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Low Rates of Adoption and Implementation of Rapid HIV Testing in Substance Use Disorder Treatment Programs

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ABSTRACT

Introduction: Rapid HIV testing (RHT) greatly increases the proportion of clients who learn their test results. However, existing studies have not examined the adoption and implementation of RHT in programs treating persons with substance use disorders, one of the population groups at higher risk for HIV infection.
Methods: We examined 196 opioid treatment programs (OTPs) using data from the 2011 National Drug Abuse Treatment System Survey (NDATSS). We used logistic regressions to identify client and organizational characteristics of OTPs associated with availability of on-site RHT. We then used zero-inflated negative binomial regressions to measure the association between the availability of RHT on-site and the number of clients tested for HIV.
Results: Only 31.6% of OTPs offered on-site rapid HIV testing to their clients. Rapid HIV testing was more commonly available on-site in larger, publicly owned and better-staffed OTPs. On the other hand, on-site rapid HIV testing was less common in OTPs that prescribed only buprenorphine as a method of opioid dependence treatment. The availability of rapid HIV testing on-site reduced the likelihood that an OTP did not test any of its clients during the prior year. But on-site availability rapid HIV testing was not otherwise associated with an increased number of clients tested for HIV at an OTP.
Conclusions: New strategies are needed to a) promote the adoption of rapid HIV testing on-site in substance use disorder treatment programs and b) encourage substance use disorder treatment providers to offer rapid HIV testing to their clients when it is available.

1. Introduction

More than 1.2 million people in the United States are living with HIV, with an estimated 50,000 new infections each year (CDC, 2012, 2015). Substance use is strongly associated with HIV (CDC, 2012, 2014). Nearly 25% of HIV/AIDS cases are directly or indirectly related to injecting drug use (SAMHSA, 2010) and HIV prevalence is also high among non-injecting drug users (CDC, 2013b; Tempalski et al., 2009).

Despite the role of substance use in HIV transmission in the US, the rate of HIV testing among substance users remains limited. In 2012, about 37% of HIV-infected persons who inject drugs (PWID) were unaware of their infection status (Spiller, Broz, Wejnert, Nerlander, & Paz-Bailey, 2015), thus preventing linkage to HIV medical care and initiation of treatment. This is in part the case because the availability of HIV testing services remains low in substance use disorder treatment programs. Although an increasing proportion of substance users attend such treatment programs (SAMHSA, 2014), more than a third of all substance use disorder treatment programs in the nation did not offer HIV testing to their clients in 2011 (D'Aunno, Pollack, Jiang, Metsch, & Friedmann, 2014).

The limited availability of HIV testing in substance use disorder treatment programs is often due to the complexities of the traditional HIV testing protocol, which requires drawing venous blood from clients as well as access to laboratory facilities (CDC, 2013a). Few substance use disorder treatment programs – which are often small, community-based organizations – can afford the investment in facilities, equipment, certifications and/or human resources required to implement this protocol (Pilcher, Christopoulos, & Golden, 2010).

Furthermore, laboratory-based HIV antibody testing can take up to 2 weeks to produce results, if the antibody test result is positive and confirmatory testing must be conducted. Clients are thus required to visit the health facility a second time to receive their test results. Significant proportions of clients fail to do so however. Thus, even in

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substance use disorder treatment programs that offer such HIV testing services, a large number of clients who get tested do not learn their HIV infection status (Franco-Paredes, Tellez, & del Rio, 2006; Grusky, Roberts, & Swanson, 2007).

The introduction of rapid HIV testing (RHT) assays addresses these barriers to increasing awareness of HIV infection among substance users (Schwartz et al., 2013). RHT uses blood from a finger-stick or oral fluid from a swab, and can be conducted under a Clinical Laboratory Improvement Amendments (CLIA) Certificate of Waiver (Branson, 2015). It does not require extensive laboratory facilities and can be performed without a doctor, nurse, or phlebotomist. RHT is also highly accurate (Delaney et al., 2011; Pai et al., 2012), and yields preliminary results in 20 minutes or less, which allows testing and notification of results to occur during the same visit. In a recent trial, on-site RHT in substance use disorder treatment programs substantially increased receipt of HIV test results (Metsch et al., 2012) and was cost-effective (Schackman et al., 2013).

The FDA approved CLIA-waived RHT in 2003, but few studies have examined the adoption and implementation of on-site RHT in substance use disorder treatment programs. In this paper, we used nationally representative survey data to document the extent to which substance use disorder treatment programs have adopted and implemented RHT several years after FDA approval.

