Uptake and Repeat Use of Postexposure Prophylaxis in a Community-Based Clinic in Los Angeles, California

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Abstract

Postexposure prophylaxis (PEP) has become an important tool for HIV prevention in the men who have sex with men (MSM) communities within Los Angeles County. However, it is unclear as to whether the most sexually at-risk MSM populations are accessing PEP services. Furthermore, it is unclear what behavioral risk factors differentiate individuals who utilize PEP once (single PEP) versus those who utilize it multiple times (re-PEP). Data were collected between May 2011 and December 2012 on all clients enrolled in the Los Angeles LGBT Center's (the Center) PEP-LA program as well as on all sexually transmitted infection (STI) screening clients visiting the Center. Multivariate logistic regression models were used to analyze results. PEP clients had greater odds of having a history of gonorrhea in the past year when compared to high-risk, non-PEP clients (OR: 1.71; CI: 1.25–2.35). Furthermore, they had greater odds of using methamphetamines (OR: 1.71; CI: 1.30–2.24) and inhaled nitrates (OR: 1.62; CI: 1.30–2.01) in the past 12 months when compared to high-risk, non-PEP clients. Re-PEP clients had greater odds of methamphetamine use than single PEP clients (OR: 2.80; CI: 1.65–4.75). There were no significant differences by race/ethnicity between high-risk, non-PEP clients and PEP clients in either the entire cohort or MSM only sample. However, African Americans made up 8.5% of persons accessing PEP services but 16.7% of persons who tested HIV positive. Similar proportions of PEP use by race/ethnicity are problematic considering the disproportionate burden of HIV infections in the African American community. Although uptake among the highest risk populations has been brisk ($n = 649$), inequities based upon race/ethnicity suggest the need for increased outreach.

Introduction

POSTEXPOSURE PROPHYLAXIS (PEP) is an emergency intervention to abort HIV acquisition after occupational,¹ sexual, or intravenous drug use exposures.² Lack of efficacy data,³ challenges with medication adherence,^{4,5} and cost^{6–9} have limited PEP uptake and utilization of such strategies on the part of providers and patients.¹⁰

Nonetheless, 10 jurisdictions have implemented publicly funded PEP services as part of HIV prevention strategies nationwide,¹¹ including the County of Los Angeles Department of Public Health, Division of HIV and STD Programs (DHSP), following a successful 1-year demonstration project in which 286 courses of PEP were dispensed.¹² The DHSP-sponsored, community-based PEP-LA program provides

tenofovir/emtricitabine fixed dose combination (Truvada) or zidovudine/lamivudine fixed dose combination (Combivir) for 28 days within 72 h of a potential high-risk, non-occupational exposure to HIV. Safety monitoring and serial HIV and sexually transmitted infection (STI) testing are provided in concert with risk reduction programming.

The Los Angeles LGBT Center (The Center) provides comprehensive HIV treatment services, free HIV and STI testing, as well as primary care and broad mental health and substance abuse services to many individuals at high risk for HIV infection in Los Angeles County. The Center's HIV testing program has a 3.3% HIV incidence rate per year, and identifies approximately 300 new HIV infections annually.¹³ Ten percent of these individuals are diagnosed with acute or primary HIV infection identified by pooled nucleic acid

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amplification testing. Due to the high positivity rate within this population, the Center was chosen as one of two DHSP-funded sites for the PEP-LA program.

The Center's PEP-LA staff anecdotally noted a large absolute number of repeat clients in the PEP-LA program; repeat clients of PEP programs have been previously noted in almost all published cohorts.^{14–18} The need for repeat courses of PEP suggests ongoing transmission-associated risk behavior, and persistent or increased risk of HIV acquisition—including the possibility of drug-resistant virus acquisition.¹⁹ As a result of ongoing sexual risk between periods of PEP use, such individuals may be more appropriately protected from HIV infection by uninterrupted antiretroviral therapy (ART) administration, as is used in preexposure prophylaxis (PrEP).

The optimal time for PEP administration is directly following exposure, and intervention efficacy dissipates after 72 h.² Given this time sensitivity, it is crucial that providers offering PEP services be within close proximity of the most at-risk populations to minimize structural barriers that may impede immediate uptake. Eighty-two percent of Los Angeles County's new HIV cases occur in five distinct geographic clusters that occupy 31% of the land area (Fig. 1). Of these five clusters, 46.3% of cases occur in the cluster containing the city of West Hollywood and downtown Los Angeles.²⁰ Furthermore, these areas contain a high proportion of men who have sex with men (MSM) in Los Angeles County, a group that accounts for 61% of new infections annually.²¹ The Center is located in the center of this cluster with the highest incidence. Given the close proximity to the highest affected areas and MSM focus, the Center serves a high proportion of sexually high-risk individuals in Los Angeles County who can benefit from biomedical HIV prevention tools.

