



Limited Knowledge and Lack of Screening for Acute HIV Infection at Primary Care Clinics in High-Prevalence Communities of New York City

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Abstract

Diagnosis and treatment of acute HIV infection (AHI) is crucial for ending the HIV epidemic. Individuals with AHI, who have high viral loads and often are unaware of their infection, are more likely to transmit HIV to others than those with chronic infection. In preparation for an educational intervention on AHI in primary health care settings in high HIV-prevalence areas of New York City, 22 clinic directors, 313 clinic providers, and 220 patients were surveyed on their knowledge and awareness of the topic from 2012–2015. Basic HIV knowledge was high among all groups while knowledge of AHI was partial among providers and virtually absent among patients. Inadequate knowledge about this crucial phase of HIV may be impeding timely identification of cases in the primary care setting.

Keywords Acute HIV infection · Primary care · Healthcare providers · Knowledge and screening

Resumen

El diagnóstico y tratamiento de la infección aguda para el VIH (AHI por sus siglas en inglés) es crucial para detener la epidemia del VIH. Las personas con AHI, quienes tienen cargas virales altas y a menudo desconocen de su infección, son más propensas a transmitir el VIH a otras personas que aquellas con una infección crónica. En preparación para una intervención educativa sobre la AHI en clínicas de cuidado de salud primaria, localizadas en áreas de alta prevalencia para el VIH de la ciudad de Nueva York, 22 directores de clínicas, 313 proveedores de salud, y 220 pacientes fueron encuestados sobre su conocimiento de la AHI del 2012 al 2015. Todos los grupos demostraron alto conocimiento básico acerca del VIH. Sin embargo, los proveedores de salud demostraron conocimiento parcial acerca de la AHI, mientras que los pacientes prácticamente desconocían sobre la AHI. El conocimiento inadecuado sobre esta fase crucial del VIH puede impedir la identificación oportuna de casos de AHI en sectores de la salud primaria.

Introduction

Although public health systems dedicate considerable resources to screening and testing for HIV, attention to the acute infection phase of HIV (AHI) may be inadequate. Because HIV viral load usually spikes to very high levels during the initial weeks after infection, individuals in the acute phase are estimated to be up to 26 times more likely to transmit HIV to a partner than those in the later stages of chronic infection [1]. Estimates of the percentage of new infections attributable to transmission during AHI range from 8.6 to 35% [2–8]. AHI has been termed a “significant” [1] and “disproportionate” [9] source of onward transmission, a consensus that is supported by biological data [10].

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Since many individuals are unaware of their infection during AHI, strategies to improve AHI diagnosis could have a significant impact on HIV incidence [9, 11]. Interrupting the chain of infection during AHI, especially in communities with a high HIV prevalence, is of public health importance since individuals with AHI diagnosed and treated promptly are far less likely to transmit HIV [12]. An estimated 30% of new infections in the U.S. come from persons unaware they have HIV [13].

Awareness of AHI symptomology is generally low, even among populations attuned to HIV risk and HIV prevention [14, 15]. Therefore, even knowledgeable individuals who are tested frequently may miss the physical signs of an acute infection in the crucial weeks during which they are most likely to transmit HIV to others. Additionally, identifying AHI is beneficial for the newly infected individual given strong evidence that persons initiating antiretroviral therapy (ART) soon after infection are likely to have better long-term health outcomes [16–18].

In the United States, the Centers for Disease Control and Prevention (CDC) recommend routine or universal HIV antibody testing embedded in all medical settings [19], but there are limitations. Most (but not all) newly infected persons will develop HIV antibodies between 3 and 12 weeks; therefore, standard HIV antibody testing may not detect many AHI cases in the first few weeks after infection [20]. Although the newer combination antigen and antibody tests may detect infection in as soon as 13 days, and most, but not all infections, within 42 days, the CDC recommends that a non-reactive laboratory-based antigen/antibody result within 45 days after a possible HIV exposure should be followed-up with an additional test. New York State clinical guidelines recommend “always” screening for AHI with an HIV RNA assay if recent exposure is suspected and symptoms of AHI are present [21]. However, the rigor with which providers adhere to these guidelines is not known. It is critical to the successful implementation of this recommendation to determine the level of patient and provider understanding of the guidelines and to assess provider attitudes and challenges to implementing them.

