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Factors associated with obtaining sterile syringes from pharmacies among persons who inject drugs in 20 US cities

Maria Zlotorzynska[a,*], **Paul J. Weidle**[b], **Gabriela Paz-Bailey**[b], **Dita Broz**[b] **NHBS Study Group**[1]

[a]Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA, USA

[b]Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention (CDC), Atlanta, GA, USA

Abstract

Background: Increased access to sterile syringes has been shown to reduce HIV risk among people who inject drugs (PWID). Where syringe services programs (SSPs) are limited, pharmacies are an important sterile syringe source. We assessed factors associated with using pharmacies as the primary source of syringes among PWID from 20 US cities.

Methods: PWID ages ≥18 years were recruited for the 2015 National HIV Behavioral Surveillance using respondent-driven sampling. Using generalized estimating equation (GEE) models, we assessed demographic characteristics independently associated with participant-reported primary syringe source: pharmacies vs. SSPs. We calculated associations between primary syringe source and various behavioural outcomes, adjusted for participant characteristics.

Results: PWID who were < 30 years old, female, white, and less frequent injectors were more likely have used pharmacies as their primary syringe source. Accessing syringes primarily from pharmacies, as compared to SSPs, was associated with receptive syringe sharing and unsafe

*Corresponding author at: Rollins School of Public Health, Emory University, 1518 Clifton Rd NE, Atlanta, GA 30322, USA. mzlotor@emory.edu (M. Zlotorzynska).

[1]The NHBS Study Group includes following members: Atlanta, GA: Pascale Wortley, Jeff Todd, Kimi Sato; Baltimore, MD: Colin Flynn, Danielle German; Boston, MA: Dawn Fukuda, Rose Doherty, Chris Wittke; Chicago, IL: Nikhil Prachand, Nanette Benbow, Antonio D. Jimenez; Dallas, TX: Jonathon Poe, Shane Sheu, Alicia Novoa; Denver, CO: Alia Al-Tayyib, Melanie Mattson; Detroit, MI: Vivian Griffin, Emily Higgins, Kathryn Macomber, Houston, TX: Salma Khuwaja, Zaida Lopez, Paige Padgett; Los Angeles, CA: Ekow Kwa Sey, Yingbo Ma; Miami, FL: Marlene LaLota, John-Mark Schacht, David Forrest; Nassau-Suffolk, NY: Bridget Anderson, Anthony Romano, Lou Smith; New Orleans, LA: William T. Robinson, Narquis Barak, Meagan C. Zarwell; New York City, NY: Alan Neaigus, Kathleen H. Reilly; Newark, NJ: Barbara Bolden, Afework Wogayehu, Henry Godette; Philadelphia, PA: Kathleen A. Brady, Mark Shpaner, Jennifer Shinefeld; San Diego, CA: Lissa Bayang, Veronica Tovar-Moore; San Francisco, CA: H. Fisher Raymond, Theresa Ick; San Juan, PR: Sandra Miranda De León, Yadira Rolón-Colón; Seattle, WA: Tom Jaenicke, Hanne Thiede, Richard Burt; Washington, DC: Jenevieve Opoku, Irene Kuo; CDC: Winston Abara, Alexandra Balaji, Dita Broz, Laura Cooley, Melissa Cribbin, Paul Denning, Katherine Doyle, Teresa Finlayson, Kathy Hageman, Kristen Hess, Brooke Hoots, Wade Ivy, Rashunda Lewis, Stacey Mason, Lina Nerlander, Gabriela Paz-Bailey, Taylor Robbins, Kathryn Salo, Catlainn Sionean, Amanda Smith, Justin Smith, Michael Spiller, Cyprian Wejnert, Mingjing Xia.

Author contribution

M. Zlotorzynska and D. Broz developed the concept and planned the data analyses. M. Zlotorzynska performed all data analyses and led the writing of the manuscript. D. Broz and P. Weidle conducted the literature searches and contributed to writing sections of the manuscript. G. Paz-Bailey was the principal investigator of NHBS at the time of data collection and contributed substantially to interpreting the findings, and reviewing and editing the final manuscript. All authors contributed to and have approved the final manuscript.

syringe disposal; using sterile syringes, recent HIV testing and participation in an HIV behavioural intervention were negatively associated with primary pharmacy use.

Conclusions: Pharmacies can play an important role in comprehensive HIV prevention among PWID. Linkage to HIV interventions and syringe disposal services at pharmacies could strengthen prevention efforts for PWID who cannot access or choose not to utilize SSPs.

