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Delivery of HIV Antiretroviral Therapy Adherence Support Services by HIV Care Providers in the United States, 2013 to 2014

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Abstract

Background—Little is known about clinicians' adoption of recommendations of the International Association of Providers of AIDS Care and others for supporting adherence to antiretroviral therapy (ART).

Methods—We surveyed a probability sample of US HIV care providers to estimate the percentage offering 3 ART adherence support services to most or all patients and assessed the characteristics of providers offering all 3 services (comprehensive support) to most or all patients.

Results—Almost all providers (95.5%) discussed ART adherence at every visit, 60.1% offered advice about tools to increase adherence, 53.5% referred nonadherent patients for supportive services, and 42.8% provided comprehensive support. Nurse practitioners were more likely to offer comprehensive support as were providers who practiced at Ryan White HIV/AIDS Program-funded facilities, provided primary care, or started caring for HIV-infected patients within 10 years.

Conclusion—Less than half of HIV care providers offered comprehensive ART adherence support. Certain subgroups may benefit from interventions to increase delivery of adherence support.

Keywords

antiretroviral; adherence guidelines; HIV provider

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Authors' Note

JW contributed to study conception, data analysis, and wrote the article; JS contributed to study conception, data analysis, and edited the article; JTB, KI, and LB contributed to study conception and edited the article; GWG. and CCD contributed to data analysis and edited the article; and BTW contributed to survey weighting, data analysis, writing, and edited the article

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Introduction

Among HIV-infected patients, sustained high adherence to antiretroviral therapy (ART) is a strong predictor of viral suppression, and interventions to improve adherence can reduce the risk of HIV transmission and death.[1–4] HIV care providers play an important role in supporting their patients to consistently take ART as prescribed.[1–5] The International Association of Providers of AIDS Care and others recommend methods for promoting ART adherence by HIV care providers[4–7]; however, little is known about the adoption of these recommendations. To address this knowledge gap, we surveyed a national probability sample of US HIV care providers to determine the percentage of providers who offered key ART adherence support services and how these providers might differ from others. This information could identify providers who might benefit from interventions to increase routine provision of ART adherence support.

Methods

Sample Design and Data Collection

In the United States, the medical monitoring project (MMP) is an HIV surveillance system that during 2013 to 2014 used a 3-stage probability sampling design to assess the clinical and behavioral characteristics of HIV-infected adults receiving out-patient medical care for HIV infection. Data describing provider characteristics and practices were obtained from the 2013 to 2014 MMP provider survey, using a national probability sample of HIV care providers practicing at outpatient HIV care facilities sampled for MMP. The sampling and survey methods have been described in more detail elsewhere.[8] Briefly, first 16 states and 1 territory were selected using probability proportionate to size (PPS) sampling with size based on estimates of the number of AIDS cases in 2002. All sampled areas agreed to participate. Second, 622 facilities providing HIV care within these areas were sampled using PPS based on the number of persons receiving care for HIV infection; and of these, 505 agreed to participate (81% participation rate). A list of all physicians, physician assistants, and nurse practitioners who had completed their training and provided HIV care (defined as ordering CD4 count or HIV viral load tests and/or prescribing antiretroviral medications) between January 1 and April 30, 2012, were obtained from each participating facility, resulting in a total of 2208 HIV care providers. All of these providers were invited to participate in the survey.

Providers were recruited with a modified version of Dillman's Tailored Design[9] which included mailing individualized recruitment packets to all of the providers in selected facilities, with follow-up letters and e-mails sent at set intervals between June 2013 and January 2014. The recruitment packets included a letter from the Centers for Disease Control and Prevention (CDC), explaining the purpose of the survey, instructions for completing the self-administered survey via paper or a Web-based response system, and a US$20 cash incentive. The recruitment materials explained the voluntary nature of the survey, and written informed consent was not obtained.