Primary and urgent care clinics are logical places to identify HIV infections in the acute phase since between 50 and 90% of people infected with HIV experience some flu-like symptoms shortly after the time of infection, most typically fever and rash but also headache, muscle and joint pain, or swollen lymph nodes [22–24]. Patients seeking medical care because of these symptoms are often misdiagnosed [25], even among populations known to be at high risk for HIV [26, 27].

We assessed provider awareness of AHI symptoms and attitudes toward implementing clinical guidelines for AHI screening in primary and urgent care medical settings in high HIV-prevalence communities of New York City (NYC).

Moreover, we compared levels of knowledge and attitudes between clinical (prescribers) and non-clinical (non-prescribers) providers. Further, we assessed AHI-related knowledge among the patients of the participating clinics.

Methods

Recruitment

Clinics were recruited from 2012 to 2015 as part of a randomized controlled trial designed to assess two arms of an AHI training intervention. An initial list of not-for-profit healthcare facilities was compiled and provided to us by the New York State Department of Health’s AIDS Institute. Study staff visited the clinics to meet with the clinic directors to advertise the study and assess interest in joining.

A total of 92 primary and urgent care sites were invited to enroll their facilities in the study. Facilities that were approached were in high HIV-prevalence zip codes of northern Manhattan and The Bronx, New York. Data from the New York City Department of Health and Mental Hygiene’s HIV surveillance reports were used to identify zip codes with an HIV prevalence equal to or more than 2% of all adults. Sites were excluded if they primarily offered specialized care (e.g., pediatric patients, antenatal care, etc.) given their specialized approach to routine HIV testing. From a final pool of 77 sites, 22 agreed to enroll. Those declining to participate cited time pressures on providers, incompatibility of the proposed screening procedure with newly established electronic medical records systems, perceived low HIV incidence among the clinic population, or other institutional barriers.

Cross-Sectional Survey

Clinic directors answered a 20-min survey and furnished a comprehensive list of all providers employed in the clinic, and who had regular patient interaction. These providers subsequently were surveyed during their routine staff meetings, morning huddles, lunch breaks or after clinic hours to ensure a 100% completion rate within each clinic. Further, at each site ten randomly selected patients aged 18 or older were invited to anonymously answer a survey on HIV and AHI knowledge. No personal identifying information was collected.

Providers included clinical providers (hereby labelled prescribers, i.e., physicians, physicians’ assistants, and nurse practitioners) and non-clinical providers (hereby labelled non-prescribers, i.e., social workers, HIV test counselors, medical assistants, nurses, and case managers). Patient respondents were persons who were either awaiting or had just received clinical care at the site. All study procedures

were approved by the Institutional Review Board of the New York State Psychiatric Institute and Columbia University.

Measures

Assessments were developed by the research team to highlight the dynamic interactions among the clinics' social environment, the providers who work in these settings, and the patients served, based on the predisposing, enabling and reinforcing factors that influence behavior [28], including knowledge and awareness, attitudes, and skills.

AHI/HIV Infection Knowledge

We used an 11-item true and false questionnaire to assess HIV testing (sub-scale of 5-items) and AHI knowledge (sub-scale of 6-items) among clinic directors ($n=22$) and providers ($n=313$). The items elicited information on HIV transmission, NYS HIV and AHI testing, and AHI symptom knowledge. A categorical scale with three levels of responses (true, false, not sure) was used. Example items included "Under the amended 2010 NYS HIV testing law, oral (versus written) consent for HIV testing is sometimes acceptable" (true), and "Coughing, sneezing, and runny nose may indicate acute HIV infection" (false). A 7-item true and false questionnaire was used to assess AHI knowledge among clinic patients ($n=220$). These items elicited information on symptoms and transmission during AHI, for example "Viral load is lowest during acute HIV infection" (false). In addition, patients were asked if they had heard the term "acute HIV infection" and what they understood it to mean. Finally, each correct answer was scored as 1, summed and averaged to obtain a total and mean knowledge score based on the total number of questions in the questionnaire.

HIV/AHI Screening and Testing Attitudes

Attitudes toward screening and testing for AHI were assessed using a 15-item scale that measured intent and prioritization of AHI testing in their practice. Prescribing and non-prescribing providers were asked to rate their attitudes, on a 6-point Likert-scale (1, Strongly disagree, to 6, Strongly agree), about their own comfort with HIV/AHI screening and testing, including discussion of risk behaviors, and the relative priority they and their sites placed on these issues. Example items included "I am unsure about referral procedures for HIV-positive patients" and "I intend to ensure that all patients I see who want to be tested for HIV are screened for recent flu-like symptoms". Scores were summed and averaged to obtain mean attitude score per each scale item.

