Medicaid Expansion's Impact on Human Immunodeficiency Virus Outcomes in a Nonurban Southeastern Ryan White HIV/AIDS Program Clinic

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Background. Although the Ryan White HIV/AIDS Program supports high-quality human immunodeficiency virus (HIV) care, Medicaid enrollment provides access to non-HIV care. People with HIV (PWH) with Medicaid historically have low viral suppression (VS) rates. In a state with previously high Qualified Health Plan coverage of PWH, we examined HIV outcomes by insurance status during the first year of Medicaid expansion (ME).

Methods. Participants were PWH ages 18–63 who attended ≥1 HIV medical visit/year in 2018 and 2019. We estimated associations of sociodemographic characteristics with ME enrollment prevalence and associations between insurance status and engagement in care and VS.

Results. Among 577 patients, 151 (33%) were newly eligible for Medicaid, and 77 (51%) enrolled. Medicaid enrollment was higher for those with incomes <100% federal poverty level (adjusted prevalence ratio, 1.67; 95% confidence interval [CI], 1.00–1.86) compared with others. Controlling for age, income, and 2018 engagement, those with employment-based private insurance (adjusted risk difference [aRD], −8.5%; 95% CI, −16.9 to 0.1) and Medicare (aRD, −12.5%; 95% CI, −21.2 to −3.0) had lower 2019 engagement than others. For those with VS data (n = 548), after controlling for age and baseline VS, those with Medicaid (aRD, −4.0%; 95% CI, −10.3 to 0.3) and with Medicaid due to ME (aRD, −6.2%; 95% CI, −14.1 to −0.8) were less likely to achieve VS compared with others.

Conclusions. Given that PWH who newly enrolled in Medicaid had high engagement in care, the finding of lower VS is notable. The discordance may be due to medication access gaps associated with changes in medication procurement logistics.

Keywords. health care reform; health insurance; HIV; Medicaid; Patient Protection and Affordable Care Act.

Before the Patient Protection and Affordable Care Act (ACA), it was estimated that approximately 20% of people with human immunodeficiency virus (PWH) in the United States were uninsured [1]. As of July 1, 2020, 37 states and the District of Columbia have expanded Medicaid through the ACA in an effort to increase access to healthcare for people with low incomes [2]. In 2018, approximately half of PWH in Medicaid expansion states were covered by Medicaid, and in Medicaid nonexpansion states, only one third of PWH had Medicaid [1]. Given the large numbers of PWH relying on Medicaid, it is important to understand and quantify the rates of viral suppression (VS) associated with Medicaid and Medicaid expansion, especially as the United States aims for the UNAIDS goal of 90-90-90 and the federal government's "Ending the HIV Epidemic" initiative [3, 4]. Viral suppression is an essential outcome given that the individual benefits from improved health and the public benefits through averted human immunodeficiency virus (HIV) transmissions [5–7]. When a PWH becomes virally suppressed, it averts 1.8 infections per 100 person-years [8], and each averted HIV infection saves $402 000 [9].

Before the ACA and Medicaid expansion, PWH with Ryan White HIV/AIDS Program (RWHAP) support and Medicaid historically had low VS rates (65%–68%) [10, 11]. For 2015, the first full year of Medicaid expansion, among 40 United States jurisdictions, the sustained VS rate in jurisdictions that expanded Medicaid was higher (51.4%) than the rate in jurisdictions that did not expand Medicaid (47.9%) [12]. From other recent aggregate data presented, the post-ACA sustained VS rates for PWH with Medicaid are reported to be 59%–60% [1]. To date, there has been little published about VS rates associated with Medicaid, specifically after Medicaid expansion, using patient-level data and adjusting for individuals' characteristics.

Beginning in 2014, all PWH with low-incomes who were Virginia AIDS Drug Assistance Program (ADAP) clients were

offered individual private plans or Qualified Health Plans (QHPs) purchased on the ACA Marketplace and funded by the Virginia ADAP. This program resulted in a significant increase in VS [13]. During 2018, 70.6% of Virginia ADAP clients had ADAP-supported QHPs [14]. When Virginia expanded Medicaid in January 2019, many PWH transitioned from ADAP-purchased QHPs to Medicaid. More states are now expanding Medicaid and will shift PWH off of ADAP-purchased QHPs to Medicaid [2]. In addition, employment changes brought on by the coronavirus disease 2019 (COVID-19) pandemic [15] may result in more PWH transitioning from individual and/or employer-based private insurance to Medicaid. It will be critical to ensure that gains in VS made while on QHPs are preserved for PWH transitioned to Medicaid Expansion.