In all, 2023 of 2208 sampled providers from 391 HIV facilities in 16 states were determined to be eligible, and 1234 of the eligible providers returned surveys for an adjusted response rate of 64% (AAPOR Response Rate 3).[10] Responding providers' data were then weighted based on probability of selection, and adjustments were made based on factors associated with nonresponse such as number of HIV care providers practicing at the facility and provider profession. The sample design and weighting methods allow inference from estimates to all HIV care providers at outpatient HIV healthcare facilities in the United States between January 1 and April 30, 2012.

Variables Used in the Analysis

The survey instrument (available at https://www.cdc.gov/hiv/pdf/statistics/systems/mmp/research_mmp_providersurvey_2013.pdf). consisted of 61 questions and took about 30 minutes to complete. Participants reported the proportion of patients for whom they provided 3 ART adherence support services: (1) discuss treatment adherence at every visit; (2) offer education and advice about tools to increase adherence such as dose reminder alarms, diaries, or pillboxes; and (3) for patients who are nonadherent to ART refer for support services as needed. We constructed a composite variable, "delivery of comprehensive adherence support," defined as providing all 3 services to most or all patients. The survey assessed profession (physician [MD or DO], nurse practitioner, or physician assistant) and board certification status, if applicable. Physicians who were board certified in infectious diseases (IDs) were classified as ID physicians regardless of additional board certifications. Physicians, nurse practitioners, and physician assistants were classified as HIV specialists if they met specialist criteria of the HIV Medicine Association (HIVMA) or American Academy of HIV Medicine (AAHIVM), according to whether they provided primary care (ie, were point of first contact and provided comprehensive care with an emphasis on prevention and coordination of care). Participants were classified by the number of HIV-infected patients for whom they provided continuous and direct patient care, that is, HIV patient caseload (≤20, 21–50, 51–200, or > 200 patients) and by the number of years since starting to care for HIV-infected patients (0–10, 11–20, or >20). Participants also indicated on a 5-point Likert-type scale how satisfied they were with several aspects of their HIV-related practice that might be associated with adherence support practices. Using data from a previous MMP facility survey, we determined whether providers worked at a facility that received Ryan White HIV/AIDS Program (RWHAP) funding or at a private practice (a facility could be both RWHAP funded and a private practice, or neither), and at a facility providing on-site case management, mental health services, substance abuse treatment, and consultations or programs specifically designed to support or improve patient adherence to HIV treatment.

Analytic Methods

We computed frequencies and weighted percentages with 95% confidence intervals (CIs) for variables that described HIV care providers, the facilities where they worked, and the adherence support services they provided. Rao-Scott chi-square tests for the differences between 2 proportions or heterogeneity of multiple proportions were used to assess associations of provider and facility characteristics with delivering comprehensive adherence support. Pairwise unadjusted prevalence ratios were calculated to assess the differences

between subgroups and a referent. All estimates incorporated survey weights and were adjusted for nonresponse. Variance estimates were computed using Taylor Series Linearization to reflect the complex features of the MMP provider survey sample such as cluster sampling of facilities. We used SAS/STAT (version 9.3) and SUDAAN (version 11) procedures for the analysis of complex sample survey data. We considered estimates with a coefficient of variation >0.3 unreliable.

Ethics Statement

In accordance with the guidelines for defining public health research,[11] CDC determined MMP was public health surveillance used for disease control, program, or policy purposes. Local institutional review board approval was obtained at participating states, territories, and facilities when required.

Results

We estimated that among all HIV care providers in the United States during 2013 to 2014, 44.5% were ID board-certified physicians, 30.0% other board-certified physicians, 15.2% nurse practitioners, 5.4% physician assistants, and 4.8% non-board-certified physicians (Table 1). Among board-certified physicians, the majority were ID specialists (59.7%) followed by internal medicine physicians (20.0%), family physicians (17.0%), pediatricians (1.6%), and physicians in other specialties (1.7%). Among all providers, over half met HIVMA or AAHIVM specialist criteria (57.8%), and 83.1% reported providing primary care; 47.5% practiced in RWHAP-funded facilities, and 41.9% worked in private practices.

