

# Cutaneous Abscess Prevalence and Risk Factors Among People Who Inject Drugs in Denver, Colorado

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**Background.** Skin and soft tissue infections (SSTIs) are considered common problems for people who inject drugs (PWID), yet few studies actually quantify injection-related SSTIs or identify contributing risk behaviors. We report the prevalence of self-reported cutaneous abscesses among PWID and explore associations between abscesses and injection-related behaviors.

**Methods.** PWID were recruited to participate in the National HIV Behavioral Surveillance system in Denver, Colorado, and answered questions about their experiences with abscesses and injection-related activities. We used  $\chi^2$  statistics to assess differences between sociodemographic and healthcare characteristics and injection-related behaviors associated with self-reported abscess in the past 12 months. We used generalized linear models to estimate the unadjusted and adjusted prevalence ratios to describe the association between using sterile needles and abscess in the past 12 months. We also examined the association between using alcohol swabs and abscess in the past 12 months.

**Results.** Of the 533 participants who completed the survey in 2018, 257 (48%) reported having at least 1 abscess in the past 12 months while 98 of the 277 (35%) participants in 2022 reported an abscess. In both 2018 and 2022, participants who reported less consistent use of sterile needles were significantly more likely to report having an abscess in the past 12 months.

**Conclusions.** These findings highlight the relatively high prevalence of recent abscesses among PWID and underscore the need to identify simple, accessible prevention strategies for use in clinical and nonclinical settings.

**Keywords.** abscess; injection drug use; people who inject drugs; PWID; skin and soft tissue infection.

Cutaneous abscess, defined as an enclosed collection of pus within the dermis or subcutaneous space that is generally swollen or inflamed [1], and other skin and soft tissue infections (SSTIs) are among the most common morbidities experienced by people who inject drugs (PWID). Estimates of the extent of the problem are imprecise due to lack of data; however, a systematic review published in 2023 suggests that 31.7% of an estimated 14.8 million PWID worldwide have experienced an SSTI within the past year [2]. Earlier estimates suggested incidences of between 155 000 and 540 000 injection-related skin infections each year in the United States (US) [3]. These figures were derived by applying abscess incidence data from 2 studies of

PWID to national estimates of individuals who injected nonprescription drugs in 2011. The number of individuals estimated to have injected nonprescription drugs in the US in 2018 was 3.7 million, a nearly 5-fold increase from the 774 000 estimated PWID in 2011 [4, 5]. Given the increase in injection drug use over that time, the national burden of SSTIs among PWID in the US is likely higher than the limited current estimates.

Additional studies of local SSTI prevalence and risk factors are needed to more precisely estimate the burden of SSTIs among PWID and design targeted public health responses. A study in San Francisco using self-reported data from PWID estimated the prevalence of SSTIs to be 29% within the past year, with a lifetime prevalence of 70% [6]. Other studies have found the prevalence of injection-related abscesses to range from 20% to 70% in the past year [7–11], with lifetime prevalence ranging from 55% to 70% [6, 11–13]. Many PWID do not seek medical care for SSTIs [13, 14]; thus, medical record data are of limited utility for informing prevalence estimates. Untreated, SSTIs may progress to chronic wounds or more serious bacterial infections such as pyomyositis, necrotizing fasciitis, osteomyelitis, or endocarditis, with a high risk for hospitalizations, medical complications [15], and death [16]. Given the significant medical and economic impacts of SSTIs, a better understanding of local epidemiological data of these infections and how they can be prevented is urgently needed.

Received 07 December 2024; editorial decision 11 March 2025; accepted 15 March 2025; published online 18 March 2025

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Open Forum Infectious Diseases®

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<https://doi.org/10.1093/ofid/ofaf165>

Prior studies have found that injecting multiple times a day and reusing needles are associated with a greater risk of developing an abscess [17–19]. Intramuscular or subcutaneous injections have also been shown to increase the risk of developing an SSTI [8, 14, 20]. Licking needles before injection [21] and failure to clean the skin have been associated with abscesses in some studies but were not found to be significant factors in others [8, 17, 20]. Similarly, sharing needles is associated with risk for transmission of viral infections, but the association between needle sharing and bacterial infections is not as clear [6, 22].

This study aims to understand the prevalence of abscesses among 2 cross-sectional samples of PWID in Denver, Colorado, and to characterize injecting practices associated with elevated risks for abscesses. To our knowledge, this is 1 of the largest examinations of SSTI prevalence and risk behaviors among PWID in the US to date.