Keywords

Injection drug use; Non-prescription syringe sales; Syringe services programs; Behavioural surveillance

Introduction

Persons who inject drugs (PWID) are at increased risk of transmission of blood-borne pathogens, including HIV and hepatitis C virus (HCV), through injection equipment sharing. PWID represent approximately 9% of new HIV diagnoses despite representing only an estimated 0.3% of the population in the United States (Centers for Disease Control & Prevention, 2018; Oster et al., 2015). Between 2010 and 2014, reported cases of HCV infection increased by 158%, a trend that has been attributed in large part to the rise in injection of heroin and other opioids (Centers for Disease Control & Prevention, 2013; Jones, Logan, Gladden, & Bohm, 2015). Increasing access to sterile syringes is an effective strategy to reduce transmission of HIV and other blood-borne pathogens (2012). In the United States, syringe services programs (SSPs) and non-prescription syringe sales (NPSS) at pharmacies are the primary sources of sterile syringes for PWID where these sources are available (Bluthenthal et al., 2004; Rich, Wolf, & Macalino, 2002).

SSPs are an important component of efforts to reduce HIV transmission among PWID (Centers for Disease Control & Prevention, 2012). In addition to providing sterile syringes, SSPs offer a range of services, such as HIV testing, behavioural interventions, and referrals to substance use disorder treatment programs. Importantly, SSPs play a role in maintaining public safety by disposing of used syringes. However, several legal and financial constraints limit their reach. Only 16 states have explicitly authorized SSPs (Oramasionwu, Johnson, Zule, Carda-Auten, & Golin, 2015). SSPs are predominantly located in urban areas and as injection drug use patterns shift increasingly to suburban and rural areas (Suryaprasad et al., 2014), spatial barriers can impede access to sterile syringes for PWID. Thus, in areas where the operation of SSPs is limited or non-existent, pharmacy NPSS are an important source of sterile syringes for PWID (Stopka, Donahue, Hutcheson, & Green, 2017).

Pharmacies play a critical role in the public health response to the HIV epidemic by providing sterile syringes to PWID who are unwilling or unable to get them from SSPs. Pharmacies are more geographically widespread than SSPs and do not operate under the same financial constraints that limit their hours of operation. They may also offer more anonymity to those engaging in stigmatized behaviours. Increased access to sterile syringes through NPSS has been associated with reduced risky injection behaviour (Cotten-Oldenburg, Carr, DeBoer, Collison, & Novotny, 2001; Pouget et al., 2005; Vlahov, 1995).

NPSS are permitted in all stales (Oramasionwu et al., 2015), but are dependent upon both drug paraphernalia laws and laws that regulate syringe sales. Laws that specifically regulate syringe sales may require proof of identification or age, limiting the quantity of syringes that can be purchased, and maintaining records of buyers. NPSS implementation is often left to the pharmacist's discretion and individual store policy. Thus, syringe access for PWID depends on the pharmacist's or store's patterns of practice (Reich et al., 2002; Taussig, Junge, Burris, Jones, & Sterk, 2002). Additionally, most pharmacies do not offer comprehensive harm-reduction services nor provide safe disposal of used syringes (Cooper et al., 2010; Janulis, 2012; Riley et al., 2010).

PWID who access pharmacies for syringes may have different demographic and behavioural risk characteristics than those who primarily use SSPs. They may also have different service utilization patterns and prevention behaviours due to the lack of comprehensive harm-reduction services in pharmacies. While there have been a few localized studies that examined differences in PWID who access syringes from pharmacies as compared to other sources (Costenbader, Zule, & Coomes, 2010; Fuller et al., 2004; Riley et al., 2010; Rudolph et al., 2010; Vorobjov et al., 2009), to date, there have been no studies using data from a large, geographically diverse sample of PWID. Further exploration of the factors associated with obtaining syringes from pharmacies may provide insights to help tailor comprehensive prevention services for this group and increase uptake of harm-reduction services, when available. The present study uses data from the 2015 United States National HIV Behavioral Surveillance (NHBS) system in 20 cities to characterize the population who primarily obtain syringes from pharmacies compared to those who primarily obtain syringes from SSPs.

Methods

Recruitment and data collection

In 2015, NHBS surveys of PWID were implemented in 20 U.S. cities within metropolitan statistical areas with > 500,000 residents. Methods for NHBS among PWID are described in detail elsewhere (Lansky et al., 2007). Participants were recruited using respondent-driven sampling (RDS) (Heckathorn, 1997; Lansky et al., 2007). Briefly, eligible initial recruits, identified during the formative assessment phase (Allen, Finlayson, Abdul-Quader, & Lansky, 2009), were asked to recruit up to five PWID whom they knew personally to complete the survey. Eligible recruits completed the survey and were asked to recruit others by using a system of coded coupons and this recruitment process continued until the sample size was reached (n = 500 per city) or the sampling period ended. A summary of findings from the full NHBS sample of PWID is available (Centers for Disease Control & Prevention, 2018).