Clinic HIV Testing, Training Priorities and Training History

Clinic directors were asked questions regarding clinic organizational structure (including services, resources, infrastructure, priorities, and policies), questions regarding their patient and staff characteristics, as well as questions regarding training history, and clinic HIV testing practices. Further, providers were asked questions about their role and length of service at the facility, prior HIV-related trainings, current clinic testing practices, and they were asked to report the number of recent HIV and AHI diagnoses.

Statistical Analysis

We used SAS 9.4 for data analysis. Descriptive statistics included mean and standard deviation (SD) for continuous variables, and count (n) and percentage (%) for categorical and binary variables. We performed comparisons between prescribers and non-prescribers adjusting for clustering (i.e., clinics). PROC SURVEYFREQ was used for categorical and binary variables. PROC SURVEYREG and LMEANS were used to analyze continuous variables. Statistical significance was determined on a 95% confidence level (P -values < 0.05).

Results

Twenty primary care clinics (PCC) and two urgent care centers (UCC) in The Bronx ($n=16$) and Manhattan ($n=6$) were enrolled in the study from 2012 to 2015 (23.9% of all PCCs and UCCs in the target areas). Sites were either ambulatory care centers affiliated with major hospitals ($n=12$) or part of primary care networks ($n=10$). All the catchment areas for the clinics were in zip codes reporting high or moderately high HIV prevalence (near or surpassing 2 percent of all adults). Ten of the 22 sites were defined as large (> 300 patients per week), and two were categorized as having a high burden of HIV care ($> 5\%$ of patients were HIV-positive). Nearly all site directors (95%) reported at least one new HIV diagnosis per month; three (13.6%) reported six or more new cases monthly.

Clinic Directors

Twenty-two clinic directors (100%) replied to a baseline survey. Table 1 includes descriptive statistics of clinic directors and providers. Clinic directors had an average of 6.25 (SD = 6.00) years of service at their site (median = 4.50, range 0–17 years). Seventeen of the 22 clinic directors reported having an "extensive" formal HIV testing policy in place in their clinic; and 10 reported training of new staff on it. However, only one site reported having a policy on AHI screening and testing. Two directors reported that "most" of

Table 1 Descriptive statistics of clinic directors and providers

| | Directors (n=22) n (%) | Prescriber (n=154) n (%) | Non-prescriber (n=159) n (%) |
|---|---------------------------|-----------------------------|---------------------------------|
| Education | | | |
| High School or less | – | 1 (0.7) | 14 (9.0) |
| Some College | 5 (22.7) | 0 (0) | 66 (42.6) |
| Bachelor's degree | 1 (4.5) | 19 (12.6) | 41 (26.5) |
| Master's degree | 6 (27.3) | 34 (22.5) | 25 (16.1) |
| PhD/MD | 10 (45.5) | 88 (58.3) | 2 (1.3) |
| Other | – | 9 (6.0) | 7 (4.5) |
| Professional discipline | | | |
| Physician | 10 (45.5) | 86 (55.8) | – |
| Nurse practitioner | 1 (4.5) | 30 (19.5) | – |
| Physician's Assistant | 1 (4.5) | 30 (19.5) | – |
| Other | 7 (31.8) | 8 (5.2) | – |
| Nurse | 2 (9.1) | – | 48 (31.2) |
| Clinic support staff | – | – | 13 (8.4) |
| Medical assistant | – | – | 31 (20.1) |
| Social worker/case manager/other | 1 (4.5) | – | 24 (15.6) |
| Other | – | – | 38 (24.7) |
| Length of service | | | |
| 5 years or more of service | 10 (45.5) | 61 (40.9) | 58 (38.7) |
| Less than a year of service | 2 (9.1) | 34 (22.8) | 24 (16.0) |
| Length of service, median | 4.5 [Range 0–17] | 3.5 [Range 0–31] | 3 [Range 0–25] |
| HIV and AHI training | | | |
| Clinic has an extensive formal HIV testing policy | 17 (77.3) | – | – |
| Clinic has an extensive formal AHI testing policy | 1 (4.5) | – | – |
| HIV Testing is a high priority in my clinic | 15 (68.2) | – | – |
| Training on the NYS testing law is very important | 14 (63.6) | – | – |
| Received prior training on the 2010 NYS Testing law | 10 (45.5) | 84 (56.4) | 64 (42.2) |
| Received prior AHI training | 8 (26.7) | 53 (35.1) | 51 (33.3) |

Numbers vary due to missing data

their clinicians had been trained on AHI while three directors said that they routinely trained newly hired staff on AHI.

