



HHS Public Access

Author manuscript

J Acquir Immune Defic Syndr. Author manuscript; available in PMC 2017 July 03.

Published in final edited form as:

J Acquir Immune Defic Syndr. 2017 April 15; 74(5): 479–487. doi:10.1097/QAI.0000000000001276.

Barriers to Universal Prescribing of Antiretroviral Therapy by HIV Care Providers in the United States, 2013–2014

John Weiser, MD, MPH*, John T. Brooks, MD*, Jacek Skarbinski, MD*, Brady T. West, PhD†, Christopher C. Duke, PhD‡, Garrett W. Gremel, BS‡, and Linda Beer, PhD*

*Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, GA

†Survey Research Center, University of Michigan, Ann Arbor, MI

‡Altarum Institute, Ann Arbor, MI

Abstract

Introduction—HIV treatment guidelines recommend initiating antiretroviral therapy (ART) regardless of CD4 cell (CD4) count, barring contraindications or barriers to treatment. An estimated 6% of persons receiving HIV care in 2013 were not prescribed ART. We examined reasons for this gap in the care continuum.

Methods—During 2013–2014, we surveyed a probability sample of HIV care providers, of whom 1234 returned surveys (64.0% adjusted response rate). We estimated percentages of providers who followed guidelines and their characteristics, and who deferred ART prescribing for any reason.

Results—Barring contraindications, 71.2% of providers initiated ART regardless of CD4 count. Providers less likely to initiate had caseloads ≤ 20 vs. >200 patients [adjusted prevalence ratios (aPR) 0.69, 95% confidence interval (CI): 0.47 to 1.02, $P = 0.03$], practiced at non–Ryan White HIV/AIDS Program-funded facilities (aPR 0.85, 95% CI: 0.74 to 0.98, $P = 0.02$), or reported pharmaceutical assistance programs provided insufficient medication to meet patients' needs (aPR 0.79, 95% CI: 0.65 to 0.98, $P = 0.02$). In all, 17.0% never deferred prescribing ART, 69.6% deferred for 1%–10% of patients, and 13.3% deferred for $>10\%$. Among providers who had deferred ART, 59.4% cited patient refusal as a reason in $>50\%$ of cases, 31.1% reported adherence concerns because of mental health disorders or substance abuse, and 21.4% reported adherence concerns because of social problems, eg, homelessness, as factors in $>50\%$ of cases when deferring ART.

Correspondence to: John Weiser, MD, MPH, Division of HIV/AIDS Prevention, Centers for Disease Control, 1600 Clifton Road NE, MS E46, Atlanta, GA 30329 jweiser@cdc.gov.

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

The following are contributions of the authors to the study: J.W. contributed to study conception, data analysis, and wrote the article; J.T.B., J.S., and L.B. contributed to study conception and edited the article; G.W.G. and C.C.D. contributed to data analysis, writing, and edited the article; B.T.W. contributed to survey weighting, data analysis, writing, and edited the article.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site (www.jaids.com).

The authors have no funding or conflicts of interest to disclose.

Conclusions—An estimated 29% of HIV care providers had not adopted recommendations to initiate ART regardless of CD4 count, barring contraindications, or barriers to treatment. Low-volume providers and those at non-Ryan White HIV/AIDS Program-funded facilities were less likely to follow this guideline. Among all providers, leading reasons for deferring ART included patient refusal and adherence concerns.

Keywords

antiretroviral initiation; HIV provider barrier prescribing

INTRODUCTION

In the United States, an estimated 1.2 million persons are living with HIV infection¹ and approximately 44,000 persons were diagnosed with HIV infection in 2014.² Improvements across the HIV care continuum are needed to achieve the goals of the National HIV/AIDS Strategy to maximize individual health benefits and to reduce new infections.³ The percentage of persons who are receiving HIV medical care but not prescribed antiretroviral therapy (ART) declined from an estimated 11% in 2009 to 6% in 2013, largely as a result of efforts to improve engagement in care for persons living with HIV (PLHIV) and to promote early ART use.^{4–6} Since 2012, the Department of Health and Human Services (DHHS) has recommended ART for all persons diagnosed with HIV infection, barring medical contraindications to treatment, comorbid conditions that affect patients' readiness to start a regimen that requires sustained adherence, and patient unwillingness to begin treatment. Based on the results of the START⁷ and TEM-PRANO⁸ trials, both DHHS⁹ and the World Health Organization¹⁰ now recommend initiating ART soon after diagnosis of HIV infection regardless of CD4 cell (CD4) count. However, even if all providers adopted this standard of care, many would defer treating some patients because of contra-indications or barriers to treatment. A 2009 study examining reasons that providers deferred prescribing ART for otherwise eligible patients cited concerns about patient adherence because of medical or social factors, concerns about structural barriers, and lack of acceptance by patients.¹¹ In light of the expansion of treatment recommendations since then, reexamining these barriers may be useful for developing timely methods to help maximize use of ART.

We surveyed a probability sample of US HIV care providers to elicit information about practices related to initiation and deferral of ART. Specifically, we assessed the percentage of HIV care providers who would initiate ART regardless of CD4 count for patients with no medical contraindications or barriers to treatment, how these providers differed from those who would initiate ART based on CD4 count thresholds, and the percentage of all providers who deferred prescribing ART for any reason and their reasons for deferral.