Persons were eligible to participate and recruit if they injected drugs in the past 12 months and were aged ≥ 18 years, current residents of the city, able to complete the survey in either English or Spanish, and able to provide informed consent. Drug injection in the past 12 months was confirmed by observing physical evidence of recent injection (e.g., track marks) and by assessing knowledge of injection practices. Eligible participants who provided informed consent completed an interview and were offered HIV testing. Trained interviewers conducted the face-to-face interviews, which consisted of questions concerning

participants' demographic characteristics, sexual and drug-use behaviours, and use of HIV prevention services and programs.

Participants received $20–$30 for completing the survey, $10–$25 for HIV testing and additional $10–$20 for each person recruited (up to 5) who completed the interview; amounts were determined locally.

No personally identifying information was collected during enrolment, interview, or HIV testing. NHBS was approved by the Centers for Disease Control and Prevention and institutional review boards at each of the participating cities.

Measures

We focused the analyses on a dichotomous measure that describes the participants' primary source for new, sterile syringes: pharmacy vs. SSPs. Participants were asked where they got their new sterile needles and syringes when they injected in the past 12 months. If more than one source was reported, participants were also asked which source was the most frequently used. Anyone who reported pharmacies as the only or most frequently used source, if more than one, was coded as having obtained syringes primarily from pharmacies (from here on "primarily-pharmacies"). Similarly, "primarily-SSPs" included those who reported SSPs as the only or most frequently used source. PWID who reported sources other than pharmacies or SSPs (e.g., friends, family, off the street) as their only or most frequently used source of syringes were excluded. We chose to focus these analyses on comparisons between PWID who obtained syringes primarily through these sources, as they represented the most commonly reported facilities that could also provide syringe disposal, harm-reduction and prevention services.

Several covariates were examined as independent predictors of primary syringe source. These included demographic characteristics: age (18–29, 30 and older), race/ethnicity (non-Hispanic while and other race/ethnicity), gender, education (less than high school or equivalent, and high school diploma/equivalent or higher) current health insurance, currently homeless, and state law regarding SSPs in the respondent's stale of residence at the time of the interview (Burris, 2017). Self-reported HIV status was coded as HIV-positive, negative and unknown (never tested, did not obtain results or don't know result). Most commonly injected drug and injection frequency (daily or more, and less than daily) were defined for the past 12 months.

We examined several behavioural outcomes defined for the past 12 months, including using sterile syringes for all injections and any receptive sharing of syringes. Syringe disposal methods were classified as safe if the participant "put it in medical waste disposal container, such as Red Box," "took it to a needle or syringe exchange program", or unsafe if the participant "threw it away, e.g. in the trash or on the street", "kept it to re-use it," or "gave or sold it to someone else." Syringe disposal methods were not mutually exclusive and participants were asked to report all methods used in the past 12 months. Having received HIV testing in the past 12 months included the following three categories: 1) tested in the past 12 months (includes those who tested HIV-positive and HIV-negative), 2) did not test because participant has been previously diagnosed with HIV, and 3) did not test for any

other reasons. Participating in an individual or group HIV behavioural intervention was defined as a one-on-one conversation with a counsellor or an organized discussion regarding HIV prevention, respectively, and that did not include counselling received as part of an HIV test or conversations with friends.

Statistical analysis

Descriptive statistics of syringe sources, demographic and behavioural characteristics are presented for the total sample and by primary source of syringes: primarily-pharmacies and primarily-SSPs. Generalized estimating equation (GEE) models based on a Poisson distribution were used to calculate prevalence ratios (PR) and 95% confidence intervals (CI) for associations between the independent covariates defined above and primary source of syringes as the outcome. Estimating PRs using Poisson regression is preferred to estimating odds ratios using logistic regression and PRs have been found to be robust estimates of the strength of associations for binary outcomes in cross-sectional studies, particularly when the outcome is not rare (Barros & Hirakata, 2003).

Bivariate models accounted for RDS sampling methodology. Our analyses adjusted models for the general dependence among observations linked to one another in recruitment networks by using GEE with an exchangeable correlation matrix, clustered by recruitment chain (Wagner et al., 2011; Zeger & Liang, 1986). Estimates were adjusted for homophily (the tendency for people to associate with, and subsequently recruit, others with similar characteristics) and the direct dependence among the recruiter and recruit by including the recruiter's value on the outcome (primary source of syringes) in the model (Frost et al., 2006; Szwarcwald, de Souza, Damacena, Junior, & Kendall, 2011). We took the multi-site nature of the sampling design into account by adjusting for city in the models.