Providers

A total of 313 individuals from 22 clinics answered the survey, 154 of them were prescribing providers, mostly physicians (55.8%) along with physician's assistants (19.5%) and nurse practitioners (19.5%); and 159 were non-prescribing providers, including nurses (31.2%), medical assistants (20.1%), and social workers/case managers (15.6%).

AHI/HIV Infection Knowledge

Directors

Clinic directors scored high on overall knowledge (Mean = 7.27 correct answers out of 11 items, SD = 1.78,

Range: 3, 10). Nonetheless, they scored lower on the AHI-specific knowledge items (Mean = 3.45 correct answers out of 6 items, SD = 1.10, Range: 1, 5). Only 32% knew when AHI symptoms manifest, and half misidentified these symptoms. By contrast 86% knew that HIV transmission is more likely during the acute phase (data not shown).

Providers

Table 2 displays a comparison of prescribing and non-prescribing providers' HIV/AHI knowledge and a comparison between prescribing and non-prescribing providers. Prescribing providers had fair overall knowledge of the NYS HIV testing law when compared to non-prescribing providers (Mean = 3.13 vs. 2.88, *t* test = 1.896, *p*-val = 0.06). Further, there was a statistically significant difference between prescribers and non-prescribers AHI knowledge (Mean = 3.59 vs. 3.13, *t*-test = 2.97, *p*-val = 0.003).

Table 2 Comparison of prescribing and non-prescribing providers' HIV and AHI knowledge

| | Prescriber (n = 154) n (%) | Non-prescriber (n = 159) n (%) | χ^2 * | p Value** |
|--|-------------------------------|--------------------------------------|------------|-----------|
| Under the 2010 NYS HIV testing law, oral (vs. written) consent for HIV testing is sometimes acceptable. (T) | | | | |
| True | 111 (73.0) | 83 (55.0) | 12.68 | <0.001 |
| False | 28 (18.4) | 38 (25.2) | | |
| Not sure | 13 (8.6) | 30 (19.9) | | |
| A negative antibody result with positive viral load indicates an acute HIV infection. (T) | | | | |
| True | 120 (81.6) | 81 (55.1) | 27.50 | <0.001 |
| False | 14 (9.5) | 23 (15.7) | | |
| Not sure | 13 (8.8) | 43 (29.3) | | |
| AHI symptoms usually occur within 48 h after exposure. (F) | | | | |
| True | 32 (21.5) | 26 (17.2) | 3.92 | 0.152 |
| False | 85 (57.1) | 78 (51.7) | | |
| Not sure | 32 (21.5) | 47 (31.1) | | |
| Rash, candidiasis, fever, and swollen lymph nodes may indicate acute HIV infection. (T) | | | | |
| True | 118 (78.2) | 115 (76.7) | 14.64 | 0.001 |
| False | 27 (17.9) | 13 (8.7) | | |
| Not sure | 6 (4.0) | 22 (14.7) | | |
| Coughing, sneezing, and runny nose may indicate acute HIV infection. (F) | | | | |
| True | 82 (55.0) | 37 (24.2) | 31.23 | <0.001 |
| False | 54 (36.2) | 92 (60.1) | | |
| Not sure | 13 (8.7) | 24 (15.7) | | |
| Testing for AHI should be conducted regardless of recent risky sex or drug use. (F) | | | | |
| True | 100 (65.8) | 111 (74.0) | 5.44 | 0.12 |
| False | 37 (24.3) | 21 (14.0) | | |
| Not sure | 15 (9.9) | 18 (12.0) | | |
| Under the 2010 NYS HIV testing law, only patients aged 18–50 must be offered an HIV test. (F) | | | | |
| True | 9 (5.9) | 20 (13.07) | 4.83 | 0.07 |
| False | 123 (80.9) | 112 (73.2) | | |
| Not sure | 20 (13.2) | 21 (13.7) | | |
| When an HIV test is positive, providers are responsible for eliciting information on potentially infected sexual or needle-sharing partners. (T) | | | | |
| True | 97 (64.7) | 118 (77.6) | 8.59 | 0.007 |
| False | 32 (21.3) | 15 (9.9) | | |
| Not sure | 21 (1.0) | 19 (12.5) | | |
| According to the 2010 NYS HIV testing law, patients must be offered an HIV test annually. (F) | | | | |
| True | 103 (69.1) | 111 (75.0) | 2.62 | 0.44 |
| False | 23 (15.4) | 14 (9.5) | | |
| Not sure | 23 (15.4) | 23 (15.5) | | |
| It is easier to transmit HIV during the acute infection phase. (T) | | | | |
| True | 131 (86.2) | 98 (64.9) | 20.73 | <0.001 |
| False | 8 (5.3) | 12 (8.0) | | |
| Not sure | 13 (8.6) | 41 (27.2) | | |
| A provider must make an appointment for HIV care for patients with confirmed HIV infection. (T) | | | | |