METHODS

Sample Design and Data Collection

The Medical Monitoring Project (MMP) is an ongoing HIV surveillance system that from 2009 to 2014 used a 3-stage probability sampling design to assess the clinical and behavioral characteristics of adult PLHIV who are receiving outpatient medical care for HIV in the

United States.^{5,12} 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. Briefly, 16 states and 1 territory were selected using probability proportionate to size sampling at the first stage, with size based on estimates of the number of AIDS cases in 2002. All sampled areas agreed to participate. At the second stage, 622 facilities providing HIV care within these areas were sampled using probability proportionate to size based on the number of persons receiving care for HIV infection; of these, 505 agreed to participate (81% participation rate). A list of all physicians, physician assistants, and nurse practitioners who between January 1 and April 30, 2012 had completed their training and provided HIV care (defined as ordering CD4 counts or HIV viral load tests or prescribing antiretroviral medications) was obtained from each participating facility, resulting in a total of 2208 HIV care providers. All these providers were invited to participate in the survey.

Providers were recruited with a modified version of Dillman Tailored Design.¹³ We mailed recruitment packets, including instructions for completing the self-administered survey via paper or a web-based response system, and a \$20 cash incentive to all providers in selected facilities between June 2013 and January 2014. In all, 2023 (91.7%) of 2208 providers were determined to be eligible, and 1234 of these eligible providers returned surveys (American Association of Public Opinion Research, Response Rate 3 adjusted provider response rate¹⁴ 64.0%) from 391 HIV care facilities. The data were weighted based on probability of selection, and adjustments were made to the probability weights based on factors associated with nonresponse. The sample design and weighting methods allow inference from estimates to all HIV care providers at outpatient HIV health care facilities in the United States between January 1 and April 30, 2012. See Supplemental Digital Content, <http://links.lww.com/QAI/A962>, for detailed information on sampling methods and response rate calculation.

Variables Used in the Analysis

The survey instrument consisted of 61 questions and took about 30 minutes to complete on average. Domains included professional qualifications, experience, demographics, prescribing practices, and practice characteristics. Providers were asked: “Among patients for whom there were no barriers or contraindications, when would you first prescribe ART?” Response options were: <200, <350, <500 cells per cubic millimeter, or treat regardless of CD4 count. We constructed a 2-level variable for threshold to initiate ART: “Treat regardless of CD4 count” or “<200, <350, or <500 cells per cubic millimeter” to indicate adoption vs. nonadoption of treatment recommendations. Providers were categorized according to the percentage of patients for whom they deferred prescribing ART for any reason: none, 1%–10%, or >10%. Providers were offered reasons for deferring and were asked to indicate the percentage of patients (0%, 1%–10%, 11%–25%, 26%–50%, >50%) for whom each applied as a reason to defer prescribing ART. Reasons for deferral included patient refusal or unwillingness to commit to treatment, patient inability to pay for medications or coverage delays, provider concerns about nonadherence because of a medical problem (eg, substance abuse, mental health, other illness) or social problem (eg, homelessness, incarceration, or migrancy), provider inability to construct an effective and acceptable regimen, and provider not agreeing with recommendations to treat regardless of CD4 count. For analysis, responses

were collapsed to 2 categories: 50% vs. >50% of patients. Physicians (MDs and DOs) who were board certified in infectious diseases (ID) were classified as ID physicians regardless of any additional board certifications. Providers were classified by HIV Medicine Association¹⁵ or American Academy of HIV Medicine (AAHIVM)¹⁶ HIV specialist status, whether they provided primary care (for definition, see online methods Supplemental Digital Content, <http://links.lww.com/QAI/A962>), and by HIV patient caseload (20, 21–50, 51–200, or >200 patients). Respondents were also asked to indicate on a 5-point Likert scale how strongly they agreed that various prescription drug plans were sufficient to meet their patients' HIV treatment needs. For analysis, these responses were collapsed to 2 categories: somewhat or strongly agree vs. neither agree nor disagree, somewhat disagree, or strongly disagree. Using data from a previous MMP facility survey, we determined whether the facilities where providers worked received Ryan White HIV/AIDS Program (RWHAP)¹⁷ funding and if they were or were not private practices. Providers were also asked which on-site support services were available to patients at the facilities.

Analytic Methods

We computed frequencies and weighted percentages and their corresponding 95% confidence intervals (CI) describing the target provider population, facilities where they worked, and providers' ART-related clinical practices. Rao-Scott χ^2 tests were used to assess associations between selected variables and the probability of providers initiating ART regardless of CD4 count. In a multivariate logistic regression model, we included provider and facility characteristics that were conceptually and statistically associated (P 0.05) with the outcome of initiating ART regardless of CD4 count. All estimates incorporated the adjusted survey weights. 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 greater than 0.3 unreliable.

Ethics Statement

MMP, as a public health surveillance activity, was determined to be nonresearch in accordance with the federal human subjects protection regulations at 45 Code of Federal Regulations 46.101c and 46.102d and the Guidelines for Defining Public Health Research and Public Health Non-research of the Centers for Disease Control and Prevention.^{18,19} Participating states or territories and facilities obtained local Institutional Review Board approval to conduct MMP, if required locally.