The primary aim of this analysis was to compare a non-PEP-using, sexually high-risk cohort of HIV-uninfected individuals seeking HIV/STI testing and treatment services at

the Center between May 2011 and December 2012 with those seeking PEP services to determine behavioral differences between high-risk, non-PEP clients and PEP clients in both (1) the general population and (2) MSM only. The secondary aim of the study was to determine behavioral factors differentiating single PEP clients from repeat PEP clients.

Materials and Methods

Clinical management for PEP clients

The PEP-LA program initiated service delivery on May 25, 2011 at the Center's main testing site in Los Angeles, California. Individuals who had a probable, nonoccupational exposure to HIV in the previous 72 h were directed by the County of Los Angeles Department of Public Health and other health organizations to contact a dedicated phone line for PEP-LA calls.

All prospective PEP-LA clients were administered an intake questionnaire to determine the client's insurance status as well as the type, time, and source of exposure. A blood-based rapid HIV enzyme immunoassay was performed; urine and rectal samples were obtained for gonorrhea and chlamydia testing; pharyngeal swabs were taken for gonorrhea testing and rapid plasma reagin testing was performed for syphilis screening.

Prospective PEP-LA clients were disqualified from receiving PEP services if they (1) were exposed more than 72 h before the intake appointment, (2) were exposed occupationally, (3) were less than 15 years of age, or (4) tested positive for HIV via the rapid antibody HIV test (Box 1). Upon program enrollment, participants were administered a risk assessment questionnaire including demographics, drug use in the past 12 months, STI history, and recent sexual behavior. Referrals to ancillary services (e.g., mental health services, substance use counseling, partner violence services), comprehensive risk reduction and adherence counseling/

FIG. 1. New HIV diagnoses made within Los Angeles County, County of Los Angeles Department of Public Health (2009 Data). Reprinted with permission.

**BOX 1. INCLUSION CRITERIA FOR THE COUNTY OF LOS ANGELES DIVISION OF HIV
AND STD PROGRAMS (DHSP) POSTEXPOSURE PROPHYLAXIS PROGRAM**

The inclusion criteria for PEP are as follows:

High-risk exposure characteristic (one or more of the activities below, condomless or failed condom use)

- Receptive anal intercourse
- Insertive anal intercourse
- Receptive vaginal intercourse
- Insertive vaginal intercourse
- Receptive oral intercourse with intraoral ejaculation with known HIV+ source
- Sharing injection drug works, which have been intravascular in another user
- Other exposures not listed above should be screened and eligibility determined by the on-site Medical Director on a case by case basis

High-risk source (one or more of the below)

- Known HIV positive
- MSM
- MSM/W (men who have sex with men and women)
- Injection drug user
- Commercial sex worker
- Sexual assault perpetrator
- History of incarceration
- From an endemic country (prevalence > 1%)
- Partner of one of the above

Screening for acute infection is done for all PEP intakes. All seronegative HIV EIAs performed in the sexual health program, including the PEP program, are reflex tested with a nucleic acid amplification assay to rule out primary HIV infection. PEP, postexposure prophylaxis; MSM, men who have sex with men; EIA, enzyme immunoassay.

support, and HIV education were provided. Symptomatic STIs were preemptively treated pending site-specific testing results. Participants were then provided with a 28-day course of tenofovir/FTC (Truvada, Gilead Sciences). All services and treatment were provided at no cost to participants.

A follow-up phone consultation occurred 2 weeks after PEP initiation to monitor medication adherence, provide additional referrals as needed, and assess for adverse events. In-person appointments for repeat HIV testing were also scheduled for 4, 12, and 24 weeks after the initial PEP intake in accordance with consensus guidelines.²

Non-PEP clients

Non-PEP clients are individuals who either declined PEP services or were not able to access services within 72 h of exposure to HIV. Non-PEP clients were seen on a walk-in basis by STI/HIV counselors at two locations: the Center's primary site in Los Angeles and a high-volume satellite site located 3.8 miles away in the city of West Hollywood. All clients received the same risk assessment, and HIV and STI specimens were collected and treated in the same manner as PEP clients. Clients were advised by the provider to retest for HIV and STIs in 3–6 months, depending on their individual risk profile.

