Changing clinician practices and attitudes regarding use of antiretroviral therapy for HIV treatment and prevention: results from the HPTN 065 Study

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Abstract

As part of the HPTN065 study in the Bronx, New York and Washington, DC we surveyed clinicians to assess for shifts in their practices and attitudes around HIV treatment and prevention. ART-prescribing clinicians at 39 HIV care sites were offered an anonymous web-based survey at baseline (2010/2011) and at follow-up (2013). The 165 respondents at baseline and 141 respondents at follow-up had similar characteristics: almost 60% were female; median age was 47 years; two-thirds were physicians, and nearly 80% were HIV specialists. The percentage who reported recommending ART irrespective of CD4 cell count was higher at follow-up (15% vs. 68%), as was the percentage who would initiate ART earlier for patients having unprotected sex with partners of unknown HIV status (64% vs. 82%), and for those in HIV-discordant partnerships (75% vs. 87%). In-line with changing HIV treatment guidelines during 2010-2013, clinicians increasingly supported early ART for treatment and prevention.

Keywords

HIV prevention; early antiretroviral therapy; ART; test and treat; clinician survey

Introduction

There are over 1.2 million persons living with HIV[1,2] and approximately 50,000[3,4] new HIV infections annually in the United States (US), motivating efforts for expanding access to HIV care and prevention interventions[5] to achieve national strategy goals[6]. Based on recent scientific evidence regarding the benefits of antiretroviral therapy (ART)[7-9], there have been significant changes in US guidelines for use of ART for treatment of infection and for prevention of HIV transmission[10], as well as continued emphasis on routine opt-out HIV testing in clinical settings to increase timely HIV diagnosis[11]. Starting ART as soon as possible after HIV diagnosis, regardless of CD4 cell count, is now recommended as it reduces AIDS-related and non-AIDS related morbidity and mortality[10]. Virologic suppression also reduces the risk of HIV transmission from HIV-infected persons to their sexual and needle-sharing partners[8,12,13]. To describe and gauge potential shifts in the attitudes and practices of HIV care providers regarding HIV treatment and testing during the conduct of the HPTN 065 ('Test and Linkage to Care Plus Treat', or TLC-Plus)[14,15] study in the Bronx, NY and Washington, DC, we surveyed the ART-prescribing clinicians at participating sites twice and analyzed their responses in four key areas: assessment of sexual risk behaviors, initiation of ART, use of ART to prevent HIV transmission and routine HIV testing.

Methods

Study design and participants

The clinician survey was administered at baseline and follow-up as part of the HPTN 065 (TLC-Plus) study, which evaluated the feasibility of community-level expanded testing, linkage to care, and virologic suppression on ART, as a strategy for HIV prevention in the Bronx, NY and Washington, DC[14,15]. The baseline survey was conducted from September 2010 to May 2011 and a follow-up survey from May 2013 to December 2013. ART-prescribing clinicians at 39 participating HIV care sites were asked to complete an anonymous internet-based survey to assess attitudes and practices regarding ART use and other elements of the HIV 'test, link to care plus treat' interventions. Sites provided email addresses of all their ART-prescribing clinicians (i.e., physicians, nurse practitioners, physician assistants, residents and fellows). The same sites were included in both surveys, and select baseline results were described previously[15]. Clinicians received an introductory email with survey instructions and up to four automated email reminders during the next three weeks. Site Investigators were also asked to encourage staff to complete the survey. Clinicians confirmed their consent for participation online prior to answering any questions; no identifying information was collected. Clinicians who accessed (but did not necessarily complete) the survey received a $35 electronic gift certificate. The study protocol was approved by institutional review boards (IRB) prior to sites' participation. The protocol was

exempt from IRB review at the Centers for Disease Control and Prevention (CDC) because the CDC staff did not interact with study participants or handle identifiable data.

Data analysis

We assessed survey response rates, in aggregate and for each jurisdiction, at both baseline and follow-up. Baseline and follow-up survey results could not be linked by respondent, due to anonymous survey design. We summarized the characteristics of respondents and their clinical sites, as well as clinicians' attitudes and practices related to asking patients about HIV transmission behaviors, prescribing ART for treatment and prevention, and routine HIV testing. Unless otherwise indicated, survey items were collected on 4-point Likert scales and analyzed in four separate strata or grouped for analysis into either one of the two dichotomous variables, depending on the distribution of responses: (i) agree/strongly agree versus disagree/strongly disagree, or (ii) strongly agree versus all other responses. We used Wilcoxon two-sample test for continuous variables and the chi-square or Fisher's exact tests for categorical variables to assess for statistical differences in distribution of responses across the two surveys[16]. We first presented overall p-values for differences in distribution of disaggregated responses and then p-values for comparisons of select dichotomized variables. We could not account statistically for the correlation of survey responses for clinicians who completed the survey twice, and multiple comparisons may lead to type I error; therefore, in addition to statistical significance testing, our descriptive tables highlight in bold the categories of variables for which there was a meaningful shift in response of at least 10%.

