In univariate analysis, ACE patients were less likely to be virologically suppressed (OR 0.56, CI:0.32–0.97) (Table 2). Virologic suppression was also associated with baseline CD4>500 cells/mm^3 and virologic suppression at baseline. Viremia was associated with mental health disorder and substance use. In the multivariable model, after adjustment, the association with viremia for ACE was no longer significant, though there was a trend (AOR 0.63, CI:0.35–1.14). In the multivariable model, virologic suppression was associated with baseline CD4>500 cells/mm^3 and virologic suppression at baseline.

Clinic utilization

ACE patients had greater utilization of nursing visits, nursing telephone calls, social work visits, and psychiatric visits in the first year in care (Table 3). Univariate analysis of clinic utilization showed that retention was more likely if patients had 2–3 nurse visits in their first year in care (OR 7.79, CI:1.53–39.67]) (Table 4). Both 2–3 (OR 4.14, CI:1.49–11.48) and 4 or more (OR 10.65 [3.73–30.45]) completed social work appointments in the first year were associated with retention. Both 5–10 (OR 6.85, CI:1.92–24.46) and 11 or more (OR 7.31,

CI:2.32–23.06) nurse telephone calls in the first year were associated with retention. Three or more psychiatric visits in the first year was also associated with retention (OR 7.88, CI: 2.35–26.41). In a multivariable model of clinic utilization, adjusting for ACE versus SOC, social work visits in the first year, 2–3 (AOR 3.62, CI:1.12–11.66) and 4 or more (AOR 8.48, CI:2.39–30.08), and nurse phone calls, 5–10 (AOR 5.44, CI:1.01–29.43) and 10 or more (AOR 6.52, CI:1.23–34.45) was associated with retention. Clinical services utilization was not associated with virologic suppression in the univariate model. In the multivariable model, only 4 or more social work visits in the first year was associated with virologic suppression (AOR 2.52, CI:1.17–5.42).

For ACE patients, appointments were more likely to be made rather than missed if the peer navigator was able to confirm the appointment with the patient in a bi-directional communication prior to the visit (OR 2.69, CI:1.64–4.42). Uni-directional communication did not increase the likelihood of making the appointment (OR 1.39, CI:0.83–2.32). SOC patients did not received navigator telephone reminders.

Discussion

Patients in a youth-focused clinic embedded in an adult clinic had significantly higher retention than their YAHIV counterparts within the same adult clinic. The youth-focused ACE program screening process successfully identified YAHIV ages 18–30 years with traits associated with a high risk of attrition and viremia. Patients with substance use and mental health disorders, particularly depression, both known barriers to ART adherence in YAHIV, were of higher proportion in ACE compared to SOC. [15] Also of higher proportion in ACE were patients with lower education attainment and prior history of incarceration.

Retention in care has been a persistent challenge among YAHIV, who have the lowest rates of engagement, highest rates of attrition, and lowest rates of viral suppression amongst all populations.[3–5,16] Despite being comprised of higher risk patients, ACE had lower loss to follow up and better retention compared to the standard of care for YAHIV in the adult clinic. In adjusted analyses, retention in care was independently associated with receiving care in ACE as well as with female gender. The high risk YAHIV in ACE had a retention of 49% at 2 years, which compares to previous studies of YAHIV.[11,17] In one multisite cohort study of YAHIV, 44.6% were retained in care during the first year after engagement, though retention decreased to 22.4% for the second and third year.[11] A separate review of multiple studies estimates that 43% of YAHIV are retained over 1–3 years using varying retention measures.[17] Though various retention measures have been used in the different studies, there is evidence that different retention measures are comparable.[18] While retention for patients in ACE was comparable to other studies, it is important to note that other studies include all YAHIV and not just YAHIV at high risk of poor retention and non-adherence. Therefore, the fact that ACE, comprised of high risk patients, achieved comparable results is encouraging. Our study expanded the definition of YAHIV to age 30, rather than 24 years which is the common cut off in other studies, to capture an extended period of young adulthood, which is increasingly being recognized as vulnerable and high risk [19] The development of some of our patients may be disproportionally impacted by social determinants of health, so extension of youth focused care to age 30 allows for a more gradual transition to adulthood.