Population

This retrospective chart review included Center PEP-LA clients in the analysis if they (1) had at least one reported episode of condomless insertive anal intercourse (IAI), condomless receptive anal intercourse (RAI), or condomless vaginal intercourse (VI) in the past two sexual encounters and (2) had not tested positive for HIV prior to the beginning of the PEP-LA program on May 25, 2011. To create comparable

populations, HIV-negative, non-PEP clients who either (1) only reported oral sex during their past two sexual encounters or (2) reported condom use during all episodes of IAI, RAI, and/or VI during the past two sexual encounters were excluded from the analysis.

Individuals were classified into one of three categories based on their PEP utilization during the approximately 19 months of analysis. Clients who sought PEP on only one occasion were classified as single PEP clients. Clients who sought PEP on two or more occasions, either from the Center or the Center and another site, were classified as repeat PEP, or re-PEP, clients. Lastly, clients who did not seek or qualify for PEP during the study period and had high-risk, sexual behavior (defined as one or more instances of condomless IAI, RAI, or VI in the past two sexual encounters) were defined as sexually high-risk, non-PEP clients.

Analysis

Multivariate logistic regression modeling was used to determine the behavioral characteristics predictive of PEP use (any PEP utilization versus no PEP utilization) as a function of the demographic predictors of age group, orientation, race/ethnicity, and education level. A separate multivariate logistic regression model was developed to determine what behavioral risk factors differed between repeat PEP clients and single PEP clients as a function of the previously outlined demographic predictors. Both regressions were performed using backward elimination until all behavioral risk factors were below the chosen alpha level threshold of 0.05. Models were run for both the entire testing population and MSM only since MSM are the primary consumers of both testing and PEP resources at the Center. Time from exposure to first medication dose was calculated by subtracting the pharmacy dispensation time from the client's self-reported exposure

time. All analyses were performed using SAS version 9.3 (Cary, NC).

Results

A total of 8,852 unique clients met the inclusion/exclusion criteria for high-risk, HIV-negative clients and received the Center's services between May 25, 2011, the initiation date of the PEP-LA program, and the end of the study window on December 31, 2012. There were a total of 529 individuals classified as single PEP clients (6.0%), 120 individuals classified as re-PEP clients (1.4%), and 8,203 individuals classified as high-risk, non-PEP clients (92.6%) in the analysis.

For those prescribed PEP, the mean time from exposure to first PEP medication dose was 38.5 h [standard deviation (SD)=19 h]. A total of 69% completed the 4–6 week follow-up visit, 44% completed the 3 month visit, and 24% completed the 6 month visit. At 2 weeks of follow-up, 93% self-reported taking all four pills in the previous 4-day medication recall period. There were a total of seven seroconversions among PEP users within the study period. The mean time from exposure to first PEP medication dose was 51.5 h (SD=22.7 h) for clients who seroconverted

(Supplementary Table S1; Supplementary Data are available online at www.liebertpub.com/aid).

Of the 120 re-PEP clients, 94 patients had one previous course of PEP (78.3%), 18 had two previous courses (15%), four had three previous courses (3.3%), three had four previous courses (2.5%), and one had five previous courses of PEP (<1%). Re-PEP clients made up 18.5% of all PEP clients.

PEP clients were more likely than high-risk, non-PEP clients to be male ($p<0.0001$), be between the ages of 30 and 39 years ($p=0.006$), identify as gay/homosexual ($p<0.0001$), and have a postgraduate education or higher ($p<0.0001$), but did not significantly differ by race/ethnicity ($p=0.29$) (Table 1). Among the MSM only sample, PEP clients were more likely than high-risk, non-PEP clients to be between the ages of 30 and 39 years ($p=0.009$) and have postgraduate education or higher ($p<0.0001$), but they did not significantly differ in race/ethnicity ($p=0.48$) or orientation ($p=0.50$) (Supplementary Table S2). Despite no differences by race/ethnicity between PEP clients and high-risk, non-PEP clients in either the entire cohort or MSM only sample, local disparities in HIV infection by race/ethnicity persisted during this time period. African

TABLE 1. MULTIVARIATE LOGISTIC REGRESSION RESULTS OF RISK CATEGORY (SINGLE AND REPEAT POSTEXPOSURE PROPHYLAXIS VERSUS HIGH-RISK, NON-POSTEXPOSURE PROPHYLAXIS) REGRESSED ON DEMOGRAPHICS, MAY 2011–DECEMBER 2012