Changes in insurance or in methods of accessing care and medications can result in gaps and unintended outcomes. Although not HIV-specific, a study of patients with chronic conditions who had Medicaid demonstrated that changes in healthcare insurance plans created interruptions in coverage that resulted in worsened disease outcomes [16]. Given that PWH in our state were undergoing a healthcare delivery transition, we aimed to characterize those who transitioned to Medicaid among those newly eligible and compare their engagement in care and VS rates to those with other insurance coverage in a cohort from a nonurban Southeastern RWHAP clinic during the first year of their state's Medicaid expansion.

METHODS

Setting and Population
The studied RWHAP clinic is a nonurban academic-affiliated clinic at the University of Virginia. Clinic patients are eligible for RWHAP-supported services with an income below 500% of the federal poverty level (FPL). Approximately 97.7% of the clinic population received RWHAP-supported services during 2018–2019.

The study population includes all PWH over the age of 18 and under the age of 63 as of January 1, 2018, who had established care at the studied RWHAP clinic as of January 1, 2018, and had at least 1 medical visit at the studied RWHAP clinic in both 2018 and 2019. Data were collected from January 1, 2018 to January 15, 2020.

Patient Consent Statement
The design of the work was reviewed and approved by the University of Virginia Institutional Review Board for Health Sciences Research. Participant consent was not required because the University of Virginia Institutional Review Board for Health Sciences Research deemed that the project met the criteria of exempt research under 45CFR46.104(d)(4)iii.

Data and Definitions
Demographic characteristics included the following: age on January 1, 2018; sex; race/ethnicity; baseline income; baseline

insurance status; rural residence; HIV risk factors; HIV/acquired immune deficiency syndrome (AIDS) diagnosis; baseline CD4 count; time since HIV diagnosis; time since first clinic visit; time since first antiretroviral therapy (ART) prescription date; baseline engagement in care; and baseline viral load status. All baseline characteristics were determined from 2018 data. Due to small numbers, transgender participants were excluded given privacy concerns.

Income was categorized based on the participant's FPL percentage according to their annual household income and household size. Residence was categorized as urban or rural using the Rural Urban Commuting Area (RUCA) approximations for each zip code [17]. For zip codes that were not categorized by RUCA, the National Center for Health Statistics' categorization was used [18]. For baseline insurance status, participants were categorized as having individual private insurance, employer-based private insurance, Medicare, Medicaid, or no insurance. The baseline viral load and CD4 count were defined by the first value measured between January 1, 2018 and December 31, 2018. For HIV risk factor, participants could report more than 1 risk factor, which included male-to-male sexual contact (man who has sex with men [MSM]), heterosexual contact, injection drug use (IDU), perinatal exposure, blood transfusion, and unknown. Using the RWHAP definition, baseline engagement in care was defined as at least 1 HIV medical visit in each 6-month period during 2018 with a minimum of 60 days between medical visits [19].

Three primary outcomes were evaluated: (1) Medicaid enrollment in 2019 among those newly eligible for Medicaid due to Medicaid expansion and not on Medicare in 2018, (2) engagement in care for 2019, and (3) achieving and/or maintaining VS by the end of the study period. Participants who did not have Medicaid in 2018 and who had incomes ≤138% FPL in 2019 were considered to be newly eligible for Medicaid in 2019 due to Medicaid expansion. Engagement in care for 2019 was defined as described above. Viral suppression was categorized as undetectable if the last result between July 1, 2019 and December 31, 2019 was <200 HIV ribonucleic acid copies per milliliter [20]. If a participant had no viral loads collected in that window, a measurement within 15 days of the window (June 15–July 1, 2019 or January 1–15, 2020) was used with a preference for the latest viral load measurement. Our group chose to study outcomes timed close to the transition in healthcare, as we have learned from quantitative studies and from the perspective of PWH that changes in insurance status can result in quick impacts to care [21–23].

Statistical Methods
Analyses were performed using R (R Foundation for Statistical Computing) and RStudio (RStudio, Inc.). For each of the outcome models, categories of covariates were collapsed as necessary to avoid sparse data bias, with the aim to have greater than

10 observations with the outcome for each covariate category, if possible.