Three-quarters of providers reported always or usually having sufficient time to provide HIV care to new patients (76.0%) or established patients (74.8%). Two-thirds reported being satisfied or very satisfied with support and coverage from other HIV providers (68.0%) and the availability of specialists for consultation and referral (65.2%), and about half were satisfied or very satisfied with the effort to keep up with clinical and/or pharmaceutical advances (57.8%), work schedule and on-call responsibilities (57.2%), and support services available to assist with patient management (49.6%). However, only one-third of providers were satisfied or very satisfied with salary or reimbursement (36.7%) and time for documentation and administrative work (32.8%).

Nearly all providers (95.5%) reported discussing treatment adherence at every visit with most or all patients (Table 2). However, 60.1% offered advice about tools to increase adherence to most or all patients. When caring for patients who did not adhere to ART, only half (53.5%) provided referrals for adherence support services to most or all patients. Less than half (42.8%) reported providing comprehensive support, defined as offering all 3 services to most or all patients.

Table 3 presents associations between provider characteristics and offering comprehensive support. Nurse practitioners were nearly twice as likely as board-certified ID physicians to offer comprehensive support (65.9% versus 34.1%, prevalence ratio [PR] 1.93; $P < .0001$). Providers with HIV patient case-loads of ≤20 were 40% less likely than providers with patient caseloads >200 to provide comprehensive support (29.7% vs 49.2%, PR 0.60; $P = .$

05). Providers who started caring for HIV-infected patients within the past 10 years were two-thirds more likely than providers who started caring for patients >20 years ago to offer comprehensive support (51.8% versus 30.9%, PR 1.67; $P < .003$). Those who provided primary care were significantly more likely than others to offer comprehensive support (46.2% vs 26.1%, PR 1.77; $P = .0003$) as were providers working at RWHAP-funded facilities (52.9% if RWHAP funded versus 31.7% if non-RWHAP funded, PR 1.67; $P = .004$) and providers working at facilities that offered on-site substance abuse treatment (55.3% versus 38.9%, PR 1.42; $P = .02$). Providers in private practices were one-third less likely than other providers to provide comprehensive support (32.6% versus 50.2%, PR 0.65; $P = .01$). There was no association between providing comprehensive services and HIVMA or AAHIVM specialist designation, practicing at facilities with on-site case management, mental health services, or programs designed to improve patient adherence to ART or professional satisfaction with HIV-related practice characteristics.

Discussion

Nearly all US HIV care providers reported consistently discussing treatment adherence with patients. However, only 3 in 5 reported routinely offering education and advice about tools to increase adherence or referral of nonadherent patients for supportive services as needed and less than half of HIV care providers offered all 3 services to most or all patients on ART.

To our knowledge, only 1 other national HIV provider survey assessed the provision of adherence support services. In 2013, HealthHIV together with Medscape, LLC surveyed a convenience sample of 190 HIV primary care providers (PCPs) who cared for HIV-infected patients.[12] The survey excluded providers who reported that they do not provide primary care which we estimated to be 17% of all HIV care providers. Our survey has the advantage of assessing clinical practices of all types of HIV care providers at a wide range of types and geographic locations of HIV care facilities. HealthHIV investigators reported that 88% of survey participants provided adherence counseling and another 10% referred patients for this counseling. The percentage of providers who offered these services to most or all patients was not reported and could have been substantially lower than our estimate that 96% of providers assessed adherence at every visit for most or all patients. The findings of a statewide survey of 190 HIV physicians in North Carolina[13] conducted in 1999 were similar to our estimates. Investigators reported that over 90% of providers reported providing basic ART dosing instructions most or all the time, but less than half reported that they helped patients to plan for dose times, suggested ways to remember doses, or explained what to do if a dose were missed.