Risk factor	All		All PEP		High-Risk, non-PEP	
	n	%	n	%	n	%
Gender						$p<0.0001$
Male	7362	83.2%	603	92.9%	6759	82.4%
Female	1366	15.4%	37	5.7%	1329	16.2%
Other	124	1.4%	9	1.4%	115	1.4%
Age group						$p=0.006$
<20	263	3.0%	16	2.5%	247	3.0%
20–24	1747	19.7%	98	15.1%	1649	20.1%
25–29	2271	25.7%	170	26.2%	2101	25.6%
30–39	2711	30.6%	232	35.7%	2479	30.2%
40–49	1320	14.9%	107	16.5%	1213	14.8%
50+	540	6.1%	26	4.0%	514	6.3%
Race/ethnicity						$p=0.29$
White	4115	46.5%	276	42.5%	3839	46.8%
African American	755	8.5%	57	8.8%	698	8.5%
Hispanic	2888	32.6%	230	35.4%	2658	32.4%
Asian/PI	740	8.4%	58	8.9%	682	8.3%
Other	354	4.0%	28	4.3%	326	4.0%
Orientation						$p<0.0001$
Gay/homosexual	5539	62.6%	490	75.5%	5049	61.6%
Bisexual	1162	13.1%	77	11.9%	1085	13.2%
Heterosexual	1981	22.4%	69	10.6%	1912	23.3%
Other	170	1.9%	13	2.0%	157	1.9%
Education level						$p<0.0001$
HS grad or below	1641	18.5%	104	16.0%	1537	18.7%
Some college	2277	25.7%	182	28.0%	2095	25.5%
College grad	4132	46.7%	266	41.0%	3866	47.1%
Postgraduate	581	6.6%	79	12.2%	502	6.1%
Unknown	221	2.5%	18	2.8%	203	2.5%
Total	8852	100.0%	649	100.0%	8203	100.0%

PEP, postexposure prophylaxis.

Americans made up 8.5% of all PEP clients but 16.7% of all HIV infections during the analysis period.

Individuals who initiated PEP (either once or multiple times) were more likely to report a history of gonorrhea in the past year (OR: 1.71; CI: 1.25–2.35), were more likely to report methamphetamine use (OR: 1.71; CI: 1.30–2.24) and/or nitrate use (OR 1.62; CI 1.30–2.01) in the past year, and were more likely to have had a greater number of sexual partners in the past 30 days (OR: 1.03 per additional partner; CI: 1.02–1.05) than high-risk, non-PEP clients when controlling for gender, age group, orientation, and education (Table 2). Similar results were seen in the MSM only subset, controlling for age group and education (Supplementary Table S3).

Between single PEP and repeat PEP clients, clients did not differ significantly in gender ($p=0.91$), age group ($p=0.23$), race/ethnicity ($p=0.34$), orientation ($p=0.31$), or education level ($p=0.14$) (Table 3). Similar results were seen in the MSM only subset for age group ($p=0.14$), race/ethnicity ($p=0.38$), orientation ($p=0.65$), and education level ($p=0.16$) (Supplementary Table S4).

Single PEP and repeat PEP users differed only in their use of methamphetamine in the past 12 months—methamphetamine users had 2.80 greater odds to access PEP multiple

times than nonmethamphetamine users (OR: 2.80; CI: 1.65–4.75) (Table 4). A history of gonorrhea, chlamydia, or syphilis, as well as other drug covariates, was not significantly different between single and repeat PEP users. Similar results were seen in the MSM only subset (Supplementary Table S5).

Discussion

Postexposure prophylaxis continues to have brisk uptake in the community-based, multisite PEP-LA demonstration project as evidenced by an increase from 21 intakes in June 2011 to 42 intakes in December 2012, a 100% increase in only a year and a half. Approximately 18.5% of PEP-LA clients were repeat PEP clients at the Center, utilizing PEP between two and five times during the approximately 19-month observation period. In the PEP using cohort, previously vetted predictors of HIV seroconversion were associated with PEP use (number of sexual partners, methamphetamine and nitrate use, and prior STIs)—suggesting that PEP is being used appropriately by at-risk populations.^{21,22} This finding is reassuring given that the cost-effectiveness of this intervention is dependent upon its uptake by those at highest risk for HIV infection.^{6,8}

TABLE 2. MULTIVARIATE LOGISTIC REGRESSION RESULTS FOR BEHAVIORAL DIFFERENCES BETWEEN ALL POSTEXPOSURE PROPHYLAXIS USERS AND HIGH-RISK, NON-POSTEXPOSURE PROPHYLAXIS CLIENTS