Using follow-up survey data, we conducted univariate and multivariable logistic regression analyses[16] to explore factors associated with select key outcome variables of interest: prescribing ART for HIV-infected patients regardless of CD4 cell count, prescribing ART for prevention, and support for one-time testing and routine HIV testing in clinical settings. We evaluated the associations of several clinician-related variables (i.e., age, sex, race/ethnicity, occupation, number of years caring for HIV-infected patients) and type of HIV practice against the aforementioned outcomes. In multivariable logistic regression models we included all predictor variables from univariate analyses with chi-square p-values less than 0.20. The final multivariable models retained all variables regardless of statistical significance, except for either age or years caring for HIV-infected patients, whichever had a lower p-value, to avoid aberrant results due to multicollinearity.

Results

At baseline, 174 (60%) of 288 clinicians accessed the survey: 94 (53%) of 177 from the Bronx, NY and 80 (72%) of 111 from Washington, DC. At follow up, 150 (57%) of 264 clinicians accessed the survey: 88 (56%) of 156 from the Bronx and 62 (57%) of 108 from DC. Nine surveys were excluded from both baseline and follow-up analyses because no questions were answered, resulting in 165 baseline and 141 follow-up surveys for analyses. Fifty-three (38%) of 141 respondents indicated on follow-up survey that they had also participated in the baseline survey.

Clinician characteristics

In both surveys, almost 60% of respondents were female, the median age was 47 years, over 60% were white, two-thirds were physicians, and three-quarters reported caring for HIV-infected patients for >6 years (Table 1). Clinicians had a median of approximately 100 HIV-infected patients under their direct care and over half completed ART-related training in the past 3 months. Respondents at baseline and follow-up had a broadly similar patient mix, with almost 60% of patients being African American, about one-third women, and about one-third gay, bisexual or other men who have sex with men (MSM).

Transmission risk behaviors

There were no appreciable differences between baseline and follow-up survey in the percentages of ART-prescribing clinicians who indicated always asking their HIV-infected patients about sexual partners (49% vs. 53%, p = 0.44), sexual partners' HIV status (37% vs 46%, p = 0.16), or use of condoms (58% vs. 56%, p = 0.72), Table 2 (items 1-3).

Use of ART for treatment

The percentage of clinicians who reported recommending ART initiation "irrespective of CD4 cell count" was substantially lower at baseline when compared to follow-up survey data (15% vs. 68%, p < 0.001). Of note, the survey question phrasing and answer options were somewhat different at follow-up, as a result of changing recommendations on CD4 cell count threshold for ART initiation[10] (see Table 2, item 5 footnote). At follow-up, 50% of respondents recommended ART initiation in general at CD4 cell count > 500 cells/mm^3 (at baseline, this response option was not disaggregated). Consequently, in sum, at follow-up, a total of 76% of clinicians supported ART initiation either at CD4 cell count > 500 cells/mm^3 or irrespective of CD4 cell level. Compared with baseline findings, we noted at follow-up that markedly smaller percentage of clinicians agreed or strongly agreed with a concern that patients will develop ART-resistant viral strains (43% to 18%, p < 0.001) or will develop side-effects, toxicity, or complications when ART is initiated too early (48% to 21%, p < 0.001), Table 2 (items 8, 10).

Use of ART for prevention

When comparing baseline and follow-up results, markedly higher percentages of clinicians at follow-up reported support for earlier initiation of ART for multiple patient groups: for patients having unprotected sex with partners of unknown HIV status (64% vs. 82%, p<0.001), for those in HIV-discordant sexual partnerships (75% vs. 87%, p=0.009), and for those newly diagnosed with a sexually transmitted infection (40% to 65%, p<0.001) (Table 2, item 6). The percentage of clinicians who agreed or strongly agreed with the statement (item 12) "If a patient tells me that he or she is engaging in high-risk behaviors, I am more likely to recommend ART, irrespective of their CD4+ cell count" was 71% at baseline vs. 85% at follow-up (p <0.001). The percentage who agreed or strongly agreed with the statement (item 7) "Early initiation of ART can slow the spread of HIV in a community by making patients less infectious to others" was consistently high (95% to 97%, p<0.01). Clinicians estimated having initiated more patients on ART in the past year (item 20, a median of 10 at baseline vs. 20 at follow-up, p=0.04) and also reported initiating more