Similar Poisson models were used to calculate PR and 95% CI for associations between primary syringe source and several behavioural outcomes in the past 12 months: using sterile syringes for all injections, any receptive sharing of syringes, any unsafe syringe disposal, testing for HIV and participation in an HIV behavioural intervention. These models accounted for RDS sampling methodology as described above, and included the recruiter's value for each behavioural outcome. Adjusted PR (aPR) and 95% CI were calculated for each outcome and adjusted for age, race/ethnicity, gender, education, current homelessness, self-reported HIV status and injection frequency. The model used for HIV testing included only the subset of the sample that did not receive an HIV-positive diagnosis over 12 months ago and the aPR was not adjusted for self-reported HIV status. All analyses were conducted using SAS Version 9.3 (SAS Institute Inc., Cary, NC).

Results

Of the 10,413 PWID in the 2015 NHBS sample, 6321 (60.7%) reported using either primarily-pharmacies or primarily-SSPs for new sterile syringes and were included in this analysis. Among this group, 2569 (40.6%) reported using primarily-pharmacies and 3752 (59.4%) reported using primarily-SSPs. PWID could report multiple sources of syringes (Table 1). Among both those who used primarily-SSPs or primarily-pharmacies, a friend, relative or sex partner was the second most commonly reported source. Among

participants who used primarily-pharmacies, 29.0% also reported obtaining syringes from SSPs. Likewise, 39.9% of participants who used primarily-SSPs obtained some of their syringes from pharmacies. Similar proportions of each group reported exclusive use of their primary syringe source (29.0% and 29.6% for primarily-pharmacies and primarily-SSPs, respectively).

Demographic and behavioural characteristics for those who used primarily-pharmacies and primarily-SSPs are presented in Table 2. The sample was predominantly older than 30 years and male, and almost half (44.5%) were non-Hispanic white. Approximately two-thirds (67.1%) of the sample resided in states where SSPs were explicitly authorized by law. Of the 2569 PWID who used primarily-pharmacies, 1405 (54.7%) lived in states where SSPs were explicitly authorized under the law. The most commonly injected drug was heroin and most participants reported injecting daily.

The most frequently reported methods of syringe disposal (not mutually exclusive) among participants who used primarily-pharmacies were throwing them away, e.g. in the trash or the street (1993/2569, 77.6%), followed by keeping them to re-use (1346/2569, 52.4%), while participants who used primarily-SSPs most frequently reported taking used syringes to an SSP (2803/3752, 74.7%), followed by throwing them away (1697/3752, 45.2%) (data not shown).

Bivariate analyses of participant characteristics associated with using primarily-pharmacies, among PWID who used either pharmacies or SSPs as their primary source of syringes are described in Table 3. Factors positively associated with using primarily-pharmacies were younger age, non-Hispanic white race, having at least high school level education, having unknown HIV status, recently initiating injection drug use, most often injecting methamphetamine, and most often injecting prescription opioids. Factors negatively associated with using primarily-pharmacies were male sex, current homelessness, residence in a state where SSPs are explicitly authorized, most often injecting speedball and injecting at least daily.

Bivariate associations between primary syringe source (pharmacy vs. SSPs) and behavioural outcomes in the past 12 months are presented in Table 4. Compared to PWID who used primarily-SSPs, PWID who used primarily-pharmacies were more likely to report receptive syringe sharing and unsafe syringe disposal, and less likely to report using sterile syringes for all injections, recent testing for HIV and participation in an individual or group HIV behavioural intervention. These associations remained significant after adjusting for demographics, HIV status and injection frequency.

Discussion

In 2015, one-quarter of all PWID surveyed in 20 geographically diverse cities in the United States reported using pharmacies as their primary source to obtain sterile syringes. While over half of those PWID who reported pharmacies as the primary syringe source resided in states where SSPs were explicitly authorized by law, only 29% of this group reported any SSP utilization in the past 12 months, suggesting potential preference for pharmacies

by some PWID, low SSP coverage and/or barriers to accessing SSPs. Furthermore, 40% of PWID who primarily obtain sterile syringes from SSPs also obtained some of their syringes from pharmacies. These findings suggest that PWID use multiple sources of sterile syringes and that pharmacies can play a role in the overall effort to reduce transmission of blood-borne infections through contaminated use of injection equipment, particularly among PWID who do not have consistent access to SSPs. While SSPs are the key intervention for providing comprehensive, integrated prevention and harm-reduction services to PWID, pharmacies should be considered an important partner to complement SSPs where these services exist and provide access to syringes and other health care needs of PWID where SSPs do not exist.