## METHODS

### Data Source

We examined data collected as part of the National HIV Behavioral Surveillance (NHBS) system. The full methods of NHBS are described in detail elsewhere [23]. In brief, NHBS is a comprehensive system for biobehavioral surveillance in populations disproportionately affected by human immunodeficiency virus (HIV) and is conducted in rotating, annual cycles. Surveillance activities include ethnographic formative research, a behavioral survey, and HIV testing during each cycle. In addition to the standardized anonymous questionnaire administered at all participating NHBS sites, each site may include a limited number of questions that are pertinent to the local community. In Denver, we included questions related to abscesses in our 2018 and 2022 local questions.

### Study Design

During 22 May to 9 December 2018 and 8 July to 9 December 2022, potential participants were recruited via respondent-driven sampling, as part of the NHBS-PWID cycles in Denver, Colorado. Persons were eligible to participate if they were  $\geq 18$  years of age, had injected drugs during the preceding year, resided in the Denver metropolitan statistical area, had not previously participated in the current NHBS cycle, and were able to provide informed consent.

After verbal consent was obtained, participants completed a standardized interviewer-administered behavioral risk survey that includes questions about sexual behaviors, injection behaviors, substance use, and HIV testing. Local questions about SSTIs were derived from formative assessments with medical and public health stakeholders as well as community members and community organizations. As part of the eligibility screener during the 2018 NHBS-PWID cycle, participants were asked to show physical signs of injection, and interviewers recorded the

physical marks, which included evidence of current abscess. Physical marks were not included in the eligibility screener during the 2022 cycle.

To characterize the burden of abscesses, participants were asked if they ever had an abscess caused by injecting drugs. Participants who reported ever having an abscess were then asked about the frequency of their abscesses during the past year with response options including “about once a week,” “about once a month,” “1–2 times over the past 12 months,” “3–6 times in the past 12 months,” or “have not had an abscess in the past 12 months.” The current study is limited to participants who had responses on self-reported abscess data within the past year. We defined having complete abscess data as answering all of the abscess-related questions within the survey. A list of the questions that were asked and included in this analysis can be found in the [Supplementary Table](#).

In addition to completing the behavioral questionnaire, participants were offered an HIV test. Participants received \$35 for completing the survey and \$35 for HIV testing. Participants also received \$20 for each eligible person they recruited, up to a maximum of 5. All NHBS activities were voluntary, and no names were collected. In Denver, NHBS is considered public health surveillance and does not require institutional review board review.

### Statistical Analysis

For the purpose of this study, we reviewed all responses to questions regarding self-reported history of abscesses and a subset of questions related to infection risk based on review of published literature about risks for injection-related SSTIs. Basic descriptive statistics were used to characterize the 2 samples, and  $\chi^2$  and Fisher exact tests were calculated to compare reports of abscesses within the past 12 months within each sample. We used generalized linear models with log link and binomial error distribution to estimate the unadjusted and adjusted prevalence ratios and 95% confidence intervals (CIs) to describe the association between not always using a sterile needle and self-reported abscess in the past 12 months. Multivariable analysis was conducted to control for factors that could potentially confound the main association. We also examined the association between consistency of cleaning the skin with an alcohol swab before injecting and self-reported abscess in the past 12 months using the same analytic approach. All analyses were conducted using StataSE version 14 software (StataCorp LLC, College Station, Texas).

## RESULTS

### Demographic Characteristics of the 2 Samples

A total of 739 people were screened for the 2018 NHBS-PWID cycle in Denver, of whom 587 completed the survey. Of the 587 respondents, 533 (91%) had complete abscess data. The missing abscess data was due to a programming delay resulting in 54

**Table 1. Demographic and Healthcare Characteristics by Self-reported Abscess in the Past 12 Months in 2 Samples of Persons Who Inject Drugs, National HIV Behavioral Surveillance (NHBS), Denver, Colorado, 2018 and 2022**