patients on ART "with the main goal of making it less likely that these patients would transmit HIV to their sexual partners" (item 21, median of zero vs. three patients, p<0.01). Of note, in the follow-up survey, 62% of clinicians strongly agreed and a further 29% agreed with this statement: "Because ART reduces the risk of HIV transmission, I routinely recommend ART to my HIV-infected patients" (Table 2, item 15).

Attitudes regarding HIV testing

HIV testing was offered at nearly all HIV care sites participating in HPTN 065, and almost 40% of respondents at both baseline and follow-up indicated that they personally administered HIV testing at the clinical sites where they worked (Table 3, item 1). The majority of respondents agreed or strongly agreed with a statement that "All persons in the United States should get tested for HIV at least once" (87% at baseline and 90% at follow-up, respectively, p = 0.37) and most also agreed or strongly agreed with routinely offering HIV testing in hospital emergency rooms (92% to 96%, respectively, p = 0.17) and for inpatients admissions (95% to 96%, p = 0.74) (Table 3, items 5-7). There were meaningful differences in the percentages of clinicians who agreed or strongly agreed that a person should be able to get an HIV test kit at a drug store without prescription to self-test for infection (61% to 77%, p < 0.001) or to ask their partners to test (56% to 76%, p < 0.001, items 8,9). On both surveys, about 97% of clinicians agreed or strongly agreed with a statement that "people who have unprotected sex or who use drugs should be offered an HIV test at least once per year" and over 93% agreed or strongly agreed with a statement that "people with an STI or TB should be tested for HIV no matter when their most recent HIV test was", items 10,11. In analyses restricted to clinicians who cared for any HIV-uninfected patients, 115 out of 124 (93%) at baseline vs. 106 out of 109 (97%) at follow-up reported offering HIV testing to all of their patients aged 13 - 64 years (p=0.20), consistent with prevailing CDC recommendations (item 12).

Clinician characteristics associated with select outcomes at follow-up

At follow-up, 68% of clinicians indicated that they would generally recommend that ART be initiated for all patients irrespective of CD4 cell count, and 88% strongly agreed that early ART can slow the spread of HIV in a community by making patients less infectious to others (Table 2). For both outcomes, the only univariate correlates (p<0.20) were younger age (positively associated) and years caring for HIV-infected patients (negatively associated). The only statistically significant result was that compared with clinicians aged > 49 years, those aged 40 years were more likely (OR, 1.3, 95% CI: 1.1-6.7) to prescribe ART regardless of CD4 cell count (clinicians aged 41-49 years were as likely as those aged > 49 years). At follow-up, 62% of clinicians strongly agreed with the statement that "Because ART reduces the risk of HIV transmission, I routinely recommend ART to my HIV-infected patients (29% agreed, and 6% disagreed/strongly disagreed, Table 2). In univariate analyses, younger age and fewer years caring for HIV-infected patients were significantly associated with strong agreement with this statement; in the multivariable analyses, only age 40 years vs. > 49 years was associated with strong agreement with routinely recommending starting ART to reduce HIV transmission risk (OR, 3.7, 95% CI: 1.2-11.3).

At follow-up, 74% of clinicians strongly agreed that "All persons in the US should get tested for HIV at least once"; 16% agreed with this statement and 7% disagreed. In univariate analyses, women and younger clinicians were more likely to strongly agree, whereas clinicians of "other" race/ethnicity (compared with white), and those caring for HIV-infected patients longer were less likely to strongly agree. In multivariable models, the only independent correlates, both of which were negatively associated with strong agreement with universal lifetime testing, were "other" race/ethnicity (OR, 0.1, 95% CI: 0.04 – 0.4) and longer years caring for HIV-infected patients (OR, 0.4, 95%: 0.2 -0.7). Similarly, strong agreement with offering HIV testing to all adults who go to the ER or to all adults admitted to the hospital (Table 3) was less frequent among older clinicians and those caring for HIV-infected patients longer. In multivariable analyses, ten additional years of caring for HIV-infected patients was associated with about 70% reduction in strong agreement with routine offering of HIV testing in the ER (OR, 0.3, 95% CI: 0.1-0.9), and about 50% reduction in strong agreement with routine offering of HIV testing to inpatients (OR, 0.5, 95% CI: 0.3-0.8).