The key findings in this study are that PWID who primarily use pharmacies to obtain sterile syringes are demographically distinct, more likely to engage in unsafe injection practices and syringe disposal, and less likely to access some HIV prevention services, compared to those who primarily access SSPs. First, PWID who were younger, non-Hispanic white, had at least a high school education and were not homeless at the time of the interview were more likely to access syringes primarily from pharmacies. Consistent with previous studies (Cao & Treloar, 2006; Rudolph et al., 2010; Vorobjov et al., 2009), we found that PWID who reported injecting drugs less frequently and PWID who initiated injection in the past five years were more likely to have primarily obtained syringes from pharmacies. Younger, more recently initiated PWID may still prefer to hide their drug use and thus not attend programs specifically associated with injection drug use. They may also not reside close to drug markets in central cities, where SSPs are frequently located. Several studies have found that younger PWID are more likely to engage in higher-risk injection behaviours (Boodram, Mackesy-Amiti, & Latkin, 2015; Broz et al., 2014; Thorpe, Bailey, Huo, Monterroso, & Ouellet, 2001), thus ensuring sufficient access to sterile injection equipment and other prevention services to younger PWID as soon as they start injecting is critical.

Second, although both SSPs and pharmacies provide access to sterile syringes, PWID who utilized primarily-pharmacies were less likely to report using them for all injections and more likely to have engaged in receptive syringe sharing in the past 12 months, compared to PWID who utilized primarily-SSPs. It may be that PWID who use pharmacies as their primary source of syringes may not be able to access an adequate number of syringes to meet their injecting needs; some states have NPSS laws that limit the number of syringes that can bought at one time. Indeed, keeping syringes to re-use was the second most commonly reported disposal method among PWID who utilized primarily-SSPs, with over half the group reporting having done so in the past 12 months.

Third, PWID who utilized pharmacies as their primary source of syringes were 1.5 times as likely to have disposed of used syringes unsafely in the past 12 months. Over three-quarters of those who used primarily-pharmacies reported throwing syringes away after use. Previous studies have also found low rates of return on syringes to pharmacies (Quinn, Chu, Wenger, Bluthenthal, & Kral, 2014; Riley et al., 2010; Tookes et al., 2012). In contrast to SSPs, pharmacy programs to dispose of used syringes such as providing sharps containers, referrals to syringe disposal sites, accepting used syringes, and providing syringe education are limited and non-uniform (Jones & Coffin, 2002). Despite lower prevalence of reported

unsafe disposal among primarily-SSP clients in our sample, almost half of this group reported throwing used syringes away in non-medieal waste, which suggests that more resources for proper syringe disposal may be needed. Thus, increasing access to disposal services through pharmacies is an opportunity to promote safe syringe disposal among PWID, an important benefit to the broader community.

Finally, compared to those PWID who primarily obtained syringes from SSPs, participants who mainly accessed syringes from pharmacies were less likely to have recently been tested for HIV and to have participated in an individual or group HIV behavioural intervention. While those who self-reported as having HIV infection were not more likely to have used primarily-pharmacies, these findings suggest lower engagement with harm-reduction services among the primarily-pharmacy group. Most SSPs provide services beyond syringe access and disposal, including risk-reduction counselling, HIV and hepatitis C testing, and referrals for HIV and hepatitis C care and treatment, substance use disorder treatment and other health and social services (Des Jarlais et al., 2015). Previously, recent HIV testing was found to be less common among NHBS participants who reported receptive syringe sharing, underscoring the importance of integrating testing and prevention services for PWID within spaces where they access sterile syringes (Cooley, Wejnert, Spiller, Broz, & Paz-Bailey, 2016). NPSSs may be an opportunity to provide similar services, including HIV testing, pamphlets on safer injection practices, and referrals to other services, to PWID who may not be reached by SSPs.

Limitations

There are several limitations to this study, including potential for social desirability bias stemming from the face-to-face interviews used for data collection. Thus, the prevalence of stigmatized behaviours, such as use of unsterile syringes, may be under-reported. Furthermore, RDS sampling weights were not used in our analyses. However, we account for the potential sampling biases by adjusting for recruitment chains in GEE regression and by adjusting for participants' network size and the recruiters' value on the outcome. Without a known sampling frame, generalizability to other PWID, even within the participating cities, is unknown. Finally, NHBS recruitment is conducted in cities with high HIV prevalence, thus our findings may not reflect risk behaviours in lower prevalence areas.

Public health implications

Although NPSS are permitted in all stales, access to NPSS varies by state and even within the same state or city based on restrictions within state laws, store policy and/or an individual pharmacist's discretion (Chiarello, 2016). Since the application of drug paraphernalia and NPSS laws is often left to the discretion of the individual pharmacist or retail outlet, PWID may find it difficult to consistently purchase syringes. In one study, only 21% of attempts to buy syringes in two California counties in 2013 were successful, despite passage of legislation in 2011 making the sale and possession of up to 30 syringes legal without a prescrip Lion. (Pollini, Rudolph, & Case, 2015) In the same study, almost half of pharmacists believed a prescription was still required, which illustrates the gap between policy and practice (Chiarello, 2016; Deibert et al., 2006; Janulis, 2012; Pollini et al., 2015; Zaller, Yokell, Apeakorang, Gaggin, & Case, 2012). NPSS laws typically allow the sale of