<i>Risk factor</i>	<i>Estimate</i>	<i>SE</i>	<i>p-value</i>	<i>OR (95% CI)</i>
Gender (REF=female)				$p=0.0009$
Male	0.70	0.19	0.0002	2.02 (1.40–2.91)
Other	0.67	0.41	0.10	1.96 (0.89–4.35)
Age group (REF=30–39)				$p=0.007$
<20	–0.29	0.29	0.31	0.75 (0.43–1.31)
20–24	–0.44	0.13	0.0011	0.64 (0.49–0.84)
25–29	–0.09	0.11	0.44	0.92 (0.74–1.14)
40–49	–0.10	0.13	0.43	0.91 (0.71–1.16)
50+	–0.55	0.22	0.01	0.58 (0.38–0.88)
Orientation (REF=heterosexual)				$p=0.0004$
Gay/homosexual	0.61	0.15	<0.0001	1.83 (1.38–2.44)
Bisexual	0.54	0.18	0.003	1.71 (1.21–2.42)
Other	0.76	0.32	0.02	2.13 (1.14–4.00)
Education level (REF=college grad)				$p<0.0001$
HS grad or below	–0.01	0.13	0.93	0.99 (0.77–1.27)
Some college	0.30	0.10	0.004	1.36 (1.10–1.66)
Postgraduate	0.81	0.14	<0.0001	2.24 (1.70–2.96)
Chlamydia infection (REF=never)				$p=0.01$
Ever	–0.26	0.12	0.03	0.77 (0.61–0.97)
Past year	0.29	0.17	0.09	1.34 (0.96–1.88)
Gonorrhea infection (REF=never)				$p=0.004$
Ever	0.07	0.11	0.53	1.07 (0.86–1.33)
Past year	0.54	0.16	0.0009	1.71 (1.25–2.35)
Syphilis infection (REF=never)				$p=0.02$
Ever	–0.48	0.20	0.02	0.62 (0.42–0.92)
Past year	0.28	0.24	0.24	1.33 (0.83–2.14)
Meth use (REF=no)				$p=0.0001$
Past year	0.54	0.14	0.0001	1.71 (1.30–2.24)
Nitrate use (REF=no)				$p<0.0001$
Past year	0.48	0.11	<0.0001	1.62 (1.30–2.01)
Sexual partners in the last 30 days				$p<0.0001$
Per additional partner	0.03	0.01	<0.0001	1.03 (1.02–1.05)

TABLE 3. MULTIVARIATE LOGISTIC REGRESSION RESULTS OF POSTEXPOSURE PROPHYLAXIS STATUS (REPEAT POSTEXPOSURE PROPHYLAXIS VERSUS SINGLE POSTEXPOSURE PROPHYLAXIS) REGRESSED ON DEMOGRAPHICS, MAY 2011–DECEMBER 2012

Risk factor	All		Repeat PEP		Single PEP	
	n	%	n	%	n	%
Gender						<i>p</i> = 0.91
Male	603	92.9%	117	97.5%	486	91.9%
Female	37	5.7%	3	2.5%	34	6.4%
Other	9	1.4%	0	0.0%	9	1.7%
Age group						<i>p</i> = 0.23
< 20	16	2.5%	2	1.7%	14	2.6%
20–24	98	15.1%	12	10.0%	86	16.3%
25–29	170	26.2%	34	28.3%	136	25.7%
30–39	232	35.7%	49	40.8%	183	34.6%
40–49	107	16.5%	15	12.5%	92	17.4%
50+	26	4.0%	8	6.7%	18	3.4%
Race/ethnicity						<i>p</i> = 0.34
White	276	42.5%	49	40.8%	227	42.9%
African American	57	8.8%	9	7.5%	48	9.1%
Hispanic	230	35.4%	48	40.0%	182	34.4%
Asian/PI	58	8.9%	10	8.3%	48	9.1%
Other	28	4.3%	4	3.3%	24	4.5%
Orientation						<i>p</i> = 0.31
Gay/homosexual	490	75.5%	103	85.8%	387	73.2%
Bisexual	77	11.9%	11	9.2%	66	12.5%
Heterosexual	69	10.6%	6	5.0%	63	11.9%
Other	13	2.0%	0	0.0%	13	2.5%
Education level						<i>p</i> = 0.14
HS grad or below	104	16.0%	12	10.0%	92	17.4%
Some college	182	28.0%	26	21.7%	156	29.5%
College grad	266	41.0%	59	49.2%	207	39.1%
Postgraduate	79	12.2%	16	13.3%	63	11.9%
Unknown	18	2.8%	7	5.8%	11	2.1%
Total	649	100.0%	120	100.0%	529	100.0%

PEP, postexposure prophylaxis.