Our study is informed by the structure, process, and outcome (SPO) framework for describing health services and examining the determinants of quality of health care in health care organizations (Donabedian, 1988, 2005). In this framework, "structure" describes the context in which care is delivered, whereas "process" refers to aspects of the medical and technical decisions that determine the delivery of care. Finally, "outcomes" in the SPO framework refer to changes in health status or knowledge among patients that result from the delivery of healthcare. Examples of structures include organizational characteristics such as staffing, ownership, and accreditation (Aletraris & Roman, 2015; D'Aunno, 2006; D'Aunno et al., 2014), whereas examples of processes include treatment strategy or diagnostic tools. Both structures and processes of substance use disorder treatment programs have been linked to HIV-related outcomes among their clients, including the uptake of HIV testing and awareness of HIV status (Frimpong, Guerrero, Kong, & Tsai, 2015; Knudsen, Ducharme, & Roman, 2007; Pollack & D'Aunno, 2010; Wheeler & Nahra, 2000).

We first examined which structures and processes of substance use disorder treatment programs were associated with the availability of RHT services on-site. We then tested whether the availability of RHT on-site was associated with higher levels of HIV testing among the clients of these treatment programs.

2. Methods

2.1. Data sources

We focused on the adoption and implementation of RHT in opioid treatment programs (OTPs). We defined an OTP as a physical facility with resources dedicated specifically to treating opiate dependence through methadone or buprenorphine. The Substance Abuse and Mental Health Services Administration (SAMHSA) licenses all OTPs. It thus has a list that precisely identifies the entire U.S. population of approved OTPs. In 2011, there were 1,459 licensed OTPs with about 304,000 opioid-dependent individuals receiving services on any given day. This represents approximately 8% of all substance use disorder treatment programs and 26% of the total population of substance users in the US (SAMHSA, 2012).

The National Drug Abuse Treatment System Survey (NDATSS) uses SAMHSA's list as a sampling frame to enroll a nationally representative sample of OTPs. It was initiated in 1988, with waves of data collection taking place in 1988, 1995, 2000, 2005 and 2011. In 2011, OTPs that participated in the 2005 wave of the NDATSS were contacted. To ensure that the 2011 sample was nationally representative and had adequate statistical power, additional OTPs were selected at random from SAMHSA's, 2011 list of OTPs and were contacted. Of all the 2005 and newly selected OTPs contacted in 2011 (a target sample of 230 OTPs), 200 completed surveys, for a response rate of 86.6 percent (D'Aunno et al., 2014). OTP directors and clinical supervisors were interviewed by phone. Directors provided information concerning ownership, finances, organizational structure, and managed care arrangements of their respective OTPs. Clinical supervisors provided information regarding staff composition, client characteristics, volume of care and available treatment and ancillary services (e.g., HIV testing).

The 2011 NDATSS used established methods that maximized reliability and validity in telephone surveys. OTP directors and clinical supervisors were sent a worksheet ahead of the survey interview to help compile relevant study data. They were also encouraged to gather and review documents (e.g., monthly clinic logs and reports) ahead of the interview to ensure accurate reporting of the numbers of clients who received various services (e.g., HIV testing). Other methods included pretesting the survey with a random sample of programs and performing extensive computer reliability checks to signal inconsistent responses (e.g., percentage of clients with various demographic characteristics should sum to 100%). Interviewers then worked with respondents to resolve inconsistencies. Results were further scrutinized for reliability and validity. Reliability checks included comparisons of reported totals (e.g., total revenue) with the sum of reported detail (e.g., revenues by source); and comparison of responses to related questions; assessments of the consistency of responses provided by director and supervisor. Results from several analyses provided support for NDATSS data reliability and validity (Pollack & D'Aunno, 2010).

2.2. Measures

Outcome

Our outcome of interest is the number of OTP clients tested for HIV. Clinical supervisors were asked how many clients of the OTP were tested for HIV during the year prior to the survey. Clinical supervisors were asked to assess this number regardless of the location of the test (i.e., at the OTP or elsewhere) and the testing method used (i.e., rapid or laboratory-based HIV testing).