Discussion

A follow-up survey of ART-prescribing clinicians found that, compared with baseline findings more than two years previously, a higher percentage of clinicians in the Bronx, NY and Washington, DC supported use of early ART for treatment and prevention, and that support for routine HIV testing in medical settings was consistently high. Respondents of the follow-up survey voiced more support for prescribing ART to HIV-infected patients irrespective of CD4 cell count, for patients reporting unprotected sex, and for those in an HIV-discordant relationship. These shifts in practices are consistent with: (i) the scientific evidence that emerged between baseline and follow-up surveys about the effectiveness of ART for reducing HIV transmission in discordant couples (the HPTN 052 results were published in July 2011)[8] and (ii) the updated DHHS HIV treatment guidelines (first released in February 2013) recommending ART initiation regardless of CD4 cell count based on individual clinical benefits in observational studies and START randomized clinical trial[9,10]. Early ART for treatment and prevention and routine HIV testing are critical to realizing the benefits of ART for individual health and reduction in HIV transmission[5].

Our follow-up results regarding the percentage of providers who reported prescribing ART regardless of CD4 cell count (68%) were similar to the analogous population-based results from the Medical Monitoring Project surveying HIV clinicians from June 2013 to January 2014 (71%),[17] and those from a regional survey among infectious disease physicians in late 2013 (69%)[18]. However, our result (68%) was lower than the estimate from the September 2014 survey of infectious disease physicians in the US and Canadian Emerging Infections Network (87%)[19]. The waning concerns about emergence of resistance and about side effects noted in our follow-up survey likely reflect accumulating evidence that newer ART regimens are more potent, better tolerated, and more forgiving of non-adherence,[10] thus resulting in fewer patients experiencing virologic failure[1,20] and developing antiretroviral drug resistance. These increasingly more effective ART regimens have contributed to improved life expectancy over time[21].

Most clinicians who completed the survey supported using ART for prevention at baseline in 2010/2011; the level of support was even higher among participants at follow-up survey. Their attitudes were also in line with the growing evidence from clinical trials and observational studies regarding reduced infectiousness with ART[8,12] and population-level epidemiologic and modeling studies (reviewed by Wilson)[22] which, to varying degree, suggest public health benefit of ART for limiting the continued spread of HIV in high- and low-income settings[13,23-26]. Although the practice of always asking HIV-infected patients about the HIV status of their sexual partners was also more common at follow-up than baseline, there was a substantial minority of clinicians (20 to 25%, depending on the survey question) that indicated they "never", "rarely" or only "occasionally" asked patients about sexual partners, partners' HIV status, and condom use. These results reinforce the need for continued efforts and structural interventions (e.g., computer prompts) with clinicians to enhance HIV prevention efforts with positive persons[5]. Ascertaining the HIV status of sexual partners by clinicians can open the door to discussions about not only the use of ART by the HIV-infected partner to reduce transmission risk, but also about the use of condoms, pre-exposure prophylaxis (PrEP) or post-exposure prophylaxis (PEP) by HIV-uninfected partners[27], to further limit HIV transmission in HIV-discordant partnerships[13,28,29].

In July 2013, during implementation of the study, the US Preventive Services Task Force released the recommendation that clinicians screen persons aged 15 to 65 years (younger adolescents and older adults who are at increased risk should also be screened) for HIV infection at least once, with at least annual re-screening of individuals at very high risk, such as sexually active MSM[11]. In our study, ART-prescribing clinicians expressed consistently high levels of support for routine HIV testing in clinical settings, including ERs and inpatient wards, both in the baseline and the follow-up survey. This enthusiasm, however, may not translate into hospital practice. In another component of HPTN 065, aimed at scale-up of HIV screening in ERs and inpatient settings at participating hospitals, the observed scale-up was modest over the 3-year study period and limited by institutional and logistical obstacles,[30] echoing findings from prior US-based studies[31]. Finally, use of commercially available HIV-test kits for self-testing or offering testing to partners was also favored by the majority of clinicians at baseline; support was even higher during follow-up, after the Food and Drug Administration (FDA) approved the first in-home HIV test in July of 2012. Acceptability and demand for such testing options was documented in prior studies in New York [32] and in a survey in Philadelphia[33] and may increase as more affordable and accurate HIV rapid test kits enter the market[34].