RESULTS

We estimate that in 2012, there were 8257 (CI: 6902 to 9611) HIV care providers in the United States. An estimated 44.5% of providers were ID physicians, 30.0% other board-certified physicians, 15.2% nurse practitioners, 5.4% physician assistants, and 4.8% non-board-certified physicians (Table 1). In all, 57.8% of providers met HIV Medicine Association or AAHIVM specialist criteria and 83.1% provided primary care. HIV caseloads of 20, 21–50, 51–200, and >200 patients were reported by 15.1%, 19.6%, 39.0%,

and 26.3% of providers, respectively. Among all providers, 25.3% reported comanaging their patients by receiving expert assistance as did 52.2% of providers with caseloads of 20 patients. Most providers agreed or strongly agreed that the following prescription programs met their patients' treatment needs: AIDS Drug Assistance Program (ADAP), 91.1%; Medicare, 72.8%; Medicaid, 81.3%; commercial insurance, 71.3%; and pharmaceutical industry-sponsored patient assistance programs, 59.2%. An estimated 47.5% of providers cared for patients at RWHAP-funded facilities and 41.9% worked in private practices.

Initiation of ART Regardless of CD4 Count

An estimated 71.2% of providers reported initiating ART regardless of CD4 count, whereas 1.2%, 8.7%, and 18.9% of providers initiated ART for patients with CD4 counts of <200, <350, and <500 cells per cubic millimeter, respectively (Table 2). In bivariate and multivariable analyses, providers with patient caseloads of 20 patients vs. >200 patients [47.3%, CI: 34.3 to 60.3, vs. 79.3%, CI: 72.6 to 86.1; adjusted prevalence ratio (aPR) 0.69, CI: 0.47 to 1.02, $P=0.03$] as were providers at non-RWHAP-funded facilities (61.7%, CI: 50.6 to 72.9, vs. 80.4%, CI: 74.1 to 86.6; aPR 0.85, CI: 0.74 to 0.98, $P=0.02$) and providers who reported that pharmaceutical companies' patient assistance programs did not provide sufficient medication to meet their patients' needs (62.0%, CI: 51.2 to 72.7, vs. 78.0%, CI: 71.6 to 84.3; aPR 0.80, CI: 0.65 to 0.98, $P=0.02$) (Table 3) were less likely to initiate ART regardless of CD4 count. None of the other variables assessed were associated with initiating ART regardless of CD4 count.

Deferral of ART Prescription for Any Reason

Among all providers, 17.0% reported that they never deferred prescribing ART for any reason, 69.6% deferred for 1%–10% of patients, and 13.3% deferred for more than 10% (Table 2). Among providers who had deferred prescribing ART, 59.4% cited patient refusal as a reason in >50% of cases when they deferred; similarly, 31.1% reported adherence concerns because of substance abuse or mental health problems; 21.4% reported adherence concerns because of social problems, such as homelessness; 10.5% cited inability to pay for medications; and 3.2% said that disagreeing with recommendations to initiate treatment regardless of CD4 count was a reason for deferring in >50% of cases. An estimated 54.2% of providers reported practicing at a facility with on-site adherence counseling, 45.1% at a facility with mental health services, 23.5% at a facility with substance abuse treatment, and 50.8% at a facility with HIV case management services.

DISCUSSION

We estimated that between June 2013 and January 2014, 71% of HIV care providers would initiate ART regardless of CD4 count for PLHIV with no medical contra-indications or barriers. Providers who had HIV caseloads of 20 patients, worked at non-RWHAP-funded facilities, or found that pharmaceutical companies' patient assistance programs were unable to provide sufficient medication to meet their patients' needs were less likely to have adopted this standard of care for initiating ART. More than 5 in 6 of all providers reported that they deferred prescribing ART for some patients, including 13% who deferred for >10%. The most frequently cited reasons for deferral were patient refusal and concerns

about nonadherence because of substance abuse or mental illness or social problems, such as homelessness.

As evidence of the clinical^{7,8,20,21} and public health^{22,23} benefits of universal ART has accumulated and concerns about tolerability, toxicity, and durability have waned,²⁴ recommendations have broadened to include offering treatment to all persons diagnosed with HIV^{9,10} and the strength of the recommendation for earlier treatment has been increased.^{9,10} In an earlier study, 68% of providers in the Bronx, NY, and Washington, DC, who participated in the HIV Prevention Trials Network 065 study in 2010–2011²⁵ reported initiating ART regardless of CD4 count as did 69% of providers affiliated with the New England AIDS Education and Training Center during 2013²⁶ and 87% of ID physicians who were members of the Emerging Infections Network in 2014.²⁷ Our study was the first to examine physicians, nurse practitioners, and physician assistants at different types of facilities throughout the country, representative of the diversity of US HIV care providers. We also assessed associations between ART initiation practices and a wide range of provider characteristics.

In all, 29% of providers used a CD4 count threshold in deciding whether to initiate ART for patients without contra-indications or barriers to treatment. Identifying and understanding the needs of these providers may help reduce the 6% of patients not currently prescribed ART. Providers who cared for < 20 patients (15% of all HIV care providers) were less likely than those with large caseloads to follow current recommendations. Other provider surveys have similarly observed that providers with smaller caseloads were less likely than those with larger caseloads to report adhering to antiretroviral prescribing guidelines.^{28–30} Though evidence suggests that expert consultation improves provider and patient outcomes,³¹ we found that half of providers with caseloads <20 patients managed their patients without the assistance of an HIV specialist. Pairing of providers who care for fewer than 20 patients with highly experienced providers is available through the AAHIVM Clinical Consult Program.³² Another resource for supporting low-volume providers is the AIDS Education and Training Center Program, the training arm of the RWHAP that provides a national network of HIV experts offering education, clinical consultation, and technical assistance.³³ Low-volume providers can be identified by local health departments and offered opportunities for clinical training and support using antiretroviral prescription claims data³⁴ and potentially also laboratory surveillance data.