Processes

Our main process of interest is the on-site availability of rapid HIV testing in OTPs. We created a binary variable that takes value 1 if RHT was offered on-site to clients and 0 otherwise. To do so, we used two questions from the NDATSS. First, OTP directors were asked whether RHT was offered on-site at their OTP (yes/no). Second, clinical supervisors were also asked whether some clients were tested on-site using RHT kits at their OTP. In total, 51 directors reported on-site availability of RHT at their OTPs. Among OTPs where the director did not report on-site availability of RHT however, 11 clinical supervisors reported that some clients were tested on-site using RHT. We thus classified 62 OTPs as having RHT available on-site. We also classified OTPs by pharmacological method of opioid addiction treatment. We created a categorical variable taking value 1 if the OTP provided methadone treatment only, 2 if the OTP provided buprenorphine prescription only, and 3 if that OTP provided both methadone and buprenorphine prescriptions.

Structures

We included independent variables describing the organizational characteristics of each OTP, i.e., their structures. We included a categorical variable describing ownership (private for-profit, private not-for-profit, or public), as well as two binary variables taking value 1 if the OTP was affiliated with a hospital or a mental health facility, respectively. We also used data provided by OTP directors to create another binary variable taking value 1 if the OTP held accreditation from The Joint Commission on the Accreditation of Healthcare Organizations (TJC). Finally,

we included several variables describing the availability of human resources in OTPs. We calculated the staff-to-client ratio by dividing the reported number of full-time-equivalent staff by the number of clients. We then dichotomized this variable to identify OTPs in which there was less than 1 staff for 15 clients. We also created a binary variable taking value 1 if at least one staff member was reported to draw venous blood from clients (i.e., phlebotomist).

Characteristics of the client population

As control covariates, we included a series of variables describing the population of clients served by each OTP. We measured the size of each OTP from information on the number of clients reported by the clinical supervisor. We created a categorical variable taking value 1 if the OTP had less than 250 clients in the past year, 2 if the OTP had between 250 and 600 clients in the past year and 3 if the OTP had more than 600 clients. Variables describing the characteristics of the client population also included a categorical variable indicating the proportion of PWID among the clients of an OTP (0–24%, 25–74%, ≥75%), a binary variable taking value 1 if more than 10% of the clients were African-Americans, and a binary variable taking value 1 if more than 10% of the clients were Hispanic. We also conducted additional analyses in which these 3 variables were included as continuous variables ranging from 0 to 100%. They yielded results similar to those obtained by treating these variables as categorical.

2.3. Statistical analysis:

In this paper, we solely use the term "outcome" within the context of the SPO framework. For statistical analyses, we use "dependent variable" to describe a variable whose determinants we investigate. We analyzed two dependent variables: a) the on-site availability of RHT in OTPs, and b) the number of clients of an OTP tested for HIV. We classify one of these dependent variables (availability of RHT) as a process measure, based on the SPO framework definition, whereas the other dependent variable (number of clients tested) is classified as an outcome by the framework.

First, we measured the proportion of OTPs that offered RHT on-site. Second, we described the organizational structures of OTPs included in the study sample, as well as the characteristics of the client populations they served. Third, we identified the organizational processes and structures, as well as the population characteristics, associated with the availability of RHT on-site. To do so, we measured the bivariate association between on-site availability of RHT and each of the covariates described above. We then used multivariate logistic regression models, in which the binary variable denoting the availability of RHT on-site was the dependent variable. In these regressions, categorical variables with more than two levels (e.g., type of opioid treatment provided, OTP ownership) were expanded into multiple binary variables identifying each level of the categorical variable. These binary variables were then introduced in the model, except the variable identifying OTPs in the reference category. This was done using the "xi" command in Stata 13. We also calculated robust standard errors using the "*robust*" command.

Finally, we measured the association between on-site availability of RHT and the number of OTP clients tested for HIV. The number of clients tested for HIV in OTPs is not normally distributed. Many OTPs do not test any of their clients. This produces a large number of observations for which the count of clients tested for HIV is zero. On the other hand, some OTPs test a (possibly very) large number of clients. We addressed this over-dispersion by using a zero-inflated negative binomial regression model. We focused on this model because it provided a better fit to the data than models a) without a zero-inflated component, and b) based on a Poisson distribution. This was corroborated by the Vuong statistic. The zero-inflated negative binomial model combines 1) a logistic component, which assesses the likelihood that an OTP did not test any client for HIV, and 2) a negative binomial component, which focuses on the number of clients tested in OTPs that conducted HIV testing. We thus report odds ratios (logistic component) and incidence rate ratios (negative binomial). In that model, we used the log of the total number of clients attending an OTP as an offset, i.e., its coefficient was set to 1. This allowed accounting for differences in OTP size when measuring the association between on-site availability of RHT and the number of OTP clients tested for HIV. All analyses were performed with Stata version 13 (StataCorp, 2013).