The study has notable strengths, including that it targeted a large panel of HIV providers in two urban areas with a high burden of HIV infection. These were providers from the 20 largest local HIV clinics (based on HIV surveillance data) per jurisdiction, representing the majority of HIV providers in each area. Our repeat survey permitted us to infer secular changes in attitudes, beliefs and practices in the same centers over a 2 year time span. The web-based, anonymous design was chosen to maximize participation and honest responses.

The findings from this research are also subject to some caveats. Despite repeat reminders, a nominal incentive for accessing the survey, and its anonymous design, the participation rates in our web-based survey were under 60%, thus response bias is possible. However, these

response rates are within the range reported for web-based clinician surveys[35]. Because of the survey design, we were unable to compare the characteristics of the respondents to non-respondents to assess how non-response may have affected our results; we also could not track changes in responses for the same individuals over time. We focused on highlighting meaningful (at least 10%) differences in survey responses, because statistical contrasts could not account for potential correlation in responses of repeat anonymous participants, and because approximately 5% of results could be statistically significant by chance alone due to multiple comparisons. Although survey response rate could be tracked for each jurisdiction (Bronx, NY vs. Washington, DC), we were unable to analyze results on both surveys by jurisdiction. Finally, clinicians surveyed were, on average, highly experienced and had sizable patient loads; thus our results may not be applicable to clinicians with lesser experience, or to those who treat few HIV patients.

In summary, we observed that ART-prescribing clinicians were increasingly supportive of offering ART to all HIV-infected patients and there was high and increasing enthusiasm for use of ART for prevention. Respondents also favored offering HIV testing in clinical settings and access for patients to self HIV testing. Our study findings can be used to inform continuing medical education for clinicians as well as to inform healthcare policies and institutional environments that maximize voluntary opt-out HIV screening, and enable prompt ART initiation with ongoing support for those diagnosed with HIV.

Acknowledgments

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Table 1

Characteristics of the clinicians surveyed in the Bronx and Washington DC, HPTN065, 2010-2013.

	Baseline (n=165)	Follow-up (n=141)	p-value
Age (years), median (Q1-Q3)	47 (38-54)	47 (37-55)	0.65
Mean (SD)	46.1 (10.2)	46.8 (11.1)	
Min, Max	28, 78	26, 81	
Gender, n (%)			
Male	59 (35.8)	57 (40.4)	0.52
Female	98 (59.4)	80 (56.7)	
Latino or of Hispanic ethnicity or origin, n (%)			
Yes	14 (8.5)	10 (7.1)	0.63
No	143 (86.7)	126 (89.4)	
Race, n (%)			
Asian	18 (10.9)	17 (12.1)	0.80
Black or African-American	17 (10.3)	18 (12.8)	0.54
White	109 (66.1)	87 (61.7)	0.28
Other (includes American Indian, Native Alaskan, Native Hawaiian, or Pacific Islander)	12 (7.3)	11 (7.8)	0.90
Site of medical practice, n (%)			
Private clinic	37 (22.4)	32 (22.7)	0.51
Public clinic	74 (44.8)	71 (50.4)	
Other	54 (32.7)	38 (27.0)	
Percentage of patients paid by Medicaid, median (Q1-Q3)	60 (30-80)	65 (40-80)	0.75
Mean Percentage (SD)	58.0 (63.2)	56.0 (29.8)	
Min, Max	0, 751	0, 100	
Current role in the care of HIV-infected patients, n (%)			
Primary care physician	53 (32.1)	36 (25.5)	0.51
Specialty physician	55 (33.3)	59 (41.8)	
Nurse practitioner	18 (10.9)	18 (12.8)	
Physician's assistant	22 (13.3)	15 (10.6)	
Other	16 (9.7)	13 (9.2)	
Percentage of medical practice consisting of HIV-infected patients, n (%)			
Did not answer	1 (0.6)	0 (0.0)	0.69
Under 25%	31 (18.8)	27 (19.1)	
25% - 49%	22 (13.3)	14 (9.9)	
50% - 74%	27 (16.4)	20 (14.2)	
75% - 100%	84 (51.0)	80 (56.7)	
Years caring for HIV-infected patients, median (Q1-Q3)	13 (6-20)	15 (6-22)	0.11
Mean (SD)	13.3 (8.3)	15.0 (9.4)	
Min, Max	0, 30	0, 33	
Number of HIV-infected patients under direct care, n (%), median (Q1-Q3)	95 (35-180)	105 (50-240)	0.05
Attended any ART training in the last 3 months, n (%)			

	Baseline (n=165)	Follow-up (n=141)	p-value
Yes	89/165 (53.9%)	82/141 (58.2%)	0.58
No	68/165 (41.2%)	55/141 (39.0%)	

Note: The timeframes were: baseline (9/2010-5/2011) and follow-up (5/2013-12/2013).