For those newly eligible for Medicaid in 2019, we estimated the associations of select demographic characteristics (age, sex, race/ethnicity, baseline income, baseline insurance status, rural residence, specific HIV risk factors, AIDS diagnosis, and baseline engagement in care) with Medicaid enrollment prevalence. Because it was rare (2.2%) for a participant's primary insurance to switch from Medicare in 2018 to Medicaid in 2019, those who had Medicare in 2018 were excluded from enrollment analyses. We used g-computation with logistic regression to estimate risk ratios using the risk Communicator package [24]. Covariates that had prevalence ratios (PRs) that were statistically significant ($P < .05$) or of large magnitude (PR, <0.83 or >1.20) were included in the adjusted model.

The risk Communicator package was also used to estimate risk differences (RDs) in engagement in care by insurance status in 2019 (including Medicaid due to Medicaid Expansion). Select characteristics (age, sex, race/ethnicity, income in 2019, rural residence, specific HIV risk factors, AIDS diagnosis, and baseline engagement in care) were assessed to be included in an adjusted model. Covariates that had RDs that were statistically significant ($P < .05$) or of large magnitude (RD, $<-5.0\%$ or $>5.0\%$) were included in the adjusted model. Finally, we estimated RDs in VS by insurance status in 2019 (including Medicaid due to Medicaid Expansion). Select characteristics (age, sex, race/ethnicity, income in 2019, rural residence, specific HIV risk factors, AIDS diagnosis, and baseline VS) were assessed to be included in an adjusted model for VS using the same criteria as described above. Income could not be included in the adjusted model because too few participants had a detectable viral load, such that the model did not converge.

RESULTS

The overall study cohort included 577 participants (Table 1). Approximately half of the participants were in the 50–63 age

Table 1. Baseline Cohort Characteristics

Characteristic	Cohort (n = 577) n (%)
Age (Years)	
50–63	271 (47.0)
41–49	138 (23.9)
31–40	104 (18.0)
18–30	64 (11.1)
Sex[a]	
Male	396 (68.6)
Female	181 (31.4)
Race/Ethnicity	
Non-Hispanic White	265 (45.9)
Non-Hispanic Black	270 (46.8)
Hispanic	35 (6.1)
Other	7 (1.2)

Table 1. Continued

Characteristic	Cohort (n = 577) n (%)
Income	
<100% FPL	239 (41.4)
101%–138% FPL	89 (15.4)
139%–250% FPL	105 (18.2)
251%–400% FPL	74 (12.8)
>400% FPL	70 (12.1)
Insurance Status (2018)	
Individual private	185 (32.1)
Employment-based private	142 (24.6)
Medicare	122 (21.1)
Medicaid	81 (14.0)
Uninsured	47 (8.1)
Rural Residence	
Urban	416 (72.1)
Rural	161 (27.9)
HIV Risk Factor[b]	
MSM	273 (47.3)
Heterosexual	247 (42.8)
IDU	45 (7.8)
Perinatal	9 (1.6)
Transfusion	8 (1.7)
Unknown	5 (0.9)
HIV/AIDS Diagnosis	
HIV Diagnosis	325 (56.3)
AIDS Diagnosis	252 (43.7)
Baseline CD4 Count[c] (cells/mm^3)	
Mean (SD)	703 (378)
Median [IQR]	671 [425–924]
>500	388 (67.2)
351–500	81 (14.0)
201–350	66 (11.4)
101–200	22 (3.8)
<100	19 (3.3)
Time Since HIV Diagnosis[d] (Years)	
Median [IQR]	12.2 [6.2–18.0]
Time Since First Clinic Visit (Years)	
Median [IQR]	8.5 [3.6–13.2]
Time on ART[e] (Years)	
Median [IQR]	8.1 [4.1–11.2]
Baseline Engagement in HIV Care	
Engaged	498 (86.3)
Not engaged	79 (13.7)
Baseline HIV Viral Load Status[f]	
Undetectable	514 (89.1)
Detectable	62 (10.7)
Mean (SD)[g]	59 646 (133 738)
Median [IQR][g]	10 212 [1307–44 002]

Abbreviations: AIDS, acquired immunodeficiency syndrome; ART, antiretroviral therapy; FPL, federal poverty level; HIV, human immunodeficiency virus; IDU, injection drug use; IQR, interquartile range; MSM, man who has sex with men; SD, standard deviation.

[a]Transgender participants were excluded due to the small number in the cohort and related disclosure concerns.

[b]Participants could report more than 1 risk factor. Total is >100%.

[c]Baseline CD4 counts available for 576 participants.