Practicing in a non-RWHAP-funded facility was another independent predictor of providers using a CD4 count threshold in deciding when to initiate ART for patients without contraindications or barriers to treatment. Another analysis of MMP provider survey data observed that these providers were also less likely to report delivering recommended ART adherence support to patients than providers at RWHAP-funded facilities.³⁵ These findings suggest a need to support non-RWHAP providers in addition to low-volume providers to adopt currently recommended ART prescribing practices.

Providers who reported that pharmaceutical industry–sponsored patient assistance programs provided sufficient medication to meet their patients’ needs were more likely to initiate ART regardless of CD4 count for patients without contraindications or barriers to treatment.

Providers may turn to patient assistance programs that use CD4 criteria to determine eligibility to fill gaps in coverage left by prescription drug plans, including ADAP. Notably, in 2015, RWHAP programs in 9 states required a CD4 count of 500 cells per cubic millimeter or less to qualify for ADAP.³⁶

Although 29% of providers would not initiate ART for patients with a CD4 count above a particular threshold, only 3% of providers who ever defer prescribing ART reported that disagreeing with the recommendation to treat patients regardless of CD4 count, barring contraindications, or barriers to treatment was a reason in more than half of cases. Other reasons for deferring ART, which may be consistent with guidelines that recommend taking into account patients' readiness and willingness, were more common. A majority of providers cited patient refusal as a common reason to defer prescribing, and many identified concerns about treatment nonadherence because of either substance abuse or mental health problems (31%) or social problems, such as homelessness (21%). Similar findings were reported in surveys of HIV care providers in 2009,¹¹ 2010–2011,³⁷ and 2013.²⁵

Patient unwillingness to accept ART is the single most commonly reported barrier to prescribing ART. However, when patients were interviewed for MMP, the most common self-reported reason for never having taken ART (80%) or discontinuing ART (35%) was that the doctor advised delaying or stopping treatment.⁵ A recent study in which patient-provider dyads were interviewed about reasons for lack of ART usage may help explain this apparent inconsistency. Christopoulos et al³⁸ found that many patients were not taking ART because they had internalized messages from their providers over time that their health was stable and that ART was not warranted at the time. Providers practicing patient-centered care often muted the offer of ART, at times unintentionally. Patients reported that providers had not strongly advised them to take ART, and many said that such a clear recommendation would be necessary to initiate ART. Future treatment and prevention guidelines should recommend that providers strongly advise all patients to initiate ART barring medical contraindications or barriers to treatment.

Concern about the effect of substance abuse and mental health disorders on medication adherence was the second most common reason why providers deferred prescribing ART. The link between these conditions has been established,^{39–41} but the level of impact is not immutable. Interventions to treat clinical depression and simultaneously support adherence with cognitive and behavioral skills can improve both depression and adherence outcomes.⁴¹ Among patients with opioid dependence, methadone and buprenorphine maintenance can improve medication adherence, and directly administered ART has been associated with improved clinical outcomes among substance abusers.⁴²

Among providers who reported that they deferred prescribing ART, 1 in 5 cited social problems, such as homelessness, as a factor in most instances. However, evidence also suggests that providers may have limited ability to predict which patients will be able to adhere to treatment.⁴³ Even though homeless patients, in general, may be at greater risk of ART nonadherence,⁴⁴ many can achieve levels of adherence comparable with housed populations⁴⁵ and benefit from ART even if adherence is suboptimal.⁴⁶

Federal guidelines state the following: “ART reduces morbidity and mortality even in patients with relatively poor adherence and established drug resistance. Thus, mental illness, substance abuse, and psychosocial challenges are not reasons to withhold ART from a patient. Rather, these issues indicate the need for additional interventions to support adherence....”⁹(pE5) A systematic review has identified 10 evidence-based interventions that can promote ART adherence.⁴⁷ However, only half of the providers reported the availability of on-site HIV case management, adherence support services, or mental health services and one-quarter practiced in a facility with on-site substance abuse treatment. Increased access to these services, all of which are more readily available at RWHAP-funded facilities,⁴⁸ would address many of the reasons that providers defer prescribing ART.

Our study was subject to limitations. The survey was conducted before the strength of the DHHS recommendation to offer treatment regardless of CD4 was changed in 2015 from moderate to strong.⁹ The percentage of providers who follow the recommendation may be higher today. ART prescription may also have increased if upward trends have continued since 2013.⁶ Second, estimates were based on self-report and may have been subject to measurement error because of socially desirable responding, which could, eg, increase the percentage of providers who reported that they would initiate ART regardless of CD4 count and decrease the percentage who reported that disagreeing with this recommendation is a reason in more than half of cases when they defer. Finally, because MMP provider and patient data are not linked, we were unable to assess possible confounding of associations between provider characteristics and reported prescribing practices by patient sociodemographic characteristics.