The percentages may not add up to 100% for certain variables due to missing (refused) responses.

[*] Race/ethnicity was collected by asking respondents to check "all that apply" categories.

Table 2

Clinicians' practices related to HIV prevention and treatment, HPTN065, 2010-2013.

	Baseline (n=165)	Follow-up (n=141)	P-value
1. How often do you ask about sexual partners?			
Always	80 (48.5%)	74 (52.5%)	0.44
Often	60 (36.4%)	41 (29.1%)	
Occasionally	18 (10.9%)	18 (12.8%)	
Rarely	3 (1.8%)	5 (3.5%)	
Never	0 (0.0%)	1 (0.7%)	
2. How often do you ask about sexual partners' HIV status?			
Always	61 (37.0%)	65 (46.1%)	0.16
Often	67 (40.6%)	41 (29.1%)	
Occasionally	25 (15.2%)	26 (18.4%)	
Rarely	8 (4.8%)	6 (4.3%)	
Never	0 (0.0%)	1 (0.7%)	
3. How often do you ask about use of condom?			
Always	95 (57.6%)	79 (56.0%)	0.72
Often	48 (29.1%)	38 (27.0%)	
Occasionally	16 (9.7%)	18 (12.8%)	
Rarely	2 (1.2%)	3 (2.1%)	
Never	0 (0.0%)	1 (0.7%)	
4. What percentage of your HIV-infected patients is currently on ART?			
Median (Q1-Q3)	85 (80-90)	90 (80-95)	<0.001
Mean Percentage (SD)	83.0 (11.1)	87.7 (13.7)	
Min, Max	30, 100	0, 100	
5 [*]. In which of the following scenarios would you generally recommend that ART be initiated for a typical HIV-infected patient? (Select all that apply)			
a. Patient with CD4+ count $\leq$ 200 cells/mm^3	**147 (89.1%)**	**95 (67.4%)**	<0.001
b. Patient with CD4+ count $\leq$ 350 cells/mm^3	**141 (85.5%)**	**95 (67.4%)**	<0.001
c. Patient with CD4+ count $\leq$ 500 cells/mm^3	92 (55.8%)	96 (68.1%)	0.03
d. Patient with CD4 count > 500 cells/mm^3	-/-(-%)	70 (49.6%)	NA
e. All patients irrespective of CD4+ cell count	**24 (14.5%)**	**96 (68.1%)**	<0.001
f. Patient on tuberculosis treatment irrespective of CD4+ cell count	107 (64.8%)	100 (70.9%)	0.31
g. Patient with chronic hepatitis B irrespective of CD4+ cell count	116 (70.3%)	113 (80.1%)	0.06
h. Patient with chronic hepatitis C irrespective of CD4+ cell count	**76 (46.1%)**	**101 (71.6%)**	<0.001
i. Patient with HIV associated nephropathy irrespective of CD4+cell count	138 (83.6%)	111 (78.7%)	0.18
j. Patient with HIV associated dementia irrespective of CD4+ cell count	142 (86.1%)	110 (78.0%)	0.03
k. Patient who is pregnant irrespective of CD4+ cell count	**152 (92.1%)**	**113 (80.1%)**	<0.001
l. Other	20 (12.1%)	7 (5.0%)	0.03
6. Which of the following factors would lead you to initiate ART earlier than you would otherwise? (Select all that apply)			
a. Patients with high viral load (> 100,000 copies/mm^3)	129 (78.2%)	109 (77.3%)	0.72
b. Patients with rapidly declining CD4+ cell count (>100 cells/mm^3 per year)	155 (93.9%)	122 (86.5%)	0.006