syringes to persons age 18 and over, and some states explicitly require identification as proof of age, which could be a barrier for PWID who otherwise may wish to remain anonymous (Des Jarlais et al., 2015). Other practices may be arbitrarily implemented based on ethical beliefs about illicit drug use that impede access to NPSS, such as asking for the purpose of syringes and requiring proof of diabetes (Chiarello, 2016). Additionally, state laws regarding possession of drug paraphernalia may be interpreted by pharmacists as being in conflict with laws permitting NPSS. For instance, a state law may allow a pharmacist to sell syringes wilhout a prescription, but also may require it be for a legitimate medical purpose; in some states the law may explicitly include the prevention of disease transmission as a legitimate use (Des Jarlais et al., 2015). However, some laws render it a felony if a syringe is used to administer narcotic drugs, creating tension between the public health benefit of syringe sales and the illegality of their use for injecting illicit drugs (Chiarello, 2016). Thus while states allow NPSS, more education and support for pharmacists, from both pharmacy management and state policy makers, is needed for consistent application of NPSS in practice.

There is an opportunity for pharmacies to play a greater role in the prevention of injection-related harms among PWID by providing a wider range of harm-reduction services. Syringe access programs provide a framework, typically developed by a state or local health department, within which specific guidance exists for integrating HIV prevention counselling, pharmacist and pharmacy staff education, syringe disposal or referrals. To date, three states, Minnesota, New York and California, have established pharmacy-based syringe access programs (Kral & Garfein, 2010; Novotny, Cotton-Oldenburg, Bond, & Tracy, 2002; Tesoriero, Battles, Klein, Kaufman, & Birkhead, 2009). These programs can serve as a model for the establishment of similar services in areas with injection drug use and low SSP coverage. Additionally, a 2015 survey of nearly 80% of the over 1000 community pharmacies in Massachusetts, where there is no limit on the number of syringes that can be sold, found that 97% of community pharmacies reported selling non-prescription syringes; they reported median sales per store of 75 per week, which translates into nearly 100,000 non-prescription syringes sold state-wide per week (Stopka et al., 2017). The intended purpose of the sold syringes was not captured, however it demonstrates the scale at which community pharmacies impact the volume of sterile syringe access.

Conclusions

This study examined factors associated with obtaining syringes from pharmacies and SSPs among PWID in 20 US cities. PWID who were younger and non-Hispanic white, were more likely to have accessed syringes primarily from pharmacies. Compared to PWID who used primarily-SSPs, PWID who used primarily-pharmacies reported higher prevalence of receptive syringe sharing and unsafe syringe disposal, and were less likely to have consistently used sterile syringes, been recentlt tested for HIV and participated in HIV behavioural interventions. These findings highlight the need for reduced barriers to syringe access and broader harm-reduction services within the pharmacy setting that could effectively serve PWID who cannot access or prefer not to use SSPs. This need is especially pressing in light of the recent prescription opioid and injection drug use epidemic that has disproportionately affected areas with low SSP coverage (Des Jarlais et al., 2015; Peters et al., 2016). Engaging pharmacies in these efforts is an opportunity to lower risk behaviours

and unsafe syringe disposal, thereby increasing public safety and reducing transmission of blood-borne pathogens. Given the extent of the opioid epidemic in communities throughout the United States, pharmacies could play a key public health role in the prevention of transmission of blood-borne pathogens, including HIV and HCV, and other injection related harms.

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Conflict of interest

We wish to confirm that there are no known conflicts of interest associated wiLh this publication and there has been no significant financial support for this work that could have influenced its outcome.

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Table 1

Frequency of syringe sources among people who inject drugs by primary source of syringes - National HIV Behavioural Surveillance, 20 cities, United States, 2015.

		Primary Source of Syringes			
	Total (N = 10,414)	**Pharmacies or SSPs (N = 6321)**	**Pharmacies (N = 2569)**	**SSPs (N = 3752)**	**Other (N = 4093)**
Any syringe sources reported [a]	N (%)	N (%)[b]	N (%)[c]	N (%)[d]	N (%)[e]
Syringe services program (SSP)	5719 (54.9)	4496 (71.1)	744 (29.0)	3752 (100.0)	1223 (29.9)
Pharmacy	5406 (51.9)	4065 (64.3)	2569 (100.0)	1496 (39.9)	1341 (32.8)
Doctor's office, clinic, hospital	770 (7.4)	404 (6.4)	209 (8.1)	195 (5.2)	366 (8.9)
Friend, relative, sex partner	6705 (64.4)	3411 (54.0)	1424 (55.5)	1987 (53.0)	3294 (80.5)
Drug dealer, shooting gallery, off the street	5033 (48.3)	2174 (34.4)	776 (30.2)	1398 (37.3)	2859 (69.9)
Other	247 (2.4)	101 (1.6)	41 (1.6)	60 (1.6)	146 (3.6)
No other source except SSP or pharmacy[f]	–	–	746 (29.0)	1100 (29.6)	–

[a] Sources of syringes are not mutually exclusive and participants could report multiple sources.