3. Results

Among the 200 OTPs that participated in NDATSS in 2011, 196 provided information on the availability of RHT on-site. Only 62 (31.6%) OTPs offered RHT on-site to their clients. RHT was not available on-site among the other 134 OTPs (68.4%). To put this finding into context, the percentage of OTPs offering any HIV testing (i.e., including laboratory-based testing) was 64% in 2011 (D'Aunno et al., 2014).

The majority of OTPs (nearly 70%) dispensed methadone for opioid addiction treatment, and 29.1% prescribed only buprenorphine. The OTPs included in the sample were primarily private not-for-profit organizations (50.0%) and 10.7% were publicly owned. A few OTPs were affiliated either with a hospital (12.2%) or with a mental health center (5.6%). Approximately 29.1% had TJC accreditation. Most OTPs (79.6%) had less than one clinical staff for 15 clients. However, more than two thirds (67.9%) of OTPs had at least one phlebotomist on staff.

Table 1
Characteristics of OTPs included in study sample.

	N (%)
Organizational processes	
Rapid HIV testing on-site	
Available	62 (31.6)
Not available	134 (68.4)
Type of drug treatment	
Methadone only	92 (46.9)
Buprenorphine only	57 (29.1)
Methadone + buprenorphine	47 (24.0)
Organizational structures	
Ownership	
Private not for profit	98 (50.0)
Private for profit	77 (39.3)
Public	21 (10.7)
Hospital affiliation	
No	172 (87.8)
Yes	24 (12.2)
Mental health center affiliation	
No	185 (94.4)
Yes	11 (5.6)
Accreditation	
None	139 (70.9)
TJC	57 (29.1)
Human resources	
<1 clinical staff per 15 clients	156 (79.6)
≥1 clinical staff per 15 clients	40 (20.4)
Phlebotomist on staff	
None	63 (32.1)
At least one	133 (67.9)
Client characteristics	
Number of clients per year	
<250	47 (24.0)
250–599	98 (50.0)
≥600	51 (26.0)
% PWID	
0–24%	72 (36.7)
25–74%	87 (44.4)
≥75	37 (18.9)
African-American clients	
Less than 10%	96 (49.0)
10% or more	100 (51.0)
Hispanic clients	
Less than 10%	105 (53.6)
10% or more	91 (46.4)

Table 2
Association of rapid HIV testing on-site in OTPs with population and organizational-level covariates.

	Availability of rapid HIV testing on-site				
	N (%)	uOR	95% CI	aOR	95% CI
Organizational processes and structures					
Type of drug treatment					
Methadone only	35 (38.0)	1	–	1	–
Buprenorphine only	8 (14.0)	0.27***	0.11, 0.63	0.21***	0.07, 0.60
Methadone + buprenorphine	19 (40.4)	1.10	0.54, 2.27	0.89	0.37, 2.11
Ownership					
Private not for profit	36 (36.7)	1		1	
Private for profit	19 (24.7)	0.56*	0.29, 1.09	0.52*	0.24, 1.13
Public	7 (33.3)	0.86	0.32, 2.34	0.63	0.20, 1.93
Hospital affiliation					
No	55 (32.0)	1		1	–
Yes	7 (29.2)	0.88	0.34, 2.24	0.83	0.26, 2.68
Mental health center affiliation					
No	59 (31.9)	1		1	–
Yes	3 (27.3)	0.80	0.20, 3.33	1.15	0.32, 4.14
Accreditation					
None	43 (30.9)	1		1	
JCAHO	19 (33.3)	1.11	0.57, 2.16	1.24	0.46, 3.32
Human resources					
<1 per 15 clients	46 (29.5)	1		1	
≥1 per 15 clients	16 (40.0)	1.59	0.77, 3.28	2.11*	0.95, 4.65
Phlebotomist on staff					
None	11 (17.5)	1		1	
At least one	51 (38.4)	2.94***	1.40, 6.16	2.19	0.77, 6.25
Client characteristics					
Number of clients per year					
<250	10 (21.3)	1		1	
250–599	29 (29.6)	1.55	0.68, 3.54	1.38	0.49, 3.86
≥600	23 (45.1)	3.04**	1.24, 7.42	2.92*	0.88, 9.67
% PWID					
0–24%	18 (25.0)	1		1	
25–74%	35 (40.2)	2.02**	1.02, 4.01	1.77	0.79, 3.97
≥75%	9 (24.3)	0.96	0.38, 2.43	0.48	0.16, 1.47
African-American clients					
<10%	22 (22.9)	1		1	
≥10%	40 (40.0)	2.24**	1.20, 4.18	2.97***	1.38, 6.41
Hispanic clients					
<10%	35 (33.3)	1		1	
≥10%	27 (29.7)	0.84	0.46, 1.55	0.60	0.29, 1.25