Characteristic	2018				2022			
	Total	No Abscess	Abscess	P Value	Total	No Abscess	Abscess	P Value
Overall <sup>a</sup>	533	276 (51.8)	257 (48.2)		277	179 (64.6)	98 (35.4)	
Gender								
Male	394 (73.9)	212 (53.8)	182 (46.2)	.201	204 (73.7)	135 (66.2)	69 (33.8)	.657
Female	135 (25.3)	63 (46.7)	72 (53.3)		65 (23.5)	39 (60.0)	26 (40.0)	
Transgender	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>		8 (2.8)	5 (62.5)	<sup>b</sup>	
Race/Ethnicity								
White, non-Hispanic	362 (67.9)	190 (52.5)	172 (47.5)	.135	194 (70.6)	126 (64.9)	68 (35.1)	.559
Black, non-Hispanic	24 (4.5)	17 (70.8)	7 (29.1)		7 (2.6)	6 (85.7)	<sup>b</sup>	
Hispanic	104 (19.5)	51 (49.0)	53 (51.0)		46 (16.7)	30 (65.2)	16 (34.8)	
Other	43 (8.1)	18 (41.9)	25 (58.1)		28 (10.2)	16 (57.1)	12 (42.9)	
Age								
≥40 y	217 (40.7)	118 (54.4)	99 (45.6)	.320	143 (51.6)	96 (67.1)	47 (32.9)	.366
≤39 y	316 (59.3)	158 (50.0)	158 (50.0)		134 (48.4)	83 (61.9)	51 (38.1)	
Experienced homelessness in past 12 mo								
No	60 (11.3)	35 (58.3)	25 (41.7)	.531	39 (14.1)	26 (66.7)	13 (33.3)	.364
Yes, not currently	76 (14.3)	40 (52.6)	36 (47.4)		29 (10.5)	22 (75.9)	7 (24.1)	
Yes, currently	397(74.5)	201(50.6)	196 (49.4)		209 (75.5)	131 (62.7)	78 (37.3)	
Currently insured								
Yes	480 (90.1)	252 (52.5)	228 (47.5)	.318	259 (93.8)	166 (64.1)	93 (35.9)	.588
No	53 (9.9)	24 (45.3)	29 (54.7)		17 (6.2)	12 (70.6)	5 (29.4)	
Seen a healthcare provider in past 12 mo								
Yes	443 (83.1)	228 (51.5)	215 (48.5)	.747	189 (68.5)	125 (66.1)	64 (33.9)	.511
No	90 (16.9)	48 (53.3)	42 (46.7)		87 (31.5)	54 (62.1)	33 (37.9)	
Self-reported hepatitis C								
Yes	251 (47.0)	109 (43.4)	142 (56.6)	<b>&lt;.001</b>	136 (49.1)	80 (58.8)	56 (41.2)	<b>.047</b>
No	282 (52.9)	167 (59.2)	115 (40.8)		141 (50.9)	99 (70.2)	42 (29.8)	
Taken medication for opioid use disorder in past 12 mo								
Yes	278 (58.0)	125 (45.0)	153 (55.0)	<b>.008</b>	134 (56.5)	78 (58.2)	56 (41.8)	.167
No	201 (42.0)	115 (57.2)	86 (42.8)		103 (43.5)	69 (67.0)	34 (33.0)	

Data are presented as No. (%) unless otherwise indicated. Bolded values are values that were statistically significant ( $P < .05$ ).

<sup>a</sup>Subcategory total may not add to overall total due to missing data.

<sup>b</sup>Cell is repressed due to  $n < 5$ .

participants not receiving the local questions. In the final 2018 sample, the majority were men (74%), White non-Hispanic (68%), aged ≤39 years (59%) (median age, 37 years [interquartile range {IQR}, 31–46 years]), and experiencing homelessness at the time of survey completion (75%) (Table 1). A total of 352 (66.2%) participants reported ever having an abscess caused by injecting; and 48% reported having at least 1 abscess within the last year. Fifty-five individuals (9.3%) had physical evidence of an abscess at the time of their participation.

In the 2022 NHBS-PWID cycle, 315 people were screened for participation, of whom 283 completed the survey. Of the 283, 277 (98%) participants had complete abscess data. Lingering effects from the coronavirus disease 2019 (COVID-19) pandemic impacted field operations and resulted in a smaller than usual sample in 2022. However, similar to the sample in 2018, the majority were men (74%), White non-Hispanic (71%), and currently experiencing homelessness (75%). Forty-eight percent of the participants were aged ≤39 years (median age, 40 years

[IQR, 34–48 years]). One hundred-eighty-two individuals (65.7%) reported ever having an abscess while 35% reported an abscess in the past year.