[b] Refers to proportion who reported obtaining syringes from each source, among those who reported either pharmacy or syringe services programs (SSP) as their primary source.

[c] Refers to proportion who reported obtaining syringes from each source, among those who reported pharmacy as their primary source.

[d] Refers to proportion who reported obtaining syringes from each source, among those who reported SSP as their primary source.

[e] Refers to proportion who reported obtaining syringes from each source, among those who reported source other than pharmacy or SSP as their primary source.

[f] Refers to exclusive use of either pharmacies or SSPs.

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Table 2

Characteristics of people who inject drugs and who use pharmacies or syringe services programs (SSPs) as their primary source of sterile syringes, by primary syringe source - National HIV Behavioural Surveillance, 20 cities, United States, 2015.

	Total[a] N (%)	Used Primarily Pharmacies N (%)	Used Primarily SSPs N (%)
TOTAL	6321	2569	3752
Age group (years)			
18–29	1136 (18.0)	567 (22.1)	569 (15.2)
≥ 30	5185 (82.0)	2002 (77.9)	3183 (84.8)
Mean (SD)	43.1 (12.4)	41.7 (12.8)	44.1 (12.1)
Gender			
Male	4534 (71.7)	1846 (71.9)	2688 (71.6)
Female	1787 (28.3)	723 (28.1)	1064 (28.4)
Race			
White, non-Hispanic	2810 (44.5)	1277 (49.7)	1533 (40.9)
Other race/ethnicity	3498 (55.3)	1288 (50.1)	2210 (58.9)
Education			
High school diploma/GED or higher	4569 (72.3)	1960 (76.3)	2609 (69.5)
< High school diploma	1751 (27.7)	608 (23.7)	1143 (30.5)
Currently has health insurance			
Yes	5049 (79.9)	1938 (75.4)	3111 (82.9)
No	1247 (19.7)	622 (24.2)	625 (16.7)
Currently homeless			
Yes	2985 (47.2)	1078 (42.0)	1907 (50.8)
No	3334 (52.7)	1491 (58.0)	1843 (49.1)
Self-reported HIV status			
Positive	317 (5.0)	98 (3.8)	219 (5.8)
Negative	5174 (81.9)	2045 (79.6)	3129 (83.4)
Unknown[b]	813 (12.9)	417 (16.2)	396 (10.6)
Live in states where SSPs are explicitly authorized in state law			
Yes	4239 (67.1)	1405 (54.7)	2834 (75.5)
No	2082 (32.9)	1164 (45.3)	918 (24.5)

	Total[a] N (%)	Used Primarily Pharmacies N (%)	Used Primarily SSPs N (%)
Years since first injection drug use [c]			
5 years or less	1223 (19.3)	591 (23.0)	632 (16.8)
More than 5 years	5095 (80.6)	1978 (77.0)	3117 (83.1)
Injection behaviours, past 12 months			
Most commonly injected drug			
Heroin	4878 (77.2)	1980 (77.1)	2898 (77.2)
Speedball (cocaine and heroin together)	627 (9.9)	204 (7.9)	423 (11.3)
Cocaine (powder or crack)	135 (2.1)	86 (3.3)	49 (1.3)
Methamphetamine	571 (9.0)	260 (10.1)	311 (8.3)
Prescription opioids	28 (0.4)	17 (0.7)	11 (0.3)
Other	82 (1.3)	22 (0.9)	60 (1.6)
Injection frequency			
Daily or more	5439 (86.0)	2117 (82.4)	3322 (88.5)
Less than daily	878 (13.9)	451 (17.6)	427 (11.4)
Always used sterile syringes			
Yes	2226 (35.2)	738 (28.7)	1488 (39.7)
No	4093 (64.8)	1830 (71.2)	2263 (60.3)
Receptively shared syringes			
Yes	1826 (28.9)	864 (33.6)	962 (25.6)
No	4492 (71.1)	1703 (66.3)	2789 (74.3)
Any unsafe syringe disposal [d]			
Yes	4574 (72.4)	2330 (90.7)	2244 (59.8)
No	1679 (26.6)	194 (7.6)	1485 (39.6)
Tested for HIV			
Yes[e]	3591 (56.8)	1309 (51.0)	2282 (60.8)
Not tested, HIV diagnosis > 12 months ago	290 (4.6)	92 (3.6)	198 (5.3)
Not tested, other reasons	2396 (37.9)	1153 (44.9)	1243 (33.1)
Participated in HIV behavioural intervention			
Yes	1778 (28.1)	586 (22.8)	1192 (31.8)
No	4533 (71.7)	1981 (77.1)	2552 (68.0)

[a]Refers to total analysis sample of PWID who reported using either pharmacies or SSPs as their primary source of syringes.