Notes: u0R = unadjusted odds ratios, aOR = adjusted odds ratios. aORs were obtained from logistic regression models in which all variables listed in the table were included simultaneously.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

The OTPs included in the sample varied greatly in size, with roughly 25% of OTPs serving less than 250 clients per year and 25% of OTPs serving more than 600 clients per year (Table 1). There was significant variation across OTPs in the proportion of clients who were PWID: in 36.7% of OTPs, less than one quarter of the clients were PWID, whereas in 1 out of 5 of the OTPs included in the sample, more than 75% of clients were PWID. OTPs also served a racially and ethnically diverse population: e.g., more than half of the OTPs included in this sample had more than 10% of African-American clients among the client population they served.

Several of these covariates were significantly associated with the availability of RHT on-site in bivariate analyses (Table 2). On-site RHT was less common in OTPs that offered only buprenorphine as a method of treatment to their clients (uOR = 0.27, 95% CI = 0.11 to 0.63), and in private for-profit OTPs (uOR = 0.56, 95% CI = 0.29 to 1.09) than private not-for-profit OTPs. OTPs that had at least one phlebotomist on staff were more likely to offer on-site RHT (uOR = 2.94, 95% CI = 1.40 to 6.16). The largest OTPs (>600 clients per year) were more likely to offer on-site RHT to their clients (uOR = 3.04, 95% CI = 1.24 to 7.42). On-site RHT was also more common among OTPs that served larger populations of PWID, but this association was not linear. Among those OTPs that had 25–74% of PWID among their clients, on-site RHT was more common than among OTPs that had fewer than 25% of PWID among their clients (uOR = 2.02, 95% CI = 1.02 to 4.01), but this was

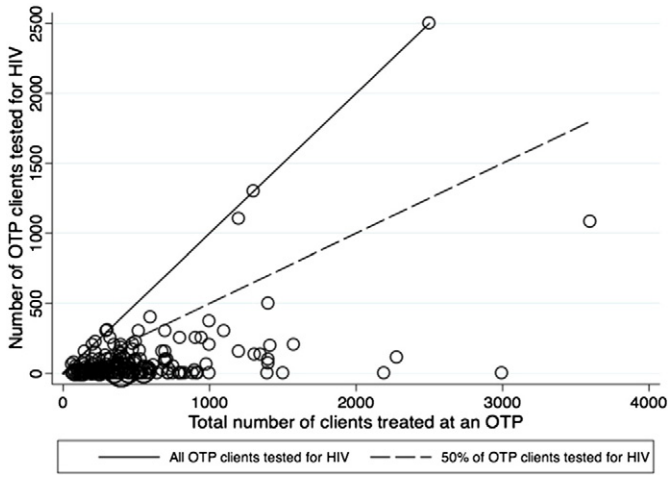

Fig. 1. Distribution of OTPs by number of clients and number of clients tested for HIV. Notes: The solid line represents situations where the coverage of HIV testing among clients is 100%, i.e. the total number of clients tested is equal to the total number of clients who attended the OTP. The dashed line represents situations where half the clients of an OTP are reported tested for HIV.

not the case among OTPs where more than 75% of clients were PWID (uOR = 0.96, 95% CI = 0.38 to 2.43). On-site RHT was also more common among OTPs that served a larger proportion of African-American clients (uOR = 2.24, 95% CI = 1.20 to 4.18).

In multivariate models, the availability of RHT on-site remained negatively associated with offer of buprenorphine-only as a method of addiction treatment and for-profit private ownership. In addition, we observed a positive association between staff-to-client ratios and RHT availability: RHT was more common among OTPs with at least 1 clinical staff for 15 clients (aOR = 2.11, 95% CI = 0.95 to 4.65). Finally, the availability of RHT on-site remained positively associated with OTP size and the proportion of African-American clients.