[20] Further, this was done to include YAHIV transferring to adult care after the age of 25. When analysis was restricted to those aged 18–25, the association of ACE with higher retention remained.

Retention was associated with more frequent social work and nursing interactions within the first year of clinic entry. This finding underscores the importance of wraparound services and multidisciplinary care. Other studies have shown that centralization and youth-focused support services, including case management, improve retention for YAHIV. Centralizing care for YAHIV in a clinic with youth-specific services and case management and adolescent trained providers improved visit constancy and decreased gaps in care.[21] An evaluation of a youth-focused case management intervention for Latino and African American young men who have sex with men (MSM) showed improved retention in care with regularly scheduled peer case management visits. [22] Most studies simply examine the availability of these services, without capturing whether interactions actually occurred, or characterizing the interactions. Our study is unique in that we fully investigated each interaction and were able to characterize the quantity and content of the interactions and the association with the outcomes of interest, retention and viral suppression. Our data shows that availability and actual use of youth-focused nursing case management and social work service alone is associated with improved outcomes. While retention was superior in ACE, there is still considerable room for improvement and the results of the analysis of clinic/service utilization, suggests that an approach targeting social work and nurse engagement will likely lead to improved retention. Nursing visits primarily address adherence issues and medication management. Social work visits primarily address insurance issues and housing and financial instability. Augmenting these services directly address major barriers to care for YAHIV.

Outpatient appointment reminder systems have been shown to be effective in reducing no show rates and in particular, clinic staff phone call or phone message has been shown to be more effective in lowering no show rates compared with an automated system in one study across multiple adult subspecialty clinics. [23] We found that a bi-directional communication with the peer navigator in the ACE program, via either telephone or electronic message, decreased the risk of missed visits. This is consistent with other studies of YAHIV, which have shown that bi-directional communication with a peer navigator decreased the likelihood of missed visits.[24] A meta-analysis of text messaging interventions for adherence to ART found that bidirectional and personalized messages had a largest effect on medication adherence.[25]

Unfortunately, improved retention did not to lead to improved viral suppression compared to the SOC group. Overall virologic suppression was achieved in 56% in ACE and 69% in SOC and for those who met the retention measure, 60% in ACE and 89% in SOC. National Data from the Ryan White HIV program show that for youth aged 13–24 years, viral suppression was 65% and in 2014.[5] The retention of 26% in the SOC group, with 69% virologic suppression suggests that those who remained in care in SOC were at lower risk of viremia. ACE was able to retain a greater proportion of high risk patients, who were more likely to have barriers, which likely explains why virologic suppression was lower in ACE compared to SOC.

The fact that improved retention for high risk YAHIV did not lead to virologic suppression underscores the challenges in this population. Virologic suppression depends on the ability of patients to engage in care and be prescribed ART, then sustainably take ART. Additional programs to address poor adherence in this high-risk population must be explored. This youth-focused clinic may be an ideal location to implement long acting injectable ART and other modalities, as it has been shown to provide services that improve retention in high-risk YAHIV who continue to struggle with daily medication adherence.

Our study is strengthened in that the majority of the patients were African American with MSM as their risk factor, consistent with the U.S. epidemic among young adults, while also including a good representation of PHIV.[26] The study also provides a level of data not previously described in terms of patient retention, virologic suppression and utilization of clinic services. The study limitations include its small size and single location. Additionally, the unique mix of providers may not be representative of typical clinics, which may limit generalizability, but can potentially inform best practices. Further, the study did not include qualitative data on the patient experience within the clinic, however, this was beyond the scope. In our study there was no retention of transgender patients, a population that has been shown to have barriers to HIV care.[27,28] However, the number of transgender YAHIV in the study was low and therefore it is difficult to draw larger conclusions.

Implementation of similar programs within adult clinics may decrease the disparity in retention and suppression of YAHIV when compared to older adults and provide a platform for implementation of innovative adherence strategies, such as long acting ART. The embedded model can be part of a package of potential interventions that may improve retention and ultimately outcomes for at-risk YAHIV.

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Table 1:

Demographic and clinical characteristics of patients in the Access Care Early (ACE) clinic versus the standard of care (SOC) clinic.