Table 2 (continued)

| | Prescriber (n = 154) | Non-prescriber (n = 159) | χ^2 * | p Value** |
|---------------------|----------------------|--------------------------|----------------|-----------|
| | n (%) | n (%) | | |
| True | 121 (79.6) | 120 (79.0) | 0.51 | 0.712 |
| False | 10 (6.6) | 13 (8.6) | | |
| Not sure | 21 (13.8) | 19 (12.5) | | |
| Mean HIV Score (SD) | 3.13 (1.1) | 2.88 (1.2) | t-test = 1.896 | 0.06 |
| Mean AHI Score (SD) | 3.5 (1.26) | 3.13 (1.4) | t-test = 2.97 | 0.003 |

*Degrees of freedom [2]

**Chi square statistic adjusted for clustering effect (i.e., clinics); Note: numbers may vary due to missing data

Overall, prescribing providers displayed more knowledge about AHI than non-prescribers, and more often knew that patients in the acute phase could transmit HIV more easily (86.2% vs. 64.9%, Chi square = 20.73, p-val < 0.001). Slightly over half of both prescribers and non-prescribers had accurate knowledge of the timing of the appearance of AHI symptoms following HIV infection (57.1% vs. 51.7%, Chi square = 3.92, p-val = 0.152). Twenty-seven (17.4%) non-prescribers and 10 (6.6%) prescribers answered “not sure” to at least half of all AHI knowledge questions.

Patients

Nearly all patients (n = 217, 89.7%) had some knowledge of HIV while only 49 (20.3%) had ever heard of AHI. Further, basic HIV knowledge was high among clinic patients (Mean = 5.56, SD = 1.3, data not shown); in contrast, there was low levels of AHI (Mean = 2.09, SD = 1.52). Most patients answered incorrectly or “not sure” to questions about elevated viral loads (87.6%), ease of transmission during the acute phase (51.4%), and that a regular HIV antibody test will not detect the virus during the acute phase (88.1%). Further, close to half (41%) of participants did not know that flu-like symptoms could be indicative of an early HIV infection (Table 3).

As with providers, patient interpretation of the term “acute HIV infection” varied widely. When asked what they understood AHI to mean, many interpreted it to mean the end stage of the disease characterized by generalized failure of the immune system. Thirty-four patients (15.5%) reported having close relatives, romantic partners or friends who currently lived with HIV, or who had died from HIV-related causes. A statement that reflecting the known high prevalence in the communities served.

Attitudes

Table 4 presents provider attitudes towards HIV and AHI testing and comparisons between provider type. Opinions between the two groups diverged on whether HIV counseling and testing should be performed by staff with specialized training: non-prescribers largely agreed with this recommendation (Mean rating = 4.72, SD = 1.66) while prescribers tended to disagree (Mean rating = 2.82, SD = 1.82, t-test = 7.546, p-val < 0.001). Moreover, prescribers and non-prescribers expressed agreement (Mean rating = 4.66, SD = 1.81; Mean rating = 4.92, SD = 1.43, respectively) in their comfort with discussing sex- and drug-related risk with young adolescent patients in their clinics.