Fig. 1 shows the distribution of the number of clients tested for HIV by the number of clients treated for substance use disorder at an OTP. It indicates that the coverage of HIV testing in OTPs is generally low. Slightly over one third of all OTPs (37.3%) did not test any of their clients for HIV. Approximately 10% of OTPs reported testing more than 50% of their clients and 9 OTPs (4.6%) reported testing all of their clients. Four large OTPs tested more than 1,000 of their clients during the year prior to the survey. The distribution of the number of clients tested in OTPs is thus highly skewed. The mean number of clients tested per OTP was 89, with a standard deviation of 237.1. Among OTPs where at least one client was tested for HIV, the mean number of clients tested was 142 with a standard deviation of 286.

Table 3 presents results from the zero-inflated negative binomial model. The likelihood that none of the clients of an OTP were tested for HIV (logistic component) was associated with several organizational structures and processes of OTPs. In particular, the likelihood that the number of clients tested at an OTP was zero was reduced when RHT was available on-site (OR = 0.02, 95% CI = 0.01 to 0.11). Compared to OTPs that only prescribed methadone, larger proportions of OTPs that prescribed only buprenorphine or buprenorphine and methadone did not test any of their clients for HIV (OR = 4.52, 95% CI = 1.46 to 14.0 and 5.38, 95% CI = 1.78 to 16.2, respectively). Finally, the likelihood that the number of clients tested at an OTP was zero was reduced among publicly owned OTPs (OR = 0.12, 95% CI = 0.02 to 0.72). On the other hand, private-for-profit OTPs were more likely not to test any of their clients for HIV (OR = 2.12, 95% CI = 0.89 to 4.922).

Table 3
Zero-inflated negative binomial regression of the number of clients tested for HIV in OTPs.

	No OTP client tested for HIV ("Logistic component")		Count of OTP clients tested for HIV ("Negative binomial component")	
	OR	95% CI	IRR	95% CI
On-site rapid HIV testing				
Not available	1	–	1	–
Available	0.02***	0.01, 0.10	1.03	0.72, 1.48
Organizational processes and structures				
Type of drug treatment				
Methadone only	1	–	1	–
Buprenorphine only	4.52***	1.46, 14.0	1.08	0.65, 1.79
Methadone + buprenorphine	5.38***	1.78, 16.2	0.92	0.61, 1.38
Ownership				
Private not for profit	1	–	1	–
Private for profit	2.09*	0.89, 4.92	1.05	0.71, 1.53
Public	0.12**	0.02, 0.72	1.78**	1.06, 2.98
Hospital affiliation				
No	1	–	1	–
Yes	0.47	0.11, 1.97	1.01	0.55, 1.82
Mental health center affiliation				
No	1	–	1	–
Yes	0.29	0.04, 2.04	0.50**	0.26, 0.96
Accreditation				
None	1	–	1	–
JCAHO	2.52	0.74, 8.53	0.96	0.61, 1.49
Human resources				
<1 per 15 clients	1	–	1	–
≥1 per 15 clients	1.26	0.48, 3.30	1.38	0.92, 2.08
Phlebotomist on staff				
None	1	–	1	–
At least one	1.17	0.42, 3.27	0.80	0.49, 1.31
Client characteristics				
% PWID				
0–24%	1	–	1	–
25–74%	0.66	0.27, 1.66	1.37	0.90, 2.06
≥75%	0.50	0.15, 1.65	2.32***	1.40, 3.85
African-American clients				
<10%	1	–	1	–
≥10%	0.94	0.39, 2.25	1.22	0.86, 1.74
Hispanic clients				
<10%	1	–	1	–
≥10%	1.12	0.49, 2.56	1.14	0.79, 1.62
N	196			
Zero observations	73			
Non-zero observations	123			
Vuong Test	7.04 (<0.001)			

Notes: OR = odds ratios, IRR = incidence rate rations; The Vuong test assesses whether the zero-inflated model improves over a simple negative binomial regression. A p-value <0.05 indicates that the zero-inflated model constitutes an improvement over the standard model. The models presented in this table include the log of the number of clients seen at an OTP in the last year as an offset.

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

The total number of clients tested for HIV (negative binomial component) was not associated with the availability of RHT on-site (IRR = 1.03, 95% CI = 0.72 to 1.48). But it was significantly higher in publicly owned OTPs than in other OTPs (IRR = 1.78, 95% CI 1.06 to 2.98), whereas it was significantly reduced in OTPs affiliated with a mental health center (IRR = 0.50, 95% CI = 0.26 to 0.96). Finally, the number of clients tested for HIV was positively associated with the proportion of PWID among the clients of an OTP. For example, the rate of HIV testing was 2.32 times higher in OTPs where more than 75% of clients were PWID than in OTPs where less than 25% of clients were PWIDs (95% CI 1.40 to 3.85).