History of an abscess in the past year was not significantly associated with gender, race, age, housing status, or insurance status in either of the NHBS cycles.

#### Injection-Related Behaviors

In the 2018 sample, fewer individuals who responded that they “always” used sterile needles reported an abscess in the past year compared to those reporting “most of the time” or “half/rarely/never” (38% vs 51% vs 61%,  $P < .001$ ; Table 2). In 2022, 25% of individuals who reported they “always” used sterile needles reported an abscess versus 49% and 33% of those who reported using sterile needles “most of the time” and “half/rarely/never” in the last year ( $P < .001$ ; Table 2).

**Table 2. Injection-Related Behaviors by Self-reported Abscess in the Past 12 Months in 2 Samples of Persons Who Inject Drugs, National HIV Behavioral Surveillance, Denver, Colorado, 2018 and 2022**

Characteristic	2018				2022			
	Total	No Abscess	Abscess	P Value	Total	No Abscess	Abscess	P Value
Overall <sup>a</sup>	533	276 (51.8)	257 (48.2)		277	179 (64.6)	98 (35.4)	
Sterile needle use when injecting								
Always	173 (32.5)	108 (62.4)	65 (37.6)	<b>.001</b>	125 (45.1)	94 (75.2)	31 (24.8)	<b>.001</b>
Most of the time	265 (49.7)	131 (49.4)	134 (50.6)		107 (38.6)	55 (51.4)	52 (48.60)	
Half/rarely/never	95 (17.8)	37 (39.0)	58 (61.1)		45 (16.2)	30 (66.7)	15 (33.3)	
Skin cleaned w/alcohol swab before injecting								
Always	126 (23.6)	75 (59.5)	51 (40.5)	.056	77 (27.8)	64 (83.1)	13 (16.9)	<b>&lt;.001</b>
Usually	97 (18.2)	40 (41.2)	57 (58.8)		71 (25.6)	44 (62.0)	27 (38.0)	
Sometimes	179 (33.6)	91 (50.8)	88 (49.2)		87 (31.4)	43 (49.4)	44 (50.6)	
Never	131 (24.6)	70 (53.4)	61 (46.6)		42 (15.2)	28 (66.7)	14 (33.3)	
Injection frequency								
More than once a day	366 (68.7)	169 (46.2)	197 (53.8)	<b>&lt;.001</b>	163 (59.1)	90 (55.2)	73 (44.8)	<b>.001</b>
Once a day	68 (12.8)	36 (52.9)	31 (47.1)		26 (9.4)	21 (80.8)	5 (19.2)	
More than once a week	51 (9.6)	30 (58.8)	21 (41.2)		41 (14.9)	29 (70.7)	12 (29.3)	
Less than once a week	48 (9.0)	41 (85.4)	7 (14.6)		46 (16.7)	38 (82.6)	8 (17.4)	
Most frequently injected drug								
Heroin	305 (57.2)	148 (48.5)	157 (51.5)	<b>.003</b>	85 (30.7)	49 (57.7)	36 (42.4)	<b>.008</b>
Methamphetamine	155 (29.1)	95 (61.3)	60 (38.7)		133 (48.0)	100 (75.2)	33 (24.8)	
Speedball	33 (6.2)	20 (60.6)	13 (39.4)		16 (5.8)	9 (56.3)	7 (43.8)	
Goofball	40 (7.5)	13 (32.5)	27 (67.5)		32 (11.6)	15 (46.9)	17 (53.1)	
Fentanyl	0	0	0		11 (4.0)	6 (54.6)	5 (45.5)	
How treated last abscess (asked of participants who reported ever having an abscess)								
Went away itself	87 (24.8)	15 (17.2)	72 (82.8)	<b>.026</b>	39 (21.4)	14 (35.9)	25 (64.1)	.291
Lanced it	95 (27.1)	29 (30.5)	66 (69.5)		57 (31.3)	29 (50.9)	28 (49.1)	
Saw a medical provider	123 (35.0)	42 (34.2)	81 (65.9)		58 (31.9)	25 (43.1)	33 (56.9)	
Other	46 (13.1)	9 (19.6)	37 (80.4)		28 (15.4)	16 (57.1)	12 (42.9)	

Data are presented as No. (%) unless otherwise indicated. Bolded values are values that were statistically significant ( $P < .05$ ).

<sup>a</sup>Subcategory total may not add to overall total due to missing data.