TABLE 4. MULTIVARIATE LOGISTIC REGRESSION RESULTS FOR BEHAVIORAL DIFFERENCES IN REPEAT POSTEXPOSURE PROPHYLAXIS USE VERSUS SINGLE POSTEXPOSURE PROPHYLAXIS USE

Risk factor	Estimate	SE	p-value	OR
Age group (REF = 30–39)				<i>p</i> = 0.25
< 20	0.13	0.83	0.88	1.13 (0.23–5.73)
20–24	–0.28	0.38	0.46	0.76 (0.36–1.59)
25–29	0.12	0.27	0.65	1.13 (0.67–1.90)
40–49	–0.56	0.35	0.11	0.57 (0.29–1.14)
50+	0.66	0.48	0.16	1.94 (0.76–4.93)
Education level (REF = college grad)				<i>p</i> = 0.13
HS grad or below	–0.60	0.37	0.10	0.55 (0.27–1.12)
Some college	–0.54	0.28	0.05	0.58 (0.34–1.00)
Postgraduate	0.02	0.33	0.95	1.02 (0.54–1.93)
Orientation (REF = heterosexual)				<i>p</i> = 0.16
Bisexual	0.29	0.56	0.60	1.34 (0.45–4.01)
Gay/homosexual	0.73	0.46	0.11	2.08 (0.85–5.11)
Meth use (REF = no)				<i>p</i> = 0.0001
Past year	1.03	0.27	0.0001	2.80 (1.65–4.75)

African American and Latino individuals have been shown to be at substantially greater risk for HIV infection than white individuals both nationally and at the Center. Epidemiologic data for the Center testing population during this analysis period show that African Americans made up 8.5% of our total population (both high-risk, non-PEP, and PEP), but this racial group made up 16.7% of the total HIV-positive test results. Hispanics made up 32.6% of the total population, but 42.4% of HIV positives. In contrast, whites made up 46.5% of the total population, but only 30.4% of HIV positives. Given this health disparity, similar rates of PEP use by these communities raise concern that the most at-risk racial groups are not fully aware of this emerging prevention tool. Even with ongoing educational efforts regarding combination HIV prevention strategies, broader coverage of these HIV prevention and health promotional education efforts is required to reach these at-risk populations and reduce HIV health disparities.

PEP is optimally used as an emergency intervention in the face of an unplanned and rare episode of condom nonuse or failure. However, high rates of multiple PEP use raise concern that sexual risk in such individuals is ongoing or possibly being facilitated by the availability of PEP. In multivariate analysis, methamphetamine use was the only behavioral risk factor predictive of repeat PEP use. Given that methamphetamine users have been previously documented as one of the most at-risk groups for contraction and propagation of HIV,^{23–25} especially when using other drugs in concert,^{26,27} the high uptake of multiple courses of PEP by stimulant users is encouraging and shows that this population is seeking and utilizing ART-based prevention strategies. It has been previously reported that PEP use in methamphetamine users appeared to be adequately supported by an incentive-based program to reduce methamphetamine use during the PEP course,²⁸ but few data are available on PEP use by stimulant users in other contexts. Higher PEP utilization by this cohort may be due to specific outreach and education efforts that have heightened the awareness of biomedical prevention tools among methamphetamine-using MSM in greater Los Angeles. Therefore, this finding may not be generalizable to other jurisdictions.

Repeat PEP use by stimulant users indicates ongoing risk behavior and suggests that an alternative strategy, such as PrEP, might be a more appropriate tool for HIV prevention than repeat PEP courses. However, the appropriate threshold of risk behavior that would indicate PrEP, as opposed to PEP, has yet to be determined. In the absence of such discernible differences in our population, the mere use of repeat courses of PEP within a given time period (perhaps 1 year) might be sufficient evidence of transmission risk to consider a PrEP-based strategy—at least until such time as transmission risk behavior could be reduced or mitigated.