Substantial evidence supports the efficacy of the 3 adherence support services we evaluated. The validity of questions used by providers to evaluate patient adherence to ART has been tested rigorously, and self-reported adherence elicited by providers during patient visits correlates with objective adherence measures such as electronic dose monitoring, viral suppression, and CD4 count.[14–17] In addition, brief provider-delivered adherence counseling is associated with long-term high adherence and viral suppression.[18] Second, many commonly used self-management adherence tools, including pillboxes, medication planners or calendars, and dose–time reminder alarms, have been associated with improved adherence

and viral suppression.[6] Third, substance abuse treatment including cognitive behavioral therapy and motivational interviewing has increased ART adherence, and directly administered ART in the setting of an opioid maintenance therapy program has increased ART adherence and viral suppression.[19–21] However, despite strong evidence about the value of these services, less than half of HIV care providers routinely offered comprehensive adherence support that has the potential to improve patient outcomes and prevent new infections.

Some provider subgroups were more likely to provide comprehensive adherence support. Nurse practitioners were twice as likely as board-certified ID physicians to provide comprehensive support. Previous studies have shown that nurse practitioners are also more likely than ID physicians to deliver HIV transmission risk reduction services[22] and clinical preventive care for HIV-infected patients.[23] This analysis supports the key role of nurse practitioners in providing comprehensive care for HIV-infected patients and highlights the need for efforts to support ID physicians in providing ART adherence services.

When substance abuse contributes to low adherence, access to on-site substance abuse treatment may facilitate referral by providers for treatment. Outside treatment facilities may be difficult to access, particularly for those with Medicaid or no insurance.[24] Collocation of supportive services in settings that routinely provide HIV medical care is a cornerstone of the RWHAP's "medical home" model.[25,26] Expansion of this model might increase referral for substance abuse treatment when it is identified as a barrier to ART adherence.[27] When collocation is not possible, directly assisting patients to initiate services with other providers can be useful.

Providers with patient caseloads ≤20 were 40% less likely than providers with patient caseloads >200 to offer comprehensive adherence support although the statistical significance of this difference was borderline. A previous analysis indicated that providers with patient caseloads ≤20 were less likely to follow national and international guidelines for initiating ART.[28] These findings suggest that additional support for low-volume providers who manage antiretroviral treatment could be beneficial.

Half of providers who started caring for HIV-infected patients within the past 10 years offered comprehensive support compared to less than one-third of those who had been providing HIV care for ≥20 years. There are at least 2 possible explanations for this finding: (1) more recent HIV training that emphasized the role of high adherence in suppressing HIV and (2) greater utilization of simpler, more tolerable ART regimens that require less complex adherence support.

Providers who worked at RWHAP-funded facilities were more likely to offer adherence support. Several factors might contribute to this association. Many patients who receive care at RWHAP-funded facilities have sociodemographic characteristics associated with low ART adherence,[25,29] which could oblige providers to offer adherence support. In addition, larger percentages of providers at RWHAP-funded facilities are nurse practitioners, provide primary care, have high HIV patient caseloads, and have access to on-site substance abuse treatment programs that were associated with offering comprehensive adherence support.[8]

Providers can access a wide variety of simple, low-cost, and readily available resources to improve their understanding of the importance of ART adherence, improve their skills in adherence support, or learn about adherence support tools such as medication organizers or pillboxes, reminder devices such as alarms and medication diaries, and medication schedules and calendars featuring images of patients' medications.[30,31] The AIDS Education and Training Center Program, RWHAP's national training program, engages HIV experts to train HIV care providers and offer clinical consultation and technical assistance on adherence support.[32] The AAHIVM's Clinical Consult Program pairs providers who care for <20 patients with providers with larger patient caseloads who may have more adherence support experience.[33] State or local initiatives for improving the quality of HIV care can identify low-volume providers through claims or surveillance data who might benefit from these services.[34] In addition, assistance implementing decision support tools/prompts in electronic health records might encourage provider delivery of adherence support services.[35] Finally, since most commercial insurance plans and Medicaid programs do not reimburse for all supportive services,[36] new service reimbursement strategies might encourage providers to offer adherence support.