[d]Date of HIV diagnosis available for 573 participants.

[e]Date of first ART prescriptions available for 554 participants.

[f]Baseline HIV viral load status available for 576 participants. Undetectable viral load is defined as <200 copies/mL.

[g]Mean and median were calculated on only those with detectable viral loads.

group (47.0%) and 68.6% of the participants were male. More than half (54.1%) were non-Hispanic black, Hispanic, or other race/ethnicities than non-Hispanic white. A total of 41.4% of participants had incomes under 100% FPL. At baseline, only 14.0% of participants were enrolled in Medicaid, and 32.1% of participants had individual private insurance. Most participants had urban residences, with 27.9% living in rural areas. For HIV risk factors, approximately half reported MSM (47.3%) or heterosexual sexual contact (42.8%), and 7.8% reported IDU. Approximately half (43.7%) had an AIDS diagnosis. Two thirds of participants (67.2%) had CD4 counts greater than 500 cells/mm^3, approximately one quarter had CD4 counts between 200 and 500 cells/mm^3 (25.4%), and 7.1% had CD4 counts below 200 cells/mm^3. At baseline, 86.3% of participants were engaged in care, and 89.1% of participants had an undetectable viral load. For those with detectable viral loads, the median baseline viral load was 10 212 copies per milliliter (interquartile range, 1307–44 002).

Among those who did not start with Medicare (n = 455), 151 (33%) were newly eligible for Medicaid due to Medicaid Expansion, and of those eligible, 77 (51%) enrolled (Figure 1). Baseline engagement in care for those newly eligible for Medicaid was 84.1% (89.6% for those who enrolled and 78.4% for those who did not enroll). Baseline VS for those newly eligible for Medicaid was 85.4% (84.4% for those who enrolled and 87.7% for those who did not enroll). Medicaid enrollment due to Medicaid expansion was more likely for those with a 2018 income less than 100% FPL (Table 2) (adjusted PR [aPR], 1.67; 95% confidence interval [CI], 1.00–1.86) compared with those with a 2018 income greater than 101% FPL, adjusting for age, race/ethnicity, insurance status, HIV risk factor of IDU, and baseline engagement in care.

Overall, 85.6% of participants were engaged in care in 2019 (Figure 2). Those enrolled in Medicaid due to Medicaid Expansion had an engagement in care rate of 87.3% compared with 91.9% for individual private insurance, 89.6% for no insurance, 85.1% for employment-based private insurance, 84.1% for Medicaid, and 79.5% for Medicare. Engagement rates for those with Medicaid (Figure 2) (adjusted RD [aRD], −3.8%; 95% CI, −11.2 to 3.7) and Medicaid Expansion (aRD, −1.9%; 95% CI, −10.6 to 5.6) were comparable to those with private insurance. Adjusting for age, income in 2019, and baseline engagement in care, being engaged in care in 2019 was an absolute 8.5% less likely (95% CI, −16.9 to 0.1) for those with employment-based private insurance and an absolute 12.5% less likely (95% CI, −21.2 to −3.0) for those with Medicare compared with those with individual private insurance.