This study has several important limitations. The study involves a retrospective chart review and is cross-sectional in nature, and therefore is able to comment only on association, rather than causality. Additionally, the population that may seek care at the Center may not be representative of the larger HIV epidemic or at-risk population in Los Angeles, or elsewhere—as it presupposes that an individual would be able to access a geographically specific location, and would be comfortable self-identifying as someone who would be seeking services at an LGBT-focused health center. Rates of follow-up in this cohort were low, paralleling the follow-up

rates found in other studies.²⁹ Occupational PEP guidance has been revised to allow 4–6 week follow-up and 4 month follow-up, provided a fourth generation screening enzyme immunoassay (EIA) is used, to increase retention and follow-up.³⁰ Provided the CDC revises nonoccupational PEP (nPEP) recommendations to mirror occupational guidelines, nPEP follow-up rates may be similarly improved. In addition, the exposure time was self-reported, but the time of first dosage was not reported by the client. Although the dispensation time was used as a proxy for the initial dosage, the calculated window of time from exposure to first dosage may be biased if a client took the first PEP dosage significantly after the dispensation time. Finally, the ability to characterize the sexual partnering of only the prior two sexual encounters in the current risk-behavior standard inventory may not sufficiently broadly characterize the totality of sexual risk behavior, underestimating HIV transmission risk behavior.

Many research questions remain regarding the use of PrEP in stimulant users, as the effectiveness of PrEP is so tightly correlated with adherence to the daily intervention. Although daily adherence to medications has proven challenging in other contexts for stimulant users, ongoing open-label demonstration projects will hopefully contain broad representation from diverse populations, including stimulant users, and may be better able to inform this question.

Future research should focus on determining the level of risk that distinguishes an occasional PEP user from an individual more properly suited for PrEP. These findings will ultimately increase the cost effectiveness of such biomedical HIV prevention tools and ensure that they are utilized by the most appropriate, at-risk populations.

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References

1. Panlilio AL, Cardo DM, Grohskopf LA, *et al.*: Updated US public health service guidelines for the management of occupational exposures to HIV and recommendations for postexposure prophylaxis. *MMWR Morb Mortal Wkly Rep* 2005;54:1–17.
2. Smith DK, Grohskopf LA, Black RJ, *et al.*: Antiretroviral postexposure prophylaxis after sexual, injection drug use, or other nonoccupational exposure to HIV in the United States: Recommendations from the U.S. Department of Health and Human Services. *MMWR Morb Mortal Wkly Rep* 2005;54:1–20.