Characteristic	ACE 61 (45%)	SOC 76 (55%)	P value
Age at enrollment			**0.001**
18–25	42 (69)	30 (39)	
26–30	19 (31)	46 (61)	
Gender			0.25
Female	18 (30)	13 (17)	
Male	41(67)	60(79)	
Male-to-Female Transgender	2 (3)	3 (4)	
Race			0.23
Black	52 (85)	56 (74)	
White	6 (10)	14 (18)	
Other	3 (5)	6 (8)	
Risk Factor			**0.004**
MSM	30 (49)	54 (71)	
Heterosexual	13(21)	17 (22)	
Perinatal	14 (23)	2 (3)	
IDU	1(2)	1 (1)	
Other/Unknown	3(5)	2 (3)	
CD4 count at entry			0.86
<200	13 (21)	20 (26)	
200–349	13 (21)	13 (20)	
350–499	14 (23)	14 (18)	
>500	21 (34)	27 (36)	
On ART at entry	32 (52)	22 (29)	**0.005**
Viral load at entry			0.24
<200	20 (33)	18 (24)	
>200	41 (67)	58 (76)	
Smoking	30 (49)	36 (47)	0.83
Any Substance use	33 (54)	30 (39)	0.09
Marijuana Use	31 (51)	26 (34)	0.05
Employment (n=130)	23/59 (39)	36/71 (51)	0.18
Stable Housing (n=119)	42/58 (74)	50/62 (81)	0.37
Education (n=103)			**<0.001**

Characteristic	ACE 61 (45%)	SOC 76 (55%)	P value
Did not finish HS	22/58 (38)	6/45 (13)	
HS/GED	21/58 (36)	12/45 (27)	
Some College	15 /58(26)	11/45 (24)	
College/Graduate School	0/58 (0)	16/45 (36)	
Mental Health Diagnosis	38 (62)	27 (36)	**0.002**
Prior Incarceration	10 (16)	4 (5)	**0.033**

P value is Chi-square. Bolded values statistically significant. CD4 count measured in cells/mm^3, viral load measured in copies/mL. MSM, men who have sex with men; IDU, injection drug use; ART, antiretroviral therapy; HS, high-school; GED, general education diploma

Table 2:

Unadjusted and adjusted logistic regression of retention in care and virologic suppression defined as HIV-1 RNA < 200 copies/mL.

	Retention in Care		Virologic suppression	
Variable	**Unadjusted OR (95% CI)**	**Adjusted AOR (95% CI)**	**Unadjusted OR (95% CI)**	**Adjusted AOR (95% CI)**
ACE clinic	**2.67 (1.23–5.76)**	**3.26 (1.23–8.63)**	**0.56 (0.32–0.97)**	0.63 (0.35–1.14)
18–25 years	0.56 (0.26–1.19)	0.66 (0.27–1.60)	1.13 (0.65–1.97)	1.21 (0.66–2.22)
Black Race	0.66 (0.27–1.61)	0.47 (0.17–1.32)	0.67 (0.32–1.38)	0.62 (0.30–1.27)
Risk				
Heterosexual	1.0(ref)	1.0(ref)	1.0(ref)	1.0(ref)
MSM	1.07 (0.41–2.73)	5.40 (0.92–31.75)	1.87 (0.93–3.73)	1.98 (0.62–6.31)
Perinatal	1.42 (0.37–5.37)	1.65(0.26–10.21)	1.76 (0.60–5.18)	1.47 (0.35–6.08)
Other	0.76 (0.12–4.70)	0.79 (0.08–7.38)	0.83 (0.15–4.45)	0.41 (0.09–2.02)
Gender*				
Male	1.0(ref)	1.0(ref)	1.0(ref)	1.0(ref)
Female	1.76 (0.74–4.23)	**5.70 (1.07–30.21)**	0.50 (0.25–1.02)	0.85 (0.26–2.80)
Transgender	--	--	0.27 (0.03–2.09)	0.48 (0.07–3.16)
CD4 Baseline				
<200	1.0(ref)	1.0(ref)	1.0(ref)	1.0(ref)
200–349	0.60 (0.20–1.81)	0.43 (0.11–1.56)	0.93 (0.44–1.94)	0.71 (0.32–1.56)
350–499	0.85 (0.28–2.58)	0.62 (0.18–2.20)	1.71 (0.79–3.69)	1.45 (0.63–3.36)
>500	0.79 (0.40–2.13)	0.48 (0.14–1.61)	**2.76 (1.33–5.75)**	**2.50 (1.16–5.34)**
Viral load at entry <200 copies/mL	0.99 (0.43–2.27)	0.81 (0.27–2.36)	**3.07 (1.50–6.32)**	**3.33 (1.30–8.57)**
Mental Health Disorder	1.43 (0.67–3.00)	0.93 (0.37–2.32)	0.59 (0.34–1.02)	0.64 (0.35–1.22)
Substance Abuse	1.06 (0.50–2.24)	0.83 (0.33–2.01)	**0.50 (0.29–0.87)**	**0.50 (0.27–0.90)**