This analysis was subject to limitations. Estimates were based on self-report and could have been subject to measurement error if participants felt compelled to over- or underreport their actual practices. In addition, some providers may have reported offering adherence support as defined by simply referring patients to programs designed to improve adherence. Although it is possible that these errors inflated our estimates of adherence support, we think it is unlikely that they would preferentially affect any particular provider subgroup or the association of a provider characteristic with adherence support. Finally, the survey did not directly address barriers to providing adherence support that would inform interventions needed to improve service delivery, and we did not find that dissatisfaction about the amount of time available to serve patients, the availability of some patient support services, or challenges keeping up with advances in ART provision were associated with providing adherence support.

Conclusion

In conclusion, nearly all providers discussed ART adherence with patients at every visit, but less than half also routinely offered education and advice about tools to increase adherence or refer patients not adhering to ART for supportive services when needed. Interventions to improve delivery of adherence support are particularly important among subgroups that were least likely to report providing comprehensive support. The ID physicians and providers who do not provide primary care, those who started caring for HIV patients more than 20 years ago, and possibly those with small HIV caseloads may benefit from training, access to adherence tools, new service reimbursement strategies, and other resources to increase delivery of adherence support. Expanding patient access to the RWHAP comprehensive model of care or, when not available, establishing linkages to substance abuse treatment programs might increase delivery of adherence support.

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Table 1

Characteristics of HIV Care Providers in the United States.[a,b]

Provider Characteristic	Sample size	Weighted %[c]	95% CI
Qualifications and practice experience			
Certification type			
Physician board-certified in infectious diseases (ID)	564	44.5	37.3–51.7
Physician board-certified in other specialty	319	30.0	22.8–37.3
Nurse practitioner	217	15.2	10.3–20.1
Physician assistant	63	5.4	2.6–8.2
Physician without board certification	61	4.8	2.2–7.4
Type of physician board certification[d]			
Infectious diseases	564	59.7	51.1–68.3
Internal medicine	164	20.0	15.2–24.9
Family medicine	102	17.0	11.2–22.7
Pediatrics	33	1.6	0.9–2.3
Other specialty	20	1.7[c]	0.5–2.9
HIV patients for whom you provide continuous and direct care			
≤20	103	15.1	9.5–20.7
21–50	186	19.6	14.4–24.8
51–200	479	39.0	34.2–43.8
>200	437	26.3	20.4–32.1
Years since starting to care for HIV patients			
0–5	231	17.6	13.1–22.0
6–10	196	17.7	13.9–21.6
11–20	428	36.1	32.1–40.0
>20	365	28.6	24.6–32.6
HIV specialist (based on criteria of HIVMA or AAHIV-S)	865	57.8	51.2–64.4
Provide primary care	1094	83.1	78.4–87.8
Practice in facility that receives Ryan White HIV/AIDS Program funding	784	47.5	35.4–59.6
Work in private practice	300	41.9	33.3–50.6
Demographics			
Age, years			
<40	211	17.5	12.9–22.2
40–49	326	24.0	21.2–26.8
50–59	453	38.4	32.3–44.6
60+	204	20.1	14.8–25.3
Gender			
Male	620	56.5	49.6–63.5
Female	585	43.5	36.5–50.4
Race/ethnicity			
White	783	62.9	55.8–70.0

Provider Characteristic	Sample size	Weighted %[c]	95% CI
Black/African American	89	10.8[e]	3.8–17.7
Hispanic	158	10.7[e]	3.5–17.8
Other	179	15.6	10.7–20.6
Sexual orientation			
Heterosexual or straight	980	85.1	81.0–89.2
Gay, lesbian, or bisexual	211	14.9	10.8–19.0
Professional satisfaction			
Always or usually has sufficient time to provide HIV care to:			
New patients	877	76.0	71.6–80.4
Established patients	894	74.8	70.7–78.9
Satisfied or very satisfied with:			
Support and coverage from other HIV providers	906	68.0	63.9–72.2
Availability of specialists for consultation and referral	815	65.2	60.1–70.4
Effort required to keep up with clinical and/or pharmaceutical advances	732	57.8	53.2–62.5
Work schedule/on-call responsibilities	751	57.2	53.5–60.9
Support services to assist with patient management	667	49.6	44.4–54.8
Salary and reimbursement	432	36.7	30.4–43.0
Amount of time required and available for documentation/administrative work	387	32.8	26.9–38.6