For VS, 548 participants had available data, and 29 (5.0%) participants were excluded due to missing baseline viral load status (n = 1) and viral load outcome (n = 28). Overall, 94% of participants achieved VS (Figure 3). Those who newly enrolled in Medicaid due to Medicaid expansion had a VS rate of 85.2%
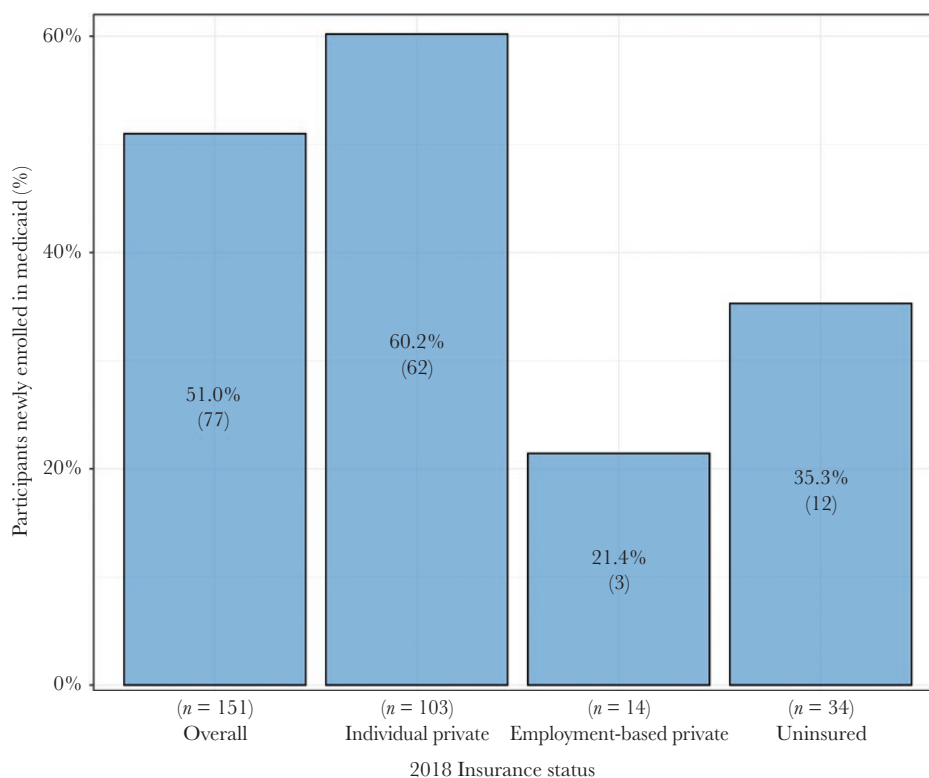
Figure 1. Medicaid enrollment for participants who were newly eligible for Medicaid due to Medicaid expansion (n = 151).
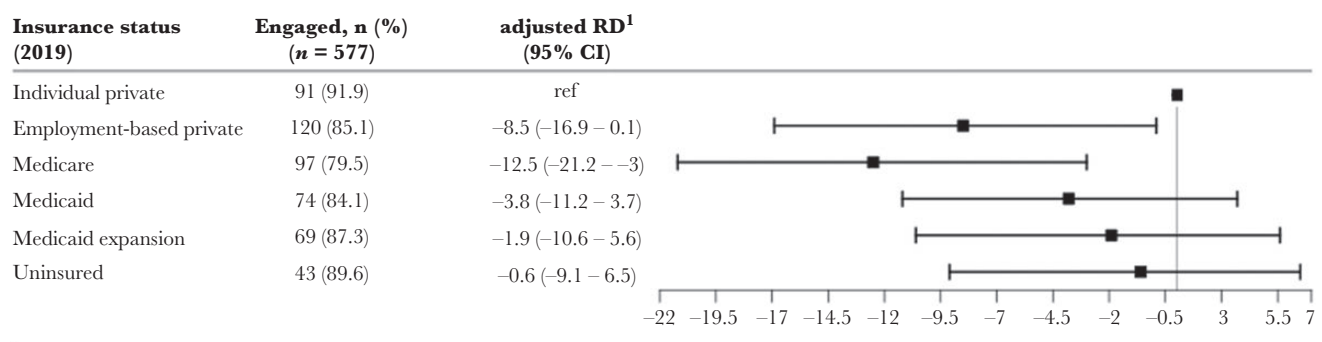
Table 2. Medicaid Enrollment in 2019 for People With HIV in the Study Cohort Who Were Newly Eligible for Medicaid Due to Virginia's Medicaid Expansion (n = 151)

Characteristic[a]	Enrollment, n (%)	Crude PR (95% CI)	Adjusted PR[b] (95% CI)
Overall	77 (51.0)		
Age (per 10 year increase)	NA	1.16 (1.02–1.32)	1.07 (0.95–1.23)
Sex			
Male	55 (53.4)	Ref	
Female	22 (45.8)	0.86 (0.58–1.20)	
Race/Ethnicity			
Non-Hispanic white	40 (65.6)	Ref	Ref
Non-white	37 (41.1)	0.63 (0.45–0.84)	0.77 (0.57–1.04)
Income (2018)			
<100% FPL	62 (59.6)	1.85 (1.27–3.23)	1.67 (1.00–1.86)
>101% FPL	15 (31.9)	Ref	Ref
Insurance Status (2018)			
Private	65 (55.6)	Ref	Ref
Uninsured	12 (35.3)	0.64 (0.35–1.00)	0.82 (0.49–1.13)
Rural Residence			
Urban	56 (50.5)	Ref	
Rural	21 (52.5)	1.04 (0.69–1.47)	
HIV Risk Factor: MSM			
HIV risk factor other than MSM	45 (51.7)	Ref	
MSM HIV risk factor	32 (50.0)	0.97 (0.69–1.33)	
HIV Risk Factor: Heterosexual			
HIV risk factor other than heterosexual	43 (54.4)	Ref	
Heterosexual HIV risk factor	34 (47.2)	0.87 (0.62–1.18)	
HIV Risk Factor: IDU			
HIV risk factor other than IDU	67 (48.2)	Ref	Ref
IDU HIV risk factor	10 (83.3)	1.73 (1.16–2.28)	1.50 (0.90–1.94)
HIV/AIDS Diagnosis			
HIV diagnosis	48 (51.1)	Ref	
AIDS diagnosis	29 (50.9)	1.00 (0.70–1.33)	
Baseline Engagement in HIV Care			
Not engaged	8 (33.3)	Ref	Ref
Engaged	69 (54.3)	1.63 (1.02–4.11)	1.33 (0.87–2.48)