In conclusion, factors limiting universal ART prescription include incomplete adoption of recommendations to initiate ART regardless of CD4 count for patients without contraindications or barriers to treatment, patient refusal, and provider concerns about nonadherence because of medical and social problems. Supporting low-volume providers and providers at non-RWHAP-funded facilities in adopting standard of care practices for ART initiation and addressing other barriers to treatment may help reduce this gap in the HIV care continuum.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The authors would like to thank the participating Medical Monitoring Project (MMP) providers, facilities, project areas, and Provider and Community Advisory Board members. They also acknowledge the contributions of the Clinical Outcomes Team, the Behavioral and Clinical Surveillance Branch, and other members of the Division of HIV/AIDS Prevention at Centers for Disease Control and Prevention and the MMP 2013 Study Group Members: <http://www.cdc.gov/hiv/statistics/systems/mmp/resources.html#StudyGroupMembers>. The authors also wish to thank the Altarum Institute data collection team.

Funding for the Medical Monitoring Project is provided by the Centers for Disease Control and Prevention.

References

1. Centers for Disease Control and Prevention. Prevalence of diagnosed and undiagnosed HIV Infection — United States, 2008–2012. MMWR Morb Mortal Wkly Rep. 2015; 64:657–662. [Accessed December 31, 2016] Available at: <http://www.cdc.gov/mmwr/R/preview/mmwrhtml/mm6424a2.htm>. [PubMed: 26110835]
2. Centers for Disease Control and Prevention. HIV Surveillance Report. 2014; 26 [Accessed April 22, 2016] Available at: <http://www.cdc.gov/hiv/library/reports/surveillance/>.
3. Office of National AIDS Policy. National HIV/AIDS Strategy for the United States: Updated to 2020. Washington, DC: Office of National AIDS Policy; 2015. Available at: <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-update.pdf> [Accessed December 31, 2016]
4. Bradley H, Hall HI, Wolitski R, et al. Vital signs: HIV diagnosis, care, and treatment among persons living with HIV—United States, 2011. MMWR. 2014; 63:1113–1117. [PubMed: 25426654]
5. Centers for Disease Control and Prevention. Behavioral and Clinical Characteristics of Persons Receiving Medical Care for HIV Infection—Medical Monitoring Project, United States, 2013 Cycle (June 2013–May 2014). HIV Surveillance Special Report. 2016; 16 [Accessed January 28, 2016] Available at: <http://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-hssr-mmp-2013.pdf>.
6. Bradley, H., Mattson, C., Beer, L., et al. for the Medical Monitoring Project. Increased HIV viral suppression among persons receiving medical care for HIV infection, 2009–2013 [Abstract 53]. Paper presented at: 11th International Conference on HIV Treatment and Prevention Adherence; February 22–26, 2016; Boston, MA. Available at: <http://www.croiconference.org/sessions/increased-hiv-viral-suppression-among-us-adults-receiving-medical-care-2009-2013>
7. INSIGHT START Study Group. Initiation of antiretroviral therapy in early asymptomatic HIV infection. N Engl J Med. 2015; 373:795–807. [PubMed: 26192873]
8. Danel C, Moh R, et al. TEMPRANO ANRS Study Group. A trial of early antiretrovirals and isoniazid preventive therapy in Africa. N Engl J Med. 2015; 373:808–822. [PubMed: 26193126]
9. Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents. Department of Health and Human Services; 2016. Available at: <https://aidsinfo.nih.gov/guidelines/html/1/adult-and-adolescent-treatment-guidelines/0> [Accessed March 9, 2016]
10. Guideline on When to Start Antiretroviral Therapy and on Pre-Exposure Prophylaxis for HIV. Geneva, Switzerland: World Health Organization; 2015. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK327115> [Accessed March 9, 2016]
11. Beer, L., Valverde, EE., Raiford, JL., et al. [Accessed December, 2015] Clinician perspectives on delaying initiation of antiretroviral therapy for clinically eligible HIV-infected patients. J Int Assoc Provid AIDS Care. 2014. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/25394912>
12. Frankel MR, McNaghten AD, Shapiro MF, et al. A probability sample for monitoring the HIV-infected population in care in the U.S. and in selected states. Open AIDS J. 2012; 6:67–76. [PubMed: 23049655]
13. Dillman, DA. Mail and Internet Surveys: The Tailored Design Method—2008 Update With New Internet, Visual, and Mixed-Mode Guide. John Wiley & Sons; Hoboken, NJ: 2008.
14. The American Association for Public Opinion Research. [Accessed February 25, 2015] Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 72011. Available at: http://www.aapor.org/AAPORKentico/AAPOR_Main/media/MainSiteFiles/StandardDefinitions2011_1.pdf
15. Identifying Providers Qualified to Manage the Longitudinal Treatment of Patients With HIV Infection and Resources to Support Quality HIV Care. HIV Medicine Association; 2013. Available at: <http://www.hivma.org/Defining-HIV-Expertise.aspx> [Accessed March 11, 2016]
16. Practicing HIV specialist (AAHIV-S). American Academy of HIV Medicine; Available at: <http://www.aahivm.org/aahivs> [Accessed March 11, 2016]
17. Health Resources and Services Administration, HIV/AIDS Bureau. [Accessed December 11, 2015] Ryan White HIV/AIDS Program website. Available at: <http://www.hab.hrsa.gov>
18. [Accessed December 11, 2015] Protection of Human Subjects, US Federal Code Title 45 Part 46. Available at: <http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html>