[b] Includes never tested, no result obtained and don't know result.

[c] Defined as the number of years from the first reported injection event to the date of interview.

[d] Includes: Threw it away (not in medical waste), kept it to re-use, gave or sold it to someone else.

[e] Includes those who tested positive for HIV infection in the past 12 months.

Table 3

Bivariate analysis of factors associated with obtaining syringes primarily from pharmacies among people who inject drugs and who use pharmacies or syringe services programs (SSPs) as their primary source of sterile syringes - National HIV Behavioural Surveillance, 20 cities, United States, 2015. Statistically significant associations are bolded.

Characteristic/Behaviour	PR (95%CI)[a]
TOTAL	
Age group (years)	
18–29	**1.19 (1.12, 1.27)**
≥ 30	REF
Gender	
Male	**0.93 (0.88, 0.99)**
Female	REF
Race	
White, non-Hispanic	**1.18 (1.07, 1.30)**
Other race/ethnicity	REF
Education	
High school diploma/GED or higher	**1.14 (1.06, 1.22)**
< High school diploma	REF
Currently has health insurance	
Yes	0.99 (0.93, 1.05)
No	REF
Currently homeless	
Yes	**0.90 (0.84, 0.97)**
No	REF
Self-reported HIV status	
Positive	0.89 (0.74, 1.08)
Negative	REF
Unknown[b]	**1.16 (1.09, 1.23)**
Live in states where SSPs are explicitly authorized in state law	
Yes	**0.75 (0.63, 0.88)** [c]
No	REF
Years since first injection drug use [d]	
5 years or less	**1.14 (1.07, 1.22)**
More than 5 years	REF
Most commonly injected drug [e]	
Heroin	REF
Speedball (cocaine and heroin together)	**0.80 (0.70, 0.90)**
Cocaine (powder or crack)	1.16 (0.97, 1.39)
Methamphetamine	**1.19 (1.06, 1.33)**
Prescription opioids	**1.47 (1.13, 1.90)**

Characteristic/Behaviour	PR (95%CI)[a]
Other	1.13 (0.89, 1.43)
Injection frequency [e]	
Daily or more	**0.82 (0.75, 0.88)**
Less than daily	REF

[a]Separate log-linked Poisson regression models using Generalized Estimating Equations (GEE); each model controlled for factors related to study design (city, recruiter's value for the outcome, network size) and clustered on recruitment chain.

[b]Includes never tested, no result obtained and don't know result.

[c]Prevalence ratio not adjusted for city.

[d]Defined as the number of years from the first reported injection event to the date of interview.

[e]Refers to behaviours in the past 12 months.

Table 4

Behavioural outcomes in the past 12 months associated with obtaining syringes primarily from pharmacies vs. SSPs, among people who inject drugs and who use pharmacies or syringe services programs (SSPs) as their primary source of sterile syringes - National HIV Behavioural Surveillance, 20 cities, United States, 2015. Statistically significant associations are bolded.

	Behavioural outcome in past months				
	Always used sterile syringes (yes vs. no)	**Receptively shared syringes (yes vs. no)**	**Any unsafe syringe disposal[a] (yes vs. no)**	**Tested for HIV[b] (yes vs. no)**	**Participated in HIV behavioural intervention (yes vs. no)**
Unadjusted PR (95% CI)[c]	**0.82 (0.74, 0.92)**	**1.18 (1.07, 1.29)**	**1.47 (1.38, 1.56)**	**0.86 (0.81, 0.92)**	**0.74 (0.65, 0.83)**
Adjusted PR (95% CI)[d]	**0.84 (0.76, 0.93)**	**1.16 (1.08, 1.26)**	**1.47 (1.38, 1.56)**	**0.86 (0.81, 0.93)** [e]	**0.77 (0.67, 0.87)**

[a] Includes: Threw it away (not in medical waste), kept it to re-use, gave or sold it to someone else.

[b] Excludes those who tested positive for HIV infection > 12 months ago.

[c] Separate log-linked Poisson regression models using Generalized Estimating Equations (GEE); each model controlled for factors related to study design (city, recruiter's value for the outcome, network size) and clustered on recruitment chain.

[d] Separate log-linked Poisson regression models using Generalized Estimating Equations (GEE); each model controlled for factors related to study and adjusted for age, race/ethnicity, gender, education, current homelessness, self-reported HIV status and injection frequency.

[e] Model did not adjust for self-reported HIV status.