Abbreviations: AIDS, acquired immunodeficiency syndrome; CI, confidence interval; FPL, federal poverty level; HIV, human immunodeficiency virus; IDU, injection drug use; MSM, men who has sex with men; PR, prevalence ratio; Ref, Reference group.

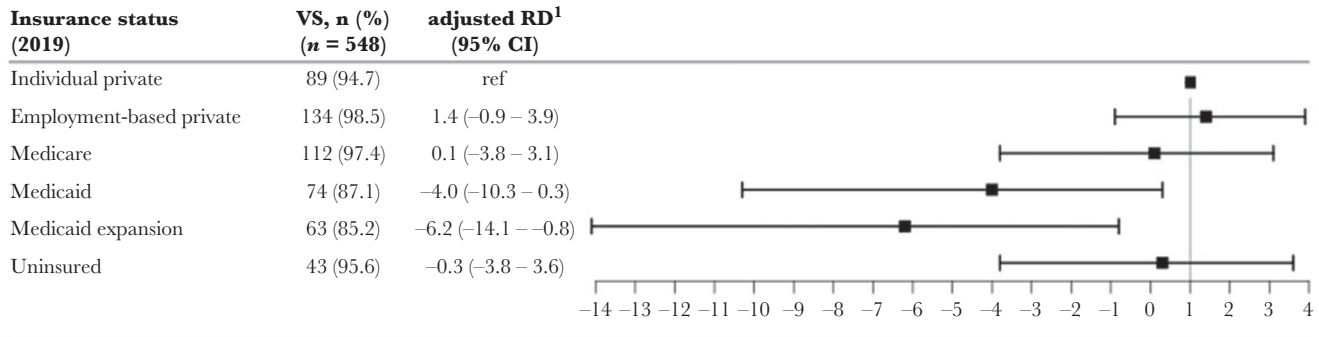[a]Some characteristics were collapsed into less categories to avoid sparse data bias.

[b]Covariates that had PRs that were statistically significant ($P < .05$) or of large magnitude (<0.83 or >1.20) were included in the adjusted model.

Insurance status (2019)	Engaged, n (%) (n = 577)	adjusted RD[1] (95% CI)	
Individual private	91 (91.9)	ref	
Employment-based private	120 (85.1)	−8.5 (−16.9 – 0.1)	
Medicare	97 (79.5)	−12.5 (−21.2 – −3)	
Medicaid	74 (84.1)	−3.8 (−11.2 – 3.7)	
Medicaid expansion	69 (87.3)	−1.9 (−10.6 – 5.6)	
Uninsured	43 (89.6)	−0.6 (−9.1 – 6.5)	

1. Adjusted for age, income, and baseline engagement in care
Abbreviations: Engaged-engaged in HIV care in 2019, RD-Risk difference

Figure 2. Association between insurance status and engagement in care for people with human immunodeficiency virus (HIV) (n = 577). CI, confidence interval; RD, risk difference.