Notably, there was a statistically significant difference between prescribers (Mean rating = 4.46, SD = 1.32) and non-prescribers (Mean rating = 3.95, SD = 1.49, t-test = -3.184, P-val = 0.005) intention to screen patients who present with flu-like symptoms for recent HIV risk behavior. Further, while providers generally had high agreement in their intention to offer HIV testing at least once while delivering primary care services, prescribing providers had a statistically significant higher intention to offer testing (Mean rating = 5.34, SD = 1.11) when compared to non-prescribers (Mean rating = 4.49, SD = 1.49, t-test = -5.74, p-val < 0.001). Further, non-prescribing providers felt that they were not skilled at delivering a positive HIV test result to a patient (Mean rating = 3.93, SD = 1.97) when compared to prescribing providers (Mean rating = 2.48, SD = 1.55, t-test = 4.977, p-val < 0.001).

Clinic HIV Testing, Training Priorities and Training History

Most clinic directors (68.2%) reported that they gave HIV testing a “high” priority; two-thirds rated training on NYS HIV testing and screening laws as “very important”

Table 3 Patient knowledge of AHI

| | Patients (n = 220) N (%) |
|--|-----------------------------|
| Acute HIV infection is the second stage of HIV infection. (F) | |
| True | 40 (19) |
| False | 45 (21.4) |
| Not sure | 125 (59.5) |
| The body makes HIV antibodies after acute HIV infection. (T) | |
| True | 53 (25.2) |
| False | 33 (15.7) |
| Not sure | 124 (59) |
| Viral load is lowest during acute HIV infection. (F) | |
| True | 58 (27.6) |
| False | 26 (12.4) |
| Not sure | 126 (60) |
| Most people have some symptoms during acute HIV infection (T) | |
| True | 124 (59) |
| False | 18 (8.6) |
| Not sure | 68 (32.4) |
| It is easier to transmit HIV during acute HIV infection. (T) | |
| True | 102 (48.6) |
| False | 16 (7.6) |
| Not sure | 92 (43.8) |
| Acute HIV infection can be found with a regular HIV antibody test. (F) | |
| True | 113 (53.8) |
| False | 25 (11.9) |
| Not sure | 72 (34.3) |
| Acute HIV infection lasts for 1 year. (T) | |
| True | 13 (6.2) |
| False | 63 (30) |
| Not sure | 134 (63.8) |
| Mean total AHI score (SD) | 2.09 (1.52) |

Correct item response is provided in parentheses after each item
Numbers vary due to missing data

(63.6%). Meanwhile, a majority (56.4%) of prescribers had previously received training on the amended NYS HIV testing law compared to 42.4% of non-prescribers (Table 1). However, only one quarter (26.7%) of clinic directors, a third (35.1%) of prescribers and non-prescribers (33.33%) had received prior training on AHI. Most of the clinic directors thought that training around HIV and AHI was “very important” (63.6%). In fact, one of the most frequently cited barriers to AHI testing was limited staff expertise (54.5%).

Discussion

This study showed that information crucial to timely diagnosis and care of AHI is inadequate among primary and urgent care providers working in high HIV-prevalence areas of NYC. By contrast, staff scored relatively high on general HIV-related knowledge that was not AHI-specific. Non-prescribing staff were unfamiliar with key points of knowledge about AHI and frequently recognized these gaps, as indicated by a high proportion of “not sure” replies to AHI knowledge questions. In addition, survey responses indicated broad, though not unanimous, willingness among providers to incorporate AHI screening and testing procedures.

Providers diverged in their opinions on whether “specialized” staff should offer and perform HIV tests or whether tests should be incorporated into routine care. This debate reflects ambivalence about NYS public health law and CDC guidance, as well as the shifting role of HIV test counselors in many sites many of whom are transitioning to broader clinic support roles. As such, training interventions looking to increase provider skills in taking comprehensive sexual histories in an open and non-judgmental manner and communicating with patients about their sexual health could be successful in increasing testing rates in clinic settings, particularly by creating teachable moments that have been successful in the dissemination of sexual health information [29].

Patients in these high prevalence communities were knowledgeable about HIV and often had experienced it directly with family members or close friends who were HIV-positive or had succumbed to AIDS. Despite the high percentage of randomly selected patients attesting to either knowing HIV-positive persons or being HIV-positive themselves, general awareness of AHI was quite rare. Only a few of those surveyed knew of the correct symptoms associated with acute infection. This finding underscores the dire need for HIV health education and outreach in clinic settings, particularly those in which cases of undiagnosed AHI could be missed. Particularly, despite being unaware at first, patients expressed great concern for the potential for symptoms to be misdiagnosed as a flu. Therefore, educating patients on risk behaviors and symptomatology, either through waiting room videos, printed materials or face-to-face counselling, could be successful in democratizing the testing environment from one primarily provider-led, to one that the patient themselves initiate [30, 31].