* no transgender retained, omitted from retention in care logistic regression. ACE=access care early; MSM=male-to-male sex; CD4 measured in cells/mm^3; viral load measured in copies/mL.

Table 3:

Clinical services utilization in Access Care Early (ACE) clinic versus the standard of care (SOC) clinic.

Variable	ACE 61 (%)	SOC 76 (%)	P value
Nurse visits			**<0.001**
0–1	45 (74)	72 (95)	
2–3	5 (8)	4 (5)	
4 or more	11 (18)	0	
Social Work visits			**0.011**
0–1	28 (46)	54 (71)	
2–3	18 (30)	11 (14)	
4 or more	15 (25)	11 (14)	
Nurse phone calls			**<0.001**
0–5	37 (61)	67 (88)	
6–10	9 (14)	6 (8)	
11 or more	15 (25)	3 (4)	
Psychiatry visits			**<0.001**
None	36 (59)	67 (88)	
1–2	12 (20)	4 (5)	
3 or more	13 (21)	5 (7)	

Table 4:

Clinical services utilization in the first year and retention in care and virologic suppression defined as HIV-1 RNA < 200 copies/mL.

	Retention		Virologic suppression	
Variable	**Univariate OR (95% CI)**	**Multivariable OR (95% CI)**	**Univariate OR (95% CI)**	**Multivariable OR (95% CI)**
Clinic type	--	1.73 (0.62–4.81)	--	0.58 (0.31–1.08)
Nurse visits				
0–1	1.0(ref)	1.0 (ref)	1.0(ref)	1.0 (ref)
2–3	**7.79(1.53–39.67)**	3.17 (0.39–25.96)	1.79 (0.52–6.14)	1.53 (0.53–4.40)
4 or more	2.23 (0.60–8.25)	0.14 (0.2–1.20)	0.37 (0.16–0.86)	0.40 (0.13–1.18)
Social Work visits				
0–1	1.0(ref)	1.0(ref)	1.0(ref)	1.0(ref)
2–3	**4.14 (1.49–11.48)**	**3.62 (1.12–11.66)**	1.42 (0.72–2.79)	1.87 (0.92–3.79)
4 or more	**10.65 (3.73–30.45)**	**8.48 (2.39–30.08)**	1.70 (0.85–3.40)	**2.52 (1.17–5.42)**
Nurse phone calls				
0–5	1.0(ref)	1.0(ref)	1.0(ref)	1.0(ref)
6–10	**6.85 (1.92–24.46)**	**5.44 (1.01–29.43)**	1.29 (0.59–2.82)	1.49 (0.66–3.36)
11 or more	**7.31 (2.32–23.06)**	**6.52 (1.23–34.45)**	0.65 (0.30–1.44)	0.84 (0.32–2.30)
Psychiatry visits				
None	1.0(ref)	1.0(ref)	1.0(ref)	1.0(ref)
1–2	1.08 (0.3–3.8)	0.33 (0.6–1.84)	0.50 (0.21–1.18)	0.60 (0.22–1.59)
3 or more	**7.88 (2.35–26.41)**	3.30 (0.69–15.81)	0.96 (0.44–2.09)	0.85 (0.32–2.30)