In both samples, injection frequency was associated with abscesses in the past year, with those reporting injecting more than once a day being most likely to report an abscess (54% in 2018 and 45% in 2022).

In 2022, fewer individuals who reported that they “always” use an alcohol swab to clean the skin before injecting also reported having an abscess in the past year (16%) compared with those who only sometimes (44%) or never (33%) used an alcohol swab ( $P < .001$ ). Similar trends were noted in the 2018 sample, though the differences were not statistically significant.

In 2018, 57% of participants reported that heroin was the drug they most frequently injected while 29% of participants reported that methamphetamine was their most frequently injected type of drug. In 2022, the order of these responses reversed with 48% of participants reporting using methamphetamine most frequently, followed by 31% reporting heroin as the most frequently used drug. A greater proportion of individuals who reported that heroin was their most frequently injected drug also a reported history of abscess compared to those who reported injecting methamphetamine most often (Table 2).

#### Healthcare Service Utilization

Neither seeing a healthcare provider in the past year nor use of medication for opioid use disorder (MOUD) in the past year was associated with lower frequency of abscesses. In 2018, participants who had received MOUD were more likely to report abscesses than those who did not (55% vs 45%,  $P = .008$ ). The same association was observed in 2022 with a greater proportion of those receiving MOUD also reporting abscesses, though the difference was not statistically significant.

Regarding how abscesses were treated, participants most often reported that they managed their abscesses by going to see a provider, with 35% and 31% of respondents choosing this method in 2018 and 2022, respectively. This was followed by lancing it by themselves (27% of 2018 respondents, 31% of 2022 respondents), letting it go away on its own (24% in 2018, 21% in 2022), taking antibiotics without seeing a doctor (6% and 7% in 2018 and 2022, respectively), and having a friend treat the abscess (1% and 5% of respondents in 2018 and 2022, respectively).

Individuals with a self-reported history of hepatitis C (HCV) were more likely to report an abscess in the past year compared to those without a history of HCV in both NHBS cycles: 57% of

those with HCV history reported an abscess in the past year versus 41% of those without HCV in the 2018 cycle ( $P \leq .001$ ). The difference was smaller but still significant in 2022 (41% vs 29%,  $P = .047$ ).

#### **Sterile Needle Use and Self-reported Abscess**

In both samples, participants who reported less consistent use of a sterile needle were significantly more likely to report having an abscess in the past year. In the 2018 sample, 51% of those reporting using a sterile needle most of the time and 61% of those reporting using a sterile needle half of the time, rarely, or never also reported having at least 1 abscess in the past 12 months. After adjusting for self-reported lifetime HCV status, frequency of injection, cleaning with an alcohol swab, and housing status, using a sterile needle half of the time, rarely, or never was associated with a 2.2-fold (95% CI, 1.2- to 3.9-fold) increase in the risk of at least 1 abscess in the past 12 months (Table 3). In the 2022 sample, the unadjusted prevalence ratio was 2.8 (95% CI, 1.6–5.0) for those reporting use of a sterile needle most of the time compared to always and 1.5 (95% CI, .7–3.2) for those reporting less consistent or no use of sterile needles. The association was attenuated when adjusting for the potential confounding factors.

#### **Cleaning Skin With Alcohol Swab Before Injecting and Self-reported Abscess**

Similar to the findings above, participants who reported less consistent cleaning of the skin with an alcohol swab before injecting were significantly more likely to report having had an abscess in the past year (Table 3).

### **DISCUSSION**

In 2 large cross-sectional surveys of PWID in Denver, Colorado, the proportion of participants who reported an abscess in the past 12 months was substantial, at 48% and 35% in 2018 and 2022, respectively. Always using a sterile needle was associated with reduced risk for abscess in both samples, while always cleaning the skin with an alcohol swab prior to injecting was significantly associated with reduced risk for abscess in the 2022 sample. Age, gender, race, and housing status were not associated with reporting an abscess, whereas individuals who reported a history of HCV were more likely to report having abscesses. Neither self-reported use of MOUD nor report of seeing a healthcare provider in the prior year was found to be protective against abscesses; on the contrary, individuals in the 2018 sample who reported use of MOUD were more likely to also report having an abscess.