19. Centers for Disease Control and Prevention. [Accessed December 11, 2015] Distinguishing Public Health Research and Public Health Nonresearch. 2010. Available at: <http://www.cdc.gov/od/science/integrity/docs/cdc-policy-distinguishing-public-health-research-nonresearch.pdf>
20. Kitahata MM, Gange SJ, Abraham AG, et al. Effect of early versus deferred antiretroviral therapy for HIV on survival. *N Engl J Med*. 2009; 360:1815–1826. [PubMed: 19339714]
21. Le T, Wright EJ, Smith DM, et al. Enhanced CD4+ T-cell recovery with earlier HIV-1 antiretroviral therapy. *N Engl J Med*. 2013; 368:218–230. [PubMed: 23323898]
22. Cohen MS, Chen YQ, McCauley M, et al. For the HPTN 052 Study Team. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med*. 2011; 365:493–505. [PubMed: 21767103]
23. Granich RM, Gilks CF, Dye C, et al. Universal voluntary HIV testing with immediate antiretroviral therapy as a strategy for elimination of HIV transmission: a mathematical model. *Lancet*. 2009; 373:48–57. [Accessed March 14, 2016] Available at: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(08\)61697-9/abstract](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)61697-9/abstract). [PubMed: 19038438]
24. Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents. Department of Health and Human Services; 2011. p. 1-166. Available at <http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf> [Accessed May 18, 2016]
25. Buchacz, K., Fariior, J., Beauchamp, G., et al. Providers' attitudes and practices related to ART use for HIV care and prevention [Abstract 1095]. Paper presented at: Conference on Retroviruses and Opportunistic Infections; February 2015; Seattle, WA. Available at: <http://www.croiconference.org/sessions/providers-attitudes-and-practices-related-art-use-hiv-care-and-prevention>
26. Krakower DS, Oldenberg CE, Mitty JA, et al. Knowledge, beliefs and practices regarding antiretroviral medications for HIV prevention: results of a survey of healthcare providers in New England. *PLoS One*. 2015; 10:e0132398. [PubMed: 26146824]
27. Krakower DS, Beekmann SE, Polgreen PM, et al. Diffusion of newer HIV prevention innovations: variable practices of frontline infectious diseases physicians. *Clin Infect Dis*. 2016; 62:99–105. [PubMed: 26385993]
28. Brosgart CL, Coleman RL, Dyer T, et al. Clinical experience and choice of drug therapy for human immunodeficiency virus disease. *Clin Infect Dis*. 1999; 28:14–22. [PubMed: 10028063]
29. Stone VE, Mansourati FF, Poses RM, et al. Relation of physician specialty and HIV/AIDS experience to choice of guideline-recommended antiretroviral therapy. *J Gen Intern Med*. 2001; 16:360–368. [PubMed: 11422632]
30. Arora S, Kalishman S, Thornton K, et al. Expanding access to hepatitis C virus treatment—Extension for Community Healthcare Outcomes (ECHO) project: disruptive innovation in specialty care. *Hepatology*. 2010; 52:1124–1133. [PubMed: 20607688]
31. Young JD, Patel M, Badowski M, et al. Improved virologic suppression with HIV subspecialty care in a large prison system using telemedicine: an observational study with historical controls. *Clin Infect Dis*. 2014; 59:123–126. [PubMed: 24723283]
32. American Academy of HIV Medicine. [Accessed November 25, 2015] Clinical Consult Program. Available at: <http://www.aahivm.org/DisplayPage.aspx?pgID=MTg4&paID=ODc=>
33. [Accessed December 12, 2015] AIDS Education and Training Center Program. Available at: <http://www.aidsetc.org>
34. O'Neill M, Karelis GD, Feller DJ, et al. The HIV Workforce in New York State: does patient volume correlate with quality? *Clin Infect Dis*. 2015; 61:1871–1877. [PubMed: 26423383]
35. Weiser, J., Brooks, JT., Skarbinski, J., et al. Delivery of antiretroviral therapy adherence support services by HIV care providers in the United States [Abstract 132]. Paper presented at: 10th International Conference on HIV Treatment and Prevention Adherence; June 2015; Miami, FL. Available at: <http://www.croiconference.org/sessions/increased-hiv-viral-suppression-among-us-adults-receiving-medical-care-2009-2013>
36. U.S. Department of Health and Human Services, Health Resources and Services Administration, HIV/AIDS Bureau. [Accessed November 25, 2015] Part B: AIDS Drug Assistance Program. Available at: <http://hab.hrsa.gov/abouthab/partbdrug.html>