3. LaFon SW, Mooney BD, McMullen JP, *et al.*: A double-blind, placebo controlled study of the safety and efficacy of Retrovir (zidovudine, ZDV) as a chemoprophylactic agent in health care workers (HCW) exposed to HIV. 30th Inter-science Conference on Antimicrobial Agents and Chemotherapy. October 21–24, 1990, Atlanta, GA. Abstract 167.
4. Havens PL: Postexposure prophylaxis in children and adolescents for nonoccupational exposure to human immunodeficiency virus. *Pediatrics* 2003;111:1475–1489.
5. Mayer KH, Mimiaga MJ, Cohen D, *et al.*: Tenofovir DF plus lamivudine or emtricitabine for nonoccupational postexposure prophylaxis (NPEP) in a Boston Community Health Center. *JAIDS* 2008;47:494–499.
6. Pinkerton SD, Martin JN, Roland ME, *et al.*: Cost-effectiveness of postexposure prophylaxis after sexual or injection-drug exposure to human immunodeficiency virus. *Arch Intern Med* 2004;164:46–54.
7. Laporte A, Jourdan N, Bouvet E, *et al.*: Post-exposure prophylaxis after non-occupational HIV exposure: Impact of recommendations on physicians' experiences and attitudes. *AIDS* 2002;16:397–405.
8. Herida M, Larsen C, Lot F, *et al.*: Cost-effectiveness of HIV post-exposure prophylaxis in France. *AIDS* 2006;20:1753–1761.
9. Scheid DC, Hamm RM, and Stevens KW: Cost effectiveness of human immunodeficiency virus postexposure prophylaxis for healthcare workers. *Pharmacoeconomics* 2000;18:355–368.
10. Landovitz RJ, Combs KB, Currier JS, *et al.*: Availability of HIV postexposure prophylaxis services in Los Angeles County. *Clin Infect Diseases* 2009;48:1624–1627.
11. The National HIV Prevention Inventory: The state of HIV prevention across the U.S. NASTAD and the Kaiser Family Foundation. Updated 2009. Accessed May 22, 2013. Available from <http://kaiserfamilyfoundation.files.wordpress.com/2013/01/7932.pdf>.
12. Sayles J, Perez M, Garcia G, *et al.*: Reducing cases of HIV: Implementation of post-exposure prophylaxis. In: *Public Health Practice: What Works*, 1st ed. (Fielding JE, Teutsch SM, eds.). Oxford University Press, New York, 2013, pp. 343–355.
13. Beymer MR: Los Angeles LGBT Center internal yearly report. Unpublished raw data 2013.
14. Kahn JO, Martin JN, Roland ME, *et al.*: Feasibility of postexposure prophylaxis (PEP) against human immunodeficiency virus infection after sexual or injection drug use exposure: The San Francisco PEP Study. *JPN J Infect Dis* 2001;183:707–714.
15. Sonder GJ, van den Hoek A, Regez RM, *et al.*: Trends in HIV postexposure prophylaxis prescription and compliance after sexual exposure in Amsterdam, 2000–2004. *Sex Trans Dis* 2007;34:288–293.
16. Schechter M, do Lago RF, Mendelsohn AB, *et al.*: Behavioral impact, acceptability, and HIV incidence among homosexual men with access to postexposure chemoprophylaxis for HIV. *J Acquir Immun Defic Syndr* 2004;35:519–525.
17. Poynten IM, Jin F, Mao L, *et al.*: Nonoccupational post-exposure prophylaxis, subsequent risk behaviour and HIV incidence in a cohort of Australian homosexual men. *AIDS* 2009;23:1119–1126.
18. Zablotska IB, Prestage G, Holt M, *et al.*: Australian gay men who have taken nonoccupational postexposure prophylaxis for HIV are in need of effective HIV prevention methods. *JAIDS* 2011;58:424–428.
19. Prada N, Davis B, Jean-Pierre P, *et al.*: Drug-susceptible HIV-1 infection despite intermittent fixed-dose combination tenofovir/emtricitabine as prophylaxis is associated with low-level viremia, delayed seroconversion, and an attenuated clinical course. *JAIDS* 2008;49:117–122.
20. Division of HIV and STD Programs, Los Angeles County Department of Public Health, the Los Angeles County Commission on HIV, and the Los Angeles County HIV Prevention Planning Committee: Los Angeles County Five-Year Comprehensive HIV Plan (2013–2017), March 2013, p. 59.
21. Buchbinder SP, Vittinghoff E, Heagerty PJ, *et al.*: Sexual risk, nitrite inhalant use, and lack of circumcision associated with HIV seroconversion in men who have sex with men in the United States. *JAIDS* 2005;39:82–89.
22. Menza TW, Hughes JP, Celum CL, *et al.*: Prediction of HIV acquisition among men who have sex with men. *Sex Trans Dis* 2009;36:547–555.
23. Prejean J, Song R, Hernandez A, *et al.*: Estimated HIV incidence in the United States, 2006–2009. *PLoS One* 2011;6:e17502.
24. Buchacz K, McFarland W, Kellogg TA, *et al.*: Amphetamine use is associated with increased HIV incidence among men who have sex with men in San Francisco. *AIDS* 2005;19:1423–1424.
25. Carey JW, Mejia R, Bingham T, *et al.*: Drug use, high-risk sex behaviors, and increased risk for recent HIV infection among men who have sex with men in Chicago and Los Angeles. *AIDS Behav* 2009;13:1084–1096.
26. Plankey MW, Ostrow DG, Stall R, *et al.*: The relationship between methamphetamine and popper use and risk of HIV seroconversion in the Multicenter AIDS Cohort Study. *JAIDS* 2007;45:85–92.
27. Ostrow DG, Plankey MW, Cox C, *et al.*: Specific sex drug combinations contribute to the majority of recent HIV seroconversions among MSM in the MACS. *JAIDS* 2009;51:349–355.
28. Landovitz RJ, Fletcher JB, Inzhakova G, *et al.*: A novel combination HIV prevention strategy: Post-exposure prophylaxis with contingency management for substance abuse treatment among methamphetamine-using men who have sex with men. *AIDS Patient Care Std* 2012;26:320–328.
29. Bogoch II, Scully EP, Zachary KC, *et al.*: Patient attrition between the emergency department and clinic among individuals presenting for HIV on occupational postexposure prophylaxis. *Clin Infect Dis* 2014;58:1618–1624.
30. Kuhar DT, Henderson DK, Struble KA, *et al.*: Updated US Public Health Service guidelines for the management of occupational exposures to human immunodeficiency virus and recommendations for postexposure prophylaxis. *Infect Control Hosp Epidemiol* 2013;34:875–892.

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