Abbreviations: No., sample size; 95% CI, 95% confidence interval; HIVMA, HIV Medicine Association; AAHIV-S, American Academy of HIV Medicine Practicing HIV Specialist; MMP, medical monitoring project.

[a] N = 1234.

[b] The 2013–2014 MMP provider survey.

[c] Values exclude “don’t know” responses.

[d] Physicians (MDs and DOs) who were board certified in infectious diseases and another specialty were classified as ID physicians.

[e] Coefficient of variation is greater than 0.30, estimate may be unreliable. Physicians (MDs and DOs) who were board certified in infectious diseases (IDs) and another specialty were classified as ID physicians.

Table 2

Provision of Care that Supports Adherence to Antiretroviral Therapy by HIV Care Providers in the United States.[a,b]

	Sample size	Weighted column %[c]	95% CI
For patients using ART, discuss treatment adherence at every visit			
Most or all	1139	95.5	93.4–97.5
More than half	51	3.8	1.8–5.9
About half	11	0.4[d]	0.2–0.7
Less than half	2	0.2[d]	0–0.4
Few or none	2	0.1[d]	0–0.2
Offer education and advice about tools to increase adherence for patients on ART[e]			
Most or all	756	60.1	52.9–67.4
More than half	227	17.7	13.8–21.6
About half	96	8.5	6–11
Less than half	85	7.1	4.3–9.9
Few or none	37	6.6	2.7–10.4
Refer patients who are non-adherent to ART for support services as needed			
Most or all	738	53.5	45.5–61.5
More than half	213	14.6	11.7–17.6
About half	80	6.3	3.9–8.7
Less than half	72	9.3	6.1–12.6
Few or none	90	16.2	10.2–22.1
Provide all 3 services for most or all patients			
Yes	577	42.8	34.6–51.0
No	610	57.2	49.0–65.4

Abbreviations: No., sample size; 95% CI, 95% confidence interval; ART, antiretroviral therapy; MMP, medical monitoring project.

[a] N = 1234.

[b] 2013–2014 MMP provider survey.

[c] Values exclude “don’t know” responses.

[d] Coefficient of variation is greater than 0.30, estimate may be unreliable.

[e] For example, dose reminder alarms, diaries, and pillboxes.

Table 3

Associations of Provider and Practice Characteristics with Providing Comprehensive Adherence Support.[a,b]

Provider Characteristic	Sample size	Weighted row % (CI)	Rao-Scott χ^2 *P* Value	PR (CI)	*P* Value
Qualifications and practice experience					
Certification type			.0004		
Nurse practitioner	138	65.9 (57.2–74.6)		1.93 (1.50–2.48)	<.0001
Physician assistant	29	48.6 (22.4–74.7)		1.42 (0.79–2.56)	.28
ID board-certified MD	227	34.1 (25.1–43.1)		Referent	–
Other board-certified MD	145	41.5 (29.0–54.1)		1.22 (0.88–1.69)	.25
Non-board-certified MD	33	45.4 (22.2–68.6)		1.33 (0.77–2.31)	.34
HIV-infected patients for whom you provide continuous and direct care			.009		
≤20	38	29.7 (13.4–46.1)		0.60 (0.34–1.06)	.05
21–50	86	33.7 (21.0–46.5)		0.68 (0.45–1.04)	.06
51–200	222	47.2 (38.2–56.2)		0.96 (0.77–1.20)	.71
>200	217	49.2 (40.4–58.0)		Referent	–
Years caring for HIV patients			.001		
0–10	230	51.8 (40.6–63.0)		1.67 (1.20–2.33)	.003
11–20	203	42.0 (31.0–53.0)		1.36 (1.00–1.85)	.06
>20	137	30.9 (22.7–39.2)		Referent	–
HIV specialist (HIVMA criteria or AAHIV-S)			.15		
No	151	38.0 (25.6–50.5)		Referent	
Yes	426	46.1 (38.8–53.4)		1.21 (0.90–1.64)	.19
Provides primary care			<.0001		
No	36	26.1 (15.9–36.2)		Referent	–
Yes	539	46.2 (37.8–54.6)		1.77 (1.25–2.50)	.0003
Facility characteristics					
Works at a facility that receives Ryan White funding			.0006		
No	107	31.7 (19.4–44.0)		Referent	–
Yes	418	52.9 (46.8–59.1)		1.67 (1.12–2.48)	.004
Works in private practice			.003		
No	477	50.2 (44.0–56.5)		Referent	