	Baseline (n=165)	Follow-up (n=141)	P-value
c. Patients in an HIV discordant sexual partnership	**124 (75.2%)**	**123 (87.2%)**	0.009
d. Patient newly diagnosed with a sexually transmitted infection	**66 (40.0%)**	**91 (64.5%)**	<0.001
e. Patients having unprotected sex with partner(s) of unknown HIV status	**105 (63.6%)**	**115 (81.6%)**	<0.001
f. Other	13 (7.9%)	15 (10.6%)	0.42
7. Early initiation of ART can slow the spread of HIV in a community by making patients less infectious to others			
Strongly agree	**107 (64.8%)**	**124 (87.9%)**	<0.001
Agree	**49 (29.7%)**	**13 (9.2%)**	
Disagree	4 (2.4%)	0 (0.0%)	
Strongly disagree	0 (0.0%)	0 (0.0%)	
8. I am concerned that a patient will develop a resistant virus if ART is initiated too early.			
Strongly agree	7 (4.2%)	2 (1.4%)	<0.001
Agree	**65 (39.4%)**	**24 (17.0%)**	
Disagree	**67 (40.6%)**	**76 (53.9%)**	
Strongly disagree	**21 (12.7%)**	**35 (24.8%)**	
9. If I start ART early in a patient with high risk sexual or other risk behaviors he or she may transmit resistant virus to his or her partners.			
Strongly agree	2 (1.2%)	2 (1.4%)	0.007
Agree	**47 (28.5%)**	**20 (14.2%)**	
Disagree	90 (54.5%)	84 (59.6%)	
Strongly disagree	21 (12.7%)	31 (22.0%)	
10. I am concerned that patients will develop side effects, toxicity or long term complications if ART is initiated too early.			
Strongly agree	7 (4.2%)	1 (0.7%)	<0.001
Agree	**73 (44.2%)**	**28 (19.9%)**	
Disagree	**71 (43.0%)**	**84 (59.6%)**	
Strongly disagree	**9 (5.5%)**	**24 (17.0%)**	
11. I take into account my patient's sexual and other HIV transmission behavior when I recommend ART.			
Strongly agree	38 (23.0%)	34 (24.1%)	0.08
Agree	95 (57.6%)	70 (49.6%)	
Disagree	25 (15.2%)	24 (17.0%)	
Strongly disagree	2 (1.2%)	9 (6.4%)	
12. If a patient tells me that he or she is engaging in high risk behaviors, I am more likely to recommend initiating ART, irrespective of their CD4+ count.			
Strongly agree	**38 (23.0%)**	**58 (41.1%)**	<0.001
Agree	79 (47.9%)	62 (44.0%)	
Disagree	**41 (24.8%)**	**14 (9.9%)**	
Strongly disagree	2 (1.2%)	3 (2.1%)	
13. I tend to defer ART if a patient is not sure whether he or she is ready to initiate it.			
Strongly agree	**67 (40.6%)**	**35 (24.8%)**	0.02
Agree	**84 (50.9%)**	**91 (64.5%)**	
Disagree	7 (4.2%)	10 (7.1%)	
Strongly disagree	2 (1.2%)	1 (0.7%)	

	Baseline (n=165)	Follow-up (n=141)	P-value
14. Because of concerns about a patient's inability to pay for ART, I tend to defer ART until a patient's CD4+ count is below 350.			
Strongly agree	1 (0.6%)	0 (0.0%)	0.02
Agree	11 (6.7%)	2 (1.4%)	
Disagree	62 (37.6%)	43 (30.5%)	
Strongly disagree	**86 (52.1%)**	**92 (65.2%)**	
15. Because ART reduces the risk of HIV transmission, I routinely recommend ART to my HIV-infected patients.			
Strongly agree	-/-(-%)	87 (61.7%)	N/A
Agree	-/-(-%)	41 (29.1%)	
Disagree	-/-(-%)	8 (5.7%)	
Strongly disagree	-/-(-%)	1 (0.7%)	
16. Please estimate the number of patients you yourself have initiated on ART in the past year			
Median (Q1-Q3)	10 (5-30)	20 (8-36)	0.04
Mean (SD)	25.9 (50.3)	23.6 (21.0)	
Min, Max	0, 500	0, 100	
17. Please estimate for how many of these patients you initiated on ART with the main goal of making it less likely that they would pass on HIV to their partners?			
Median (Q1-Q3)	0 (0-3)	3 (0-8)	<0.001
Mean (SD)	5.1 (18.4)	8.8 (15.8)	
Min, Max	0, 200	0, 100	

Note: The timeframes were: baseline (9/2010-5/2011) and follow-up (5/2013-12/2013).

The percentages may not add up to 100% for certain variables due to missing (refused) responses.

[*] At baseline, this question was phrased: "In which of the following scenarios would you recommend that ART be initiated for HIV-infected patients in any circumstance?" and there was no option d.

Table 3

Clinicians' practices and attitudes related to HIV testing, HPTN065, 2011-2013.