Findings from these surveys underscore the benefits of simple infection prevention measures to decrease bacterial burden at injection sites. Specifically, consistent use of sterile needles and always cleaning skin with alcohol swabs prior to injecting were associated with decreased incidence of abscess in the prior

12 months. In their 2017 study of PWID in San Francisco, Dahlgren et al found similar benefits for these preventive strategies. They reported that the odds of having an abscess in the past month were nearly 8 times higher for individuals who injected with a preused needle compared to those who did not and found that infrequent cleaning prior to injection carried approximately 2.5 times greater odds of SSTI [6]. We did not specify in our survey whether unsterile needles were preused by someone else or by the participant. However, in the 2018 sample, <20% of respondents reported that they used a needle after someone else the most recent time they injected, suggesting that sharing needles was not the main driver of infections.

Injecting more than once a day, each time causing a new breach to the skin barrier and opportunity for bacterial entry, was associated with higher prevalence of abscesses in both the 2018 and 2022 Denver samples, consistent with results from San Francisco as well as small studies in Tehran, Iran, and San Diego, California, USA [12, 18, 19, 24]. Even in optimized conditions like operating rooms, needles and syringes quickly become contaminated with bacteria once exposed to the environment [25, 26]. Reused needles not only harbor bacteria but also become more blunted with each use, further trapping bacteria and causing more tissue damage upon needle entry and removal than those with sharp points [27, 28].

As mentioned above, no specific sociodemographic characteristics were associated with abscesses in our 2 cross-sectional samples. This differs from prior studies that have found higher prevalence of abscesses among women [8, 17, 20, 29, 30] and older individuals [14]. The only individual characteristic associated with higher abscess prevalence in our study was history of HCV. This may reflect increased exposure to shared needles and other injection supplies, the main risk factor for transmission of HCV [31]. This same association was also observed in a cohort of PWID in Australia, suggesting the need to emphasize abscess prevention for people with HCV and in populations of high HCV prevalence [32, 33].

In the 2018 sample in our study, report of an abscess in the past year was more common among those who reported accessing MOUD than those who did not. This finding was unexpected given that MOUD has been associated with decreased frequency of injecting, which should be protective against abscesses [34]. Use of MOUD typically involves more healthcare utilization, so it is possible that abscesses were simply detected more frequently in this group. Seeing a healthcare provider in the past 12 months was neither positively nor negatively associated with abscesses in either of our samples, suggesting that healthcare visits, like the visits for MOUD, may be missed opportunities for harm reduction education.

In a retrospective cohort study of individuals in Madrid, Spain, Valencia et al noted that despite receiving harm reduction services and MOUD among those reporting daily injection of heroin or cocaine, 67.5% developed an abscess at some point during

**Table 3. Association Between Use of Sterile Needles and Alcohol Swabs With Self-reported Abscess in the Past 12 Months in 2 Samples of Persons Who Inject Drugs, National HIV Behavioral Surveillance, Denver, Colorado, 2018 and 2022**

Characteristic	2018			2022		
	Abscess Past 12 mo	Unadjusted PR (95% CI)	Adjusted <sup>a</sup> PR (95% CI)	Abscess Past 12 mo	Unadjusted PR (95% CI)	Adjusted <sup>a</sup> PR (95% CI)
Sterile needle use when injecting in the past 12 mo						
Always	65 (37.6)	1.0 (ref)	1.0 (ref)	31 (24.8)	1.0 (ref)	1.0 (ref)
Most of the time	134 (50.6)	1.7 (1.1–2.5)	1.5 (.9–2.3)	52 (48.6)	2.8 (1.6–5.0)	1.9 (.9–3.9)
Half/rarely/never	58 (61.1)	2.6 (1.6–4.4)	2.2 (1.2–3.9)	15 (33.3)	1.5 (.7–3.2)	0.8 (.3–2.1)
Clean skin with alcohol swab before injecting in the past 12 mo						
Always	51 (40.5)	1.0 (ref)	1.0 (ref)	13 (16.9)	1.0 (ref)	1.0 (ref)
Usually	57 (58.8)	2.1 (1.2–3.6)	1.5 (.8–2.8)	27 (38.0)	3.0 (1.4–6.5)	3.0 (1.2–7.8)
Sometimes	88 (49.2)	1.4 (.9–2.3)	1.0 (.6–1.8)	44 (50.6)	5.0 (2.4–10.4)	4.6 (1.9–11.3)
Never	61 (46.6)	1.3 (.8–2.1)	0.8 (.5–1.5)	14 (33.3)	2.5 (1.0–5.9)	2.1 (.7–6.3)

Abbreviations: CI, confidence interval; PR, prevalence ratio.