Provider Characteristic	Sample size	Weighted row % (CI)	Rao-Scott χ^2 *P* Value	PR (CI)	*P* Value
Yes	100	32.6 (19.7–45.6)		0.65 (0.44–0.95)	.01
On-site supportive services provided by facility Substance abuse treatment			.007		
No	348	38.9 (29.1–48.8)		Referent	–
Yes	229	55.3 (47.0–63.6)		1.42 (1.04–1.94)	.02
Mental health services			.05		
No	162	36.7 (24.0–49.5)		Referent	–
Yes	415	50.2 (43.6–56.7)		1.37 (0.95–1.96)	.07
Case management			.08		
No	139	37.1 (25.2–49.0)		Referent	–
Yes	438	48.3 (40.0–56.5)		1.30 (0.95–1.78)	.08
Consultations or programs designed to improve ART adherence			.25		
No	115	38.4 (24.0–52.7)		Referent	–
Yes	462	46.4 (40.8–52.1)		1.21 (0.84–1.74)	.27
Satisfaction with HIV medical practice Satisfied or very satisfied with:					
Salary and reimbursement			.69		
No	364	42.8 (34.7–50.9)		Referent	–
Yes	212	44.6 (33.9–55.2)		1.04 (0.86–1.26)	.68
Amount of time required and available for documentation/administrative work			.17		
No	380	40.9 (32.6–49.2)		Referent	–
Yes	193	47.6 (35.8–59.3)		1.16 (0.94–1.44)	.18
Work schedule/on-call responsibilities			.42		
No	209	40.9 (27.6–54.1)		Referent	–
Yes	365	45.6 (38.2–52.9)		1.12 (0.84–1.48)	.42
Support services to assist with patient care			.56		
No	252	41.3 (29.5–53.1)		Referent	–
Yes	323	44.9 (36.6–53.2)		1.09 (0.82–1.44)	.56
Support and coverage from other HIV providers			.79		
No	143	44.0 (31.1–56.9)		Referent	–
Yes	429	42.7 (35.0–50.4)		0.97 (0.77–1.23)	.80
Availability of specialists for consultation and referral			.66		
No	194	44.9 (34.5–55.4)		Referent	–

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Provider Characteristic	Sample size	Weighted row % (CI)	Rao-Scott χ^2 *P* Value	PR (CI)	*P* Value
Yes	379	42.1 (32.0–52.3)		0.94 (0.70–1.25)	.66
Effort required to keep up with clinical and/or pharmaceutical advances			.40		
No	217	39.9 (26.8–53.1)		Referent	–
Yes	356	45.2 (37.6–52.8)		1.13 (0.83–1.54)	.41

Abbreviations: No., sample size; 95% CI, 95% confidence interval; ART, antiretroviral therapy; MMP, medical monitoring project; PR, prevalence ratio; HIVMA, HIV Medicine Association; AAHIV-S, American Academy of HIV Medicine Practicing HIV Specialist.

[a] N = 1187.

[b] 2013–2014 MMP provider survey.