Insurance status (2019)	VS, n (%) (n = 548)	adjusted RD[1] (95% CI)	
Individual private	89 (94.7)	ref	
Employment-based private	134 (98.5)	1.4 (−0.9 – 3.9)	
Medicare	112 (97.4)	0.1 (−3.8 – 3.1)	
Medicaid	74 (87.1)	−4.0 (−10.3 – 0.3)	
Medicaid expansion	63 (85.2)	−6.2 (−14.1 – −0.8)	
Uninsured	43 (95.6)	−0.3 (−3.8 – 3.6)	

−14 −13 −12 −11 −10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4

1. Adjusted for age and baseline viral suppression; income not included in model as model did not converge when it was included.
Abbreviations: VS-viral suppression maintained or achieved in 2019, RD-Risk difference

Figure 3. Association between insurance status and viral suppression (VS) for people with human immunodeficiency virus (HIV) insurance status (n = 548). CI, confidence interval; RD, risk difference.

compared with 98.5% for employment-based private insurance, 97.4% for Medicare, 95.6% for no insurance, 94.7% for individual private insurance, and 87.1% for Medicaid. Adjusting for age and baseline VS, maintaining or achieving VS in 2019 was an absolute 4.0% less likely (Figure 3) (95% CI, −10.3 to 0.3) for those with Medicaid and an absolute 6.2% less likely (95% CI, −14.1 to −0.8) for those with Medicaid through expansion compared with those with individual private insurance.

DISCUSSION

Participants with Medicaid had the lowest VS rate of any insurance status with those with Medicaid due to Medicaid expansion faring the worst. Given that engagement in care was high for PWH who newly enrolled in Medicaid, the finding of lower VS is unexpected. Our hypothesis is that the discordance may be due to medication access gaps associated with changes in pharmacy logistics [23, 25]. Previous studies of PWH with Medicaid have found that once they discontinued ART, approximately half did not reinitiate an ART within 18 months, and those that did reinitiate had a median gap in ART of approximately 8 months [26].

To put our observed VS rates associated with Medicaid (87.1%) and Medicaid expansion (85.2%) in context, our rates are higher than the rates for historical cohorts (65%–68%) [10, 11]. This may be because our cohort represents a population that had successfully linked to HIV care and had at least 1 HIV medical visit per year in 2 consecutive years. Recently, more studies have been using sustained VS over a year. A recent Kaiser Family Foundation analysis of the 2018 Centers for Diseases Control and Prevention's 2018 Medical Monitoring Project data demonstrated a sustained VS rate of 64% for those with Medicaid and RWHAP support and just 56% for those with Medicaid and no RWHAP support [1]. These VS rates are likely lower than our observed rates because the studied population included PWH who were not engaged in care, and they

defined VS as all undetectable viral loads in a year. Given that our participants receive care in a RWHAP clinic, they would be most comparable to the Medicaid with RWHAP support group. The one other study that controlled for individuals' characteristics found a sustained VS rate of 67%. However, this study included PWH from 4 urban settings who had been engaged in care for 4 consecutive years and assessed VS more than 1 year after the insurance change [27].

The observed VS rate of 94.0% for all participants in our cohort is quite high, even for PWH engaged in care. It is higher than the RWHAP 2018 VS rate of 87.1%, which is estimated to represent 69% of all RWHAP clients [28]. This reflects that study participants were receiving robust comprehensive HIV care through the studied RWHAP-funded clinic. However, it is concerning in a clinic that supports achievement of VS by more than 90% of PWH receiving care that there is a disparity in VS outcomes for those with Medicaid. Those with Medicaid are not achieving the UNAIDS goal of 90% VS [3] at the same rate as others, and, therefore, they are not experiencing the associated benefits of VS including longevity [5] and U = U, or the knowledge that they cannot transmit HIV to sexual partners [29]. In addition, this signals that there is a gap between the care supported by Medicaid and other insurance plans. Moreover, participants with no insurance, whom we presume relied solely on the RWHAP, achieved higher rates of VS, meaning that Medicaid performed worse for PWH relative to relying only on the RWHAP. This gap could be explained by paperwork burden, miscommunication of insurance information in the setting of lower health literacy, or the pharmacy logistics previously mentioned. In terms of possible interventions, a partnership between New York State and a managed Medicaid care plan offered intensified care coordination and peer support to PWH with detectable viral loads who were enrolled in their Medicaid plan; the partnership showed promising VS outcomes [30].

However, in addition to clinic-level or state-level investigations and interventions, these disparities need to be investigated

as a systemic issue with comparisons between states to identify best practices. Currently, a larger proportion of black PWH rely on Medicaid compared with white or Hispanic PWH [1]. Therefore, black PWH will be disproportionately affected by disparities in VS associated with Medicaid. There must be greater efforts to eliminate disparities, especially those that may stem from policies embedded within the structures that are meant to provide greater access to healthcare, such as Medicaid.