37. Kurth AE, Mayer K, Beauchamo G, et al. Clinician practices and attitudes regarding early antiretroviral therapy in the United States. *J Acquir Immune Defic Syndr*. 2012; 61:e65–e69. [PubMed: 23183150]
38. Christopoulos KA, Olender S, Lopez AM, et al. Retained in HIV care but not on antiretroviral treatment: a qualitative patient-provider dyadic study. *PLoS Med*. 2015; 12:e1001863. [PubMed: 26263532]
39. Chander G, Himelhoch S, Moore RD. Substance abuse and psychiatric disorders in HIV-positive patients: epidemiology and impact on anti-retroviral therapy. *Drugs*. 2006; 66:769–789. [PubMed: 16706551]
40. Gonzalez JS, Batchelder AW, Psaros C, et al. Depression and HIV/AIDS treatment nonadherence: a review and meta-analysis. *J Acquir Immune Defic Syndr*. 2011; 58:1–11. [Accessed February 3, 2016] Available at: <http://www.ncbi.nlm.nih.gov/pubmed/21857529>. [PubMed: 21637110]
41. Saberi P, Neilands TB, Vittinghoff E, et al. Barriers to antiretroviral therapy adherence and plasma HIV RNA suppression among AIDS clinical trials group study participants. *AIDS Patient Care STDS*. 2015; 29:111–116. [PubMed: 25615029]
42. Thompson MA, Mugavero MJ, Amico KR, et al. Guidelines for improving entry into and retention in care and antiretroviral adherence for persons with HIV: evidence-based recommendations at an International Association of Physicians in AIDS Care panel. *Ann Intern Med*. 2012; 156:817–833. [PubMed: 22393036]
43. Bangsberg DR, Hecht FM, Clague H, et al. Provider assessment of adherence to HIV antiretroviral therapy. *J Acquir Immune Defic Syndr*. 2001; 26:435–442. [PubMed: 11391162]
44. Leaver CA, Bargh G, Dunn JR, et al. The effects of housing status on health-related outcomes in people living with HIV: a systematic review of the literature. *AIDS Behav*. 2007; 11(6 suppl):85–100. [PubMed: 17682940]
45. Bangsberg DR, Hecht DR, Charlebois ED, et al. Adherence to protease inhibitors, HIV-1 viral load, and development of drug resistance in an indigent population. *AIDS*. 2000; 14:357–366. [PubMed: 10770537]
46. Bangsberg DR. Less than 95% adherence to nonnucleoside reverse-transcriptase inhibitor therapy can lead to viral suppression. *Clin Infect Dis*. 2006; 43:939–941. [PubMed: 16941380]
47. Charania MR, Marshall KJ, Lyles CM, et al. Identification of evidence-based interventions for promoting HIV medication adherence: findings from a systematic review of U.S.-based studies, 1996–2011. *AIDS Behav*. 2014; 18:646–660. [PubMed: 24043269]
48. Weiser J, Beer L, Frazier EL. Service delivery and patient outcomes in Ryan White HIV/AIDS Program-funded and -non-funded health care facilities in the United States. *JAMA Intern Med*. 2015; 175:1650–1659. [PubMed: 26322677]

TABLE 1

Qualifications and Experience of HIV Care Providers in the United States, MMP Provider Survey, 2013–2014
(N = 1234)

	No.	Weighted %*	95% CI
Certification type			
ID board–certified physician [†]	564	44.5	37.3 to 51.7
Other board-certified physician	319	30.0	22.8 to 37.3
Nurse practitioner	217	15.2	10.3 to 20.1
Physician assistant	63	5.4	2.6 to 8.2
Non–board-certified physician	61	4.8	2.2 to 7.4
HIV specialist (HIVMA criteria or AAHIV-S)	865	57.8	51.2 to 64.4
Provides primary care	1094	83.1	78.4 to 87.8
HIV patients for whom you provide continuous and direct care			
20	103	15.1	9.5 to 20.7
21–50	186	19.6	14.4 to 24.8
51–200	479	39.0	34.2 to 43.8
>200	437	26.3	20.4 to 32.1
Years caring for HIV patients			
0–5	231	17.6	13.1 to 22.0
6–10	196	17.7	13.9 to 21.6
11–20	428	36.1	32.1 to 40.0
>20	365	28.6	24.6 to 32.6
Comanagement of patients			
Provides expert assistance	527	36.9	30.5 to 43.2
Receives expert assistance	241	25.3	19.5 to 31.0
Caseload of 20 patients and receives expert assistance	52	52.2	38.1 to 66.4
Somewhat or strongly agree that availability of medication provided is sufficient to meet patients' HIV treatment need:			
ADAP	1008	91.1	87.5 to 94.8
Medicare prescription drug plan	778	72.8	67.7 to 77.8
Medicaid	882	81.3	76.7 to 85.9
Commercial insurance	719	71.3	65.4 to 77.3
Pharmaceutical industry drug assistance plans	525	59.2	52.4 to 66.0
Works in an RWHAP-funded facility	784	47.5	35.4 to 59.6
Works in a private practice	300	41.9	33.3 to 50.6

* Values exclude “don't know” responses.

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

AAHIV-S, AAHIVM Practicing HIV Specialist; HIVMA, HIV Medicine Association; Wt., weighted.

TABLE 2

Clinical Practices and Practice Characteristics of HIV Medical Providers Prescribing ART, MMP Provider Survey, 2013–2014 (N = 1199^{*})