	Baseline (n=165)	Follow-up (n=141)	p-value
1. I personally administer HIV testing at the clinical care sites where I work.			
Yes	64 (38.8%)	55 (39.0%)	0.47
No	89 (53.9%)	71 (50.4%)	
Not Applicable	7 (4.2%)	10 (7.1%)	
Don't know	0 (0.0%)	1 (0.7%)	
2. HIV testing is currently offered at the clinical care sites where I work.			
Yes	157 (95.2%)	132 (93.6%)	0.63
No	2 (1.2%)	3 (2.1%)	
Not Applicable	1 (0.6%)	2 (1.4%)	
Don't know	0 (0.0%)	0 (0.0%)	
3. I refer patients outside of my clinic for HIV testing.			
Yes	10 (6.1%)	13 (9.2%)	0.31
No	141 (85.5%)	112 (79.4%)	
Not Applicable	9 (5.5%)	12 (8.5%)	
Don't know	0 (0.0%)	0 (0.0%)	
4. I only see patients after they have tested positive for HIV.			
Yes	47 (28.5%)	38 (27.0%)	0.83
No	107 (64.8%)	94 (66.7%)	
Not Applicable	6 (3.6%)	4 (2.8%)	
Don't know	0 (0.0%)	1 (0.7%)	
5. All persons in the US should get tested for HIV at least once.			
Strongly agree	109 (66.1%)	104 (73.8%)	0.37
Agree	34 (20.6%)	23 (16.3%)	
Disagree	15 (9.1%)	10 (7.1%)	
Strongly disagree	2 (1.2%)	0 (0.0%)	
6. HIV testing should be offered to all adults who go to an Emergency Room.			
Strongly agree	120 (72.7%)	108 (76.6%)	0.17
Agree	32 (19.4%)	27 (19.1%)	
Disagree	7 (4.2%)	1 (0.7%)	
Strongly disagree	1 (0.6%)	0 (0.0%)	
7. HIV testing should be offered to all adults admitted to the hospital.			
Strongly agree	121 (73.3%)	110 (78.0%)	0.74
Agree	35 (21.2%)	25 (17.7%)	
Disagree	3 (1.8%)	2 (1.4%)	
Strongly disagree	1 (0.6%)	0 (0.0%)	
8. People should be able to get HIV testing kits at a drug store without a doctor's prescription so they can test themselves for HIV.			
Strongly agree	**33 (20.0%)**	**63 (44.7%)**	<0.001
Agree	67 (40.6%)	45 (31.9%)	
Disagree	46 (27.9%)	25 (17.7%)	

	Baseline (n=165)	Follow-up (n=141)	p-value
Strongly disagree	14 (8.5%)	4 (2.8%)	
9. People should be able to get HIV testing kits at a drug store without a doctor's prescription so they can ask their partners to test for HIV.			
Strongly agree	31 (18.8%)	57 (40.4%)	<0.001
Agree	61 (37.0%)	50 (35.5%)	
Disagree	49 (29.7%)	25 (17.7%)	
Strongly disagree	19 (11.5%)	5 (3.5%)	
10. People who have unprotected sex or who use drugs should be offered an HIV test at least once a year.			
Strongly agree	142 (86.1%)	122 (86.5%)	1.00
Agree	18 (10.9%)	15 (10.6%)	
Disagree	0 (0.0%)	0 (0.0%)	
Strongly disagree	0 (0.0%)	0 (0.0%)	
11. People with an STI or TB should be tested for HIV no matter when their most recent HIV test was.			
Strongly agree	134 (81.2%)	116 (82.3%)	0.48
Agree	20 (12.1%)	19 (13.5%)	
Disagree	6 (3.6%)	2 (1.4%)	
Strongly disagree	0 (0.0%)	0 (0.0%)	
12. The CDC recently recommended HIV testing in health care settings for all patients 13 to 64 years of age. Do you offer HIV testing to your patients?			
Yes, to all my patients 13 to 64 years of age	115 (69.7%)	106 (75.2%)	0.28
Yes, but only to patients who engage in high-risk behaviors	5 (3.0%)	0 (0.0%)	
No, but I plan to start offering HIV testing for all my patients 13 to 64 yrs	2 (1.2%)	1 (0.7%)	
No, I do not think HIV testing is necessary for all my patients 13 to 64 yrs	2 (1.2%)	2 (1.4%)	
Not Applicable, as I only see patients living with HIV/AIDS	36 (21.8%)	28 (19.9%)	

Note: The timeframes were: baseline (9/2010-5/2011) and follow-up (5/2013-12/2013).

The percentages may not add up to 100% for certain variables due to missing (refused) responses.