4. Discussion

Rapid HIV testing is not universally available on-site in opioid treatment programs in the US. Using data from the NDATSS, we found that despite efforts to increase the adoption of RHT among substance use disorder treatment programs (Branson et al., 2006; NIDA SAMHSA Blending Initiative, 2012; SAMHSA, 2011), only 31.6% of OTPs offered this service to their clients in 2011. This corroborates and extends the findings of a recent study on the availability of HIV testing services in privately funded substance use disorder treatment programs (Aletraris & Roman, 2015). The low availability of RHT on-site in OTPs is concerning because clients of OTPs are at high risk of undiagnosed HIV infection. Since RHT is effective at increasing the proportion of clients who learn their HIV test results (Metsch et al., 2012), improving the availability of RHT on-site in OTPs should be an important HIV prevention priority.

RHT was particularly unlikely to be offered on-site in smaller, less-resourced and least medically equipped OTPs. For example, it was particularly rare in OTPs that prescribed only buprenorphine to their clients and among OTPs serving fewer than 250 clients per year. It was also rare in OTPs with less favorable staff-to-client ratios and in OTPs that did not have a phlebotomist on staff. The low availability of RHT in such settings is paradoxical because RHT does not require extensive certifications and can be conducted under a CLIA waiver. Instead, RHT has so far predominantly been adopted by OTPs that have the resources and staff required to implement laboratory-based HIV testing protocols.

This may be the case because the adoption and implementation of RHT have profound workflow and time-use implications for staff working in OTPs. For example, while laboratory-based HIV testing might only require providing information about HIV testing procedures prior to testing and drawing blood, RHT requires an additional waiting period, disclosure of results, post-test counseling, and referral to supportive services. With RHT, all these tasks are to be performed in a single session. Thus, if the RHT process is more convenient for clients, it can be significantly more time-intensive and demanding for staff and OTPs. Understanding the workflow and time-use implications of RHT for OTPs and developing strategies to address challenges may then be an important component of efforts to promote the adoption and implementation of RHT.

RHT was more commonly available in OTPs that served populations at increased risk for acquiring HIV. For example, it was more frequently available in OTPs that served a greater proportion of PWID or African-American clients. African-Americans are most affected by HIV and accounted for an estimated 44% of all new HIV cases among adults and adolescents in 2010. Additionally, 47% of HIV infections attributed to injecting as a method of drug use were among African-Americans (CDC, 2012, 2014). In the NDATSS sample of OTPs, we found that OTPs with at least 10% of African-Americans among their clients had close to three times the odds of offering RHT to their clients than OTPs with fewer African-American clients. Yet, even among OTPs that served such high-risk populations, rapid HIV testing was far from universally available: 40.0% of OTPs that serve client populations with at least 10% of African-Americans offered rapid HIV testing on-site vs. 22.9% among other OTPs. Additional efforts are thus needed to further increase access to HIV testing services among the most at risk groups of OTP clients.

The availability of RHT on-site also had complex relationships with the volume of HIV testing conducted in OTPs. On the one hand, on-site RHT greatly reduced the proportion of OTPs in which no clients were tested for HIV. While 52% of the OTPs where RHT was not available on-site did not test any client for HIV, this was the case for only 3% of the OTPs where RHT was available on-site. On the other hand, among OTPs where HIV testing took place, the on-site availability of RHT did not significantly increase the number of clients tested. This result was obtained using zero-inflated negative binomial regression models, which control for differences in the size of OTPs. It may be explained by dynamics at the intersection of organizational and client factors. For example, service providers at substance use disorder treatment programs may not systematically offer RHT to their clients due to beliefs about HIV, fear of infection, and concerns with their level of knowledge and/or skills related to RHT (Downing et al., 2001; Hood, Robertson, & Baird-Thomas, 2015). Likewise, client factors limiting the demand for HIV testing (e.g., low perceived risk) may explain the low number of clients tested (Bond, Lauby, & Batson, 2005; Shi, Kanouse, Baldwin, & Kim, 2012).

The volume of HIV testing conducted in OTPs was associated with several other characteristics of OTPs. It was significantly higher in OTPs where a higher proportion of clients were PWID. This may be the case because PWID experience a particularly high burden of HIV infection and thus express a greater demand for HIV testing. The volume of HIV testing was also higher in publicly owned OTPs than in private facilities. This may be so because public facilities may place a higher emphasis on public health activities such as HIV testing than private facilities. Finally, the volume of HIV testing was much lower in OTPs affiliated with a mental health facility. This may be because the complexities of mental health care complicate the integration of HIV testing in OTP practices.