	No.	Wt. % [†]	95% CI
Threshold for initiating ART if no barriers or contraindications to ART:			
Treat regardless of CD4 count	889	71.2	64.6 to 77.8
CD4 count <200 cells/mm ³	9	1.2 [‡]	0.1 to 2.3
CD4 count <350 cells/mm ³	62	8.7	5.2 to 12.1
CD4 count <500 cells/mm ³	221	18.9	14.3 to 23.5
Percentage of patients for whom provider currently defers, for any reason, prescribing ART			
0%	130	17.0	12.7 to 21.4
1%–10%	863	69.6	64.9 to 74.3
Over 10%	178	13.3	9.5 to 17.2
Among patients for whom they defer prescribing ART, percentage of providers who cite factor for at least half of patients			
Patient refusal or unwillingness to commit to treatment	657	59.4	53.8 to 65.0
Patient has medical problem that may make long-term adherence difficult (eg, substance abuse, mental health, or other illness)	333	31.1	26.8 to 35.4
Patient has social issue that may make long-term adherence difficult (eg, homeless, incarcerated, migrant)	243	21.4	17.3 to 25.5
Inability to pay for medications or medication coverage delays	80	10.5	4.1 to 16.9
Inability to construct an effective regimen with acceptable side effects	23	1.4 [‡]	0.5 to 2.2
Does not agree with current guidelines to treat HIV-infected patients at all CD4 levels	30	3.2 [‡]	0.7 to 5.7
Practice provides on-site adherence counseling	927	54.2	43.9 to 64.6
Practice provides on-site mental health services	799	45.1	36.8 to 53.4
Practice provides on-site substance abuse treatment	433	23.5	17.3 to 29.6
Practice provides on-site case management	850	50.8	41.5 to 60.1
Practice uses an integrated team	874	54.1	45.6 to 62.6
Facility uses an electronic medical record	759	62.2	48.9 to 75.5

^{*}The number of eligible providers who indicated on the survey that they prescribed ART was 1999.

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

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

Wt., weighted.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Associations Between Provider and Practice Characteristics and Initiating ART Regardless of CD4 Count, MMP Provider Survey, 2013–2014 (N = 889)

	No.	Wt. Row %*	95% CI	Rao-Scott χ^2, P	PR	CI	P^\dagger	aPR	95% CI	P^\ddagger
Total	889	71.2	64.6 to 77.8							
Certification type				0.71						
ID board-certified MD	422	70.0	58.8 to 81.2							
Other board-certified MD	247	74.0	64.9 to 83.1							
Nurse practitioner	138	71.5	63.8 to 79.2							
Physician assistant	43	76.5	55.8 to 97.3							
Non-board-certified MD	35	58.6	40.5 to 76.7							
HIV specialist (HIV/MA criteria or AAHIV-S)				0.06						
Yes	659	74.4	67.5 to 81.4							
No	230	66.4	57.5 to 75.3							
Provides primary care				0.76						
Yes	803	70.9	63.2 to 78.5							
No	80	72.4	64.8 to 80.0							
HIV patients for whom you provide continuous and direct care				<0.0005						
20	51	47.3	34.3 to 60.3		0.60	0.44 to 0.80	0.0001	0.69	0.47 to 1.02	0.03
21–50	131	67.0	51.1 to 82.9		0.84	0.66 to 1.08	0.15	0.87	0.72 to 1.06	0.15
51–200	359	76.1	67.4 to 84.8		0.96	0.85 to 1.09	0.51	0.94	0.82 to 1.07	0.33
>200	333	79.3	72.6 to 86.1		Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Years caring for HIV patients				0.88						
0–10 yrs	312	70.9	60.4 to 81.4							
11–20 yrs	311	70.4	63.2 to 77.6							
>20	259	73.0	64.1 to 81.9							
Facility is Ryan White funded				<0.0001						
Yes	585	80.4	74.1 to 86.6		Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
No	224	61.7	50.6 to 72.9		0.77	0.64 to 0.92	0.002	0.85	0.74 to 0.98	0.02
Facility is a private practice				0.09						
Yes	207	65.9	54.3 to 77.5							
No	682	75.0	9.4 to 80.6							

TABLE 3

	No.	Wt. Row %*	95% CI	Rao-Scott χ^2, P	PR	CI	P^\ddagger	aPR	95% CI	P^\ddagger
Practice uses an electronic medical record				0.84						
Yes	565	71.3	64.7 to 77.9							
No	232	69.3	52.9 to 85.7							
Source of information on HIV care used in past year										
DHHS Antiretroviral Treatment Guidelines				0.29						
Yes	796	72.6	65.6 to 79.6							
No	93	64.3	49.2 to 70.5							
International Antiviral Society USA Antiretroviral Treatment of Adult HIV Infection Recommendations				0.24						
Yes	554	74.1	66.1 to 82.1							
No	335	68.0	59.3 to 76.7							
Medication provided by prescription drug plan is sufficient to meet patients' HIV treatment needs										
ADAP				0.28						
Agree	754	73.0	65.4 to 80.8							
Do not agree	64	61.9	41.9 to 81.9							
Medicare prescription drug plan				0.31						
Agree	581	73.0	65.4 to 80.2							
Do not agree	205	66.4	53.3 to 79.5							
Medicaid				0.06						
Agree	667	75.0	67.5 to 82.1							
Do not agree	136	63.9	51.2 to 76.5							
Commercial insurance				0.46						
Agree	539	71.0	61.8 to 79.5							
Do not agree	235	75.0	66.3 to 83.6							
Pharmaceutical industry drug assistance plans				<0.005						
Agree	397	78.0	71.6 to 84.3		Ref.			Ref.		
Do not agree	308	62.0	51.2 to 72.7		0.80	0.66 to 0.96	0.009	0.79	0.65 to 0.98	0.02

* Values exclude "don't know" responses.

† Obtained from pairwise comparisons, based on the average marginal predictions.

AAHIV-S, AAHIVM Practicing HIV Specialist; HIVMA, HIV Medicine Association; Wt., weighted.