Our observed lower rate of VS among PWH with Medicaid compared with other insurance does not diminish the observed benefits of Medicaid expansion, from which PWH could benefit including, but not limited to, the following: reduction in mortality [31] and cardiovascular mortality [32]; increased use of preventative care [33]; decreased hospitalizations for ambulatory care-sensitive conditions [34]; and associated decreases in inability to afford medical care, concern about paying medical bills, and taking less medication to save money [35]. Although the RWHAP supports high-quality HIV care, Medicaid enrollment improves access to non-HIV care and should continue to be supported by RWHAP.

Among those without Medicare, approximately half of those who were eligible enrolled in Medicaid. We hypothesize that the observed low uptake of Medicaid could have been due to (1) difficulty in reaching eligible people by mail so they may not have known that they were eligible or (2) reluctance to experience a change in insurance/medication logistics. This approximately 50% uptake is consistent with what we found in the first year of a previous health insurance transition for low-income PWH in Virginia [21]. Those with higher baseline 2018 incomes were less likely to enroll. This may be because our clinic's targeted outreach for Medicaid enrollment in 2019 focused on those who had incomes under 138% in 2018. Our clinic did have 24 participants who had incomes over 138% in 2018 whose incomes declined to under 138% in 2019, making them newly eligible for Medicaid. That type of income shift affected 16% of those who were Medicaid eligible in 2019. This highlights the importance of RWHAP clinics' knowledge about changes in a client's income and employment status, so that they can help to rapidly reassess eligibility for programs such as Medicaid or ADAP. Given that clinics likely do not have adequate staffing to proactively reach out to clients between visits, we also need to ensure that RWHAP clients know the benefits of contacting their clinic with any changes in income or employment. However, we must also recognize that sharing income information is often experienced as an unwanted intrusion. Although knowledge of income and income changes is essential to the current RWHAP income-based qualification requirement for access to healthcare, we should also continue to strive to make healthcare access more universally available.

We did not observe lower rates of engagement in care for PWH with Medicaid. Rather, those with employment-based private insurance and Medicare had lower rates of engagement in care. In general, employment is thought to be positively associated with progression along the continuum of HIV care [36]. However, there is not much known about how work environments and culture may impact a PWH's ability to engage in care. We hypothesize that those who are employed in positions that offer employment-based insurance may have little leeway to miss work for appointments. In addition, those with employment-based private insurance and Medicare may have to cover more of the financial burden of visits to the RWHAP clinic if they are not receiving RWHAP support either due to not qualifying or not filling out the paperwork. These costs may be a disincentive to engagement in care. Moreover, these 2 groups had to arrange their own transportation, and in a nonurban southern setting, transportation is a barrier to engagement in care [37]. Alternatively, it is also possible that those who were only recently provided access to Medicaid through expansion had multiple unmet medical needs resulting in more frequent visits while not necessarily achieving VS.

In terms of limitations, this study was performed at 1 RWHAP clinic and the results may not be generalizable. The VS outcome was limited to those who had a viral load result in 2018 and 2019, so there were some participants excluded from that analysis. However, it was less than 5%. Given the epidemiologic issues with the definition of sustained VS [38], we opted to use an outcome of whether the last viral load was undetectable. In determining Medicaid eligibility, we did not account for citizenship or residency requirements. In terms of additional limitations, there could be unmeasured differences in terms of barriers faced between those who enrolled in Medicaid due to Medicaid expansion and those who were eligible but did not enroll. We could not adjust for differences in many social determinants of health, such as housing, alcohol use, education, internet access/literacy, mental health, transportation, stigma, language barriers. In the VS model, we could not control for income because it was collinear with insurance status. We were able to determine that having an HIV risk factor of IDU was not associated with differences in Medicaid enrollment, engagement in care, and VS, but we did not have current data about substance use.

CONCLUSIONS

With the economic issues related to COVID-19 affecting PWH [15] and the potential for additional states to expand Medicaid, we may see a substantial shift of PWH from private insurance to Medicaid. However, an ACA challenge has also been argued before the Supreme Court with a decision expected in June 2021. Understanding the impact of healthcare delivery changes on VS is crucial. We hope that our ongoing qualitative study will help to illuminate issues leading to the lower VS rate for PWH with Medicaid. Moreover, future studies with

larger cohorts will need to examine how Medicaid expansion and state-level Medicaid policies (automatic renewals, work requirements, prior authorization requirements, step therapy, monthly fee-for-service prescription limits, etc) affect PWH's overall health and HIV outcomes and the goals of the "Ending the HIV Epidemic" initiative.

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