There are several important limitations of the study. First, even though the sensitivity and specificity of the available rapid test kits are high (Delaney et al., 2011; Pai et al., 2012), there are concerns that RHT may lead to a number of false positive test results and may have limited ability to detect HIV antibodies in newly infected persons. These concerns apply primarily to low HIV prevalence settings, where RHT has slightly lower positive predictive value. Substance use disorder treatment programs are generally considered a high prevalence setting, thus the proportion of false positive test results during RHT may be limited. This may also be less of a concern for newer RHT devices and updated testing algorithms (i.e., fourth-generation HIV-1/2 immunoassay, multispot rapid test) used to increase access to testing, early diagnosis, and receipt of test results in this setting (CDC, 2013a; Westheimer et al., 2014). Second, our study does not include longitudinal data on the adoption of RHT in OTPs. This is so because NDATSS did not include any question on RHT at its previous wave in 2005. As a result, we could not document the pace of RHT adoption in recent years, i.e., whether it has been increasing or stalling. We also could not document whether some OTPs adopted and subsequently abandoned RHT. Recent studies however indicate that the availability of RHT may be increasing slightly in some types of substance use disorder treatment programs (Aletraris & Roman, 2015), even though overall the availability of other modalities of HIV testing in such programs is declining nationwide (D'Aunno et al., 2014). Further research into the dynamics of RHT adoption in OTPs is needed. Third, our use of cross-sectional data also implies that we were unable to isolate the causal effects of RHT on the volume of HIV testing in OTPs. Instead, we were only able to investigate the association between on-site RHT and the number of clients tested using negative binomial regression models. These models may be confounded by unobserved variables that determine both the adoption of RHT and the number of clients tested for HIV.

Fourth, our theoretical framework did not include funding or policy-related variables that may determine the extent to which RHT is adopted and implemented by OTPs. These include, for example, the

extent to which programs have the capacity to access state funding for HIV testing, or state laws governing pre-test counseling and consent requirements. Future investigations should include controls for such variables when investigating the effects of RHT on HIV testing outcomes. Fifth, our assessment of the extent of HIV testing and the availability of RHT in OTPs was based on data reported by OTP managers and clinical directors. These data may be affected by inaccuracies and recall biases. For example, there were some OTPs in which the program director did not report that RHT was available on-site, but the clinical supervisor did. Sixth, our study focused on OTPs, i.e., a subset of all substance use disorder treatment programs. The availability and implementation of RHT may be different in other programs, especially if they are treating clients who are less frequently PWID and who may thus be considered at lower risk of HIV infection. Finally, there were some discrepancies between the timeframes over which 1) the availability of RHT on-site and 2) the number of OTP clients tested for HIV were measured. The availability of RHT was measured at the time of the survey, whereas the number of clients tested was measured over the year prior to the survey. As a result, we were not able to capture OTPs that discontinued offering RHT during the year prior to the survey, nor could we identify OTPs that recently started offering RHT to their clients. These measurement issues may bias our estimates of the association between on-site RHT and number of clients tested toward the null hypothesis.

5. Conclusion

A considerable proportion of substance use disorder treatment programs do not offer HIV testing to their clients (D'Aunno et al., 2014). While rapid HIV testing has often been presented as a possible approach to increasing the availability of HIV testing in such settings, our findings suggest that OTPs are not rapidly adopting on-site rapid HIV testing. There is thus an urgent need to 1) understand the barriers to adopting rapid HIV testing and 2) identify strategies that address these barriers. Such strategies could include grants for the purchase of rapid test kits, training of OTP personnel in conducting RHT, or assistance in requesting state or federal funds for HIV testing (Haynes et al., 2011; Knapp & Anaya, 2013; Kritz et al., 2008). Our results also suggest that, among OTPs that have adopted RHT, its implementation is inconsistent, with a limited number of clients tested. There is thus an urgent need to promote the more frequent use of RHT by substance use disorder treatment providers.

Conflict of interest

None.

Authors' Contributions

J.A. Frimpong conceived the study and drafted the manuscript. S. Helleringer conducted the statistical analyses. T. D'Aunno and L. Metsch contributed to revisions of the manuscript. All authors read and approved the final manuscript.

Human Subjects Protection statement

The Columbia University Institutional Review Board (IRB) approved the study.

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