Virtually all provider respondents pointed to serious obstacles implementing new initiatives around HIV screening given the constantly shifting operational demands, including electronic record-keeping, added mandates,

Table 4 Comparison of attitudes^a toward HIV and AHI testing by prescribing and non-prescribing providers

| | Prescribers (n = 154) | Non-prescribers (n = 159) | <i>t</i> -test* | <i>p</i> value** |
|---|-----------------------|---------------------------|-----------------|------------------|
| | Mean (SD) | Mean (SD) | | |
| It is not my responsibility to assess patients for HIV risk | 1.70 (1.45) | 2.38 (1.76) | 2.903 | 0.009 |
| I am not comfortable discussing sexual and drug risk with older adults (50 or older) | 1.8 (1.38) | 1.99 (1.41) | 0.909 | 0.374 |
| AHI is so rare it is a waste of time to screen for it. | 1.47 (0.91) | 1.56 (1.13) | 0.578 | 0.570 |
| I am unsure about referral procedures for HIV-positive patients | 2.22 (1.57) | 2.97 (1.68) | 3.622 | 0.002 |
| Too much money and attention is being directed at HIV. | 1.53 (1.03) | 1.59 (1.26) | 0.353 | 0.728 |
| HIV counseling and testing should only be done by staff with specialized training | 2.82 (1.82) | 4.72 (1.66) | 7.546 | <0.001 |
| I am not skilled at delivering a positive HIV test result to a patient. | 2.48 (1.55) | 3.93 (1.97) | 4.977 | <0.001 |
| Compared to other training needs, training on the amended 2010 NYS HIV testing law is a low priority | 2.19 (1.31) | 2.19 (1.33) | 0.026 | 0.98 |
| I am comfortable discussing sexual and drug risk with young adolescents (ages 13–15) | 4.66 (1.81) | 4.92 (1.43) | 1.205 | 0.24 |
| Compared with other training needs; AHI is a low priority. | 2.17 (1.32) | 1.96 (1.24) | − 1.071 | 0.297 |
| I have the knowledge and skills to implement AHI screening and testing policies into my practice. | 3.77 (1.51) | 3.58 (1.60) | − 0.785 | 0.44 |
| Staff at my clinic can fulfil the guidelines in the amended 2010 NYS HIV testing law | 4.43 (1.46) | 4.5 (1.39) | 0.415 | 0.68 |
| I intend to ensure that all patients I see who want to be tested for HIV are screened for recent flu-like symptoms. | 4.22 (1.43) | 3.99 (1.48) | − 1.333 | 0.197 |
| I intend to ensure that all patients with recent flu-like symptoms are screened for sexual and drug risk behaviour. | 4.46 (1.32) | 3.95 (1.49) | − 3.184 | 0.005 |
| I intend to ensure that all patients I see are offered HIV testing at least once in the course of clinic treatment. | 5.34 (1.11) | 4.49 (1.49) | − 5.740 | <0.001 |

SD Standard Deviation

*Degrees of Freedom [20]

**Student's *t*-test adjusted for clustering effect (i.e., clinics)

^a6-point Likert Scale ranging from 1 (strongly disagree) to 6 (strongly agree)

and the time pressures typical in busy and understaffed facilities. Nonetheless, clinic directors and providers alike concurred that HIV testing, including screening for AHI, was a priority and disagreed with statements downplaying its importance. Therefore, specialized yearly trainings, tailored to provider roles, could offer the opportunity to capitalize on their interest in the topic and increase their knowledge in the subject.

Because many cases of AHI may be missed despite improvements in testing technology, providers in high-prevalence areas should maintain a level of clinical suspicion for AHI in patients with persistent flu-like symptoms in the first 45 days after a possible exposure even when HIV antigen/antibody tests are non-reactive. Implementation of 4th generation rapid HIV testing could improve testing rates in busy, over-burdened environments given that it cuts down times required for blood draws, and for generating lab results. Diagnosis and treatment of AHI are crucial to efforts to end AIDS as a public health threat [32], and primary care clinics in high-prevalence communities are not equipped to so. Although public health

systems dedicate considerable resources to screening and testing for HIV, more attention to AHI is required.

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