<sup>a</sup>Adjusted for self-reported lifetime hepatitis C status, frequency of injection, use of sterile needle or cleaning with alcohol swab, and housing status.

follow-up, with nearly a quarter of the cohort requiring hospital admission for a serious injection-related infection [35]. The authors postulated that supervised consumption spaces, available in other regions of Spain but not in Madrid, could have mitigated the high rates of infections seen in their cohort [35].

We found that 31% and 35% of respondents in 2018 and 2022, respectively, saw a medical provider to treat their abscess. Given the risks of complications from SSTIs, education for PWID about the warning signs of serious bacterial infections could promote engagement in medical care and ideally decrease serious complications and hospitalizations. Studies suggest that some of the most common reasons PWID do not seek medical attention include long waits (56%), “being afraid to go” (49%), and drug use stigma (46%) [13]. In 1 study, 43% of PWID either did not seek care or waited 10 or more days before seeking care, increasing the risk for serious complications [14]. An Australian study found that, once admitted to the hospital, the median length of stay was 5 days, and antibiotic therapy was given for a median of 11 days for SSTIs [33]. Earlier access to care could ideally prevent the need for prolonged hospitalizations and antibiotic courses, decreasing both morbidity and costs, though efforts to decrease the perceived stigma that PWID experience in healthcare are critical to improving SSSI treatment rates.

The low proportion of participants who sought medical care for abscesses in our study illustrates another important point: Healthcare records cannot be relied upon for accurate estimates of SSSI prevalence among PWID. Not only do they miss many cases, but diagnosis codes are imprecise and do not distinguish SSTIs related to injection drug use. More studies of local data from PWID directly in community settings like ours are needed to improve these estimates and inform public health activities.

### Strengths and Limitations

The relatively high proportions of individuals reporting abscesses are similar to published data from other jurisdictions in the

US and internationally, suggesting that our findings may be generalizable for PWID in other geographic areas where past year abscess rates were between 29% and 44.4% [6, 9, 12]. In contrast, the lifetime prevalence of abscess for our samples was higher than that published by Pollini et al in which 46% of participants in Tijuana, Mexico, reported ever having an abscess [36].

The relatively high proportion of individuals in our survey who reported experiencing homelessness may limit generalizability of our findings for populations with lower rates of homelessness among PWID. The Denver metropolitan area has seen homelessness increase in recent years as reported by the US Department of Housing and Urban Development yearly report to Congress [37]; thus, the high prevalence of homelessness in the Denver NHBS samples is likely an accurate reflection of housing status among PWID locally. Of 10 614 participants across 23 different NHBS sites in 2018, 7275 (68.5%) reported experiencing current homelessness [38]. This is similar, though slightly lower, than the 2018 Denver participants, 75% of whom reported current homelessness.

The use of survey data is subject to several limitations, including how questions were interpreted and recall bias. Also, lack of a standard definition for abscess, particularly for respondents who did not seek help from a medical provider, may lead to an over- or underestimate of abscesses prevalence. Finally, data collection for the 2022 survey was impacted by the COVID-19 pandemic, which limited participation compared to prior years and may have influenced the results in other ways. However, many of the associations noted in the 2022 survey results remained similar to those of the 2018 survey.

### CONCLUSIONS

We found that the prevalence of an abscess in the past year was between 35% and 48% in 2 large samples of PWID. Always using a sterile syringe and cleaning the injection site with alcohol prior to injecting reduced the risk of developing an abscess.

Ongoing access to harm reduction supplies through syringe service programs is critical for minimizing incidence of injection-related SSTIs. Utilizing healthcare visits, including those for MOUD, as an opportunity to emphasize infection prevention techniques could help mitigate the high rates of SSTIs observed, though more study around the impact of patient education in this area is needed.

## Supplementary Data

Supplementary materials are available at *Open Forum Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

## Notes

**Author contributions.** S. E. R. and A. A. conceived of the study concept and design. A. A. supervised the team who administered the survey. S. E. R., A. A., and N. L. O. analyzed the data. N. L. O. wrote the first draft of the manuscript. S. E. R. and A. A. offered critical revisions of the manuscript. All authors read and approved the final manuscript.

**Financial support.** Funding for the National HIV Behavioral Surveillance System in Denver was provided by the Centers for Disease Control and Prevention's National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (grant numbers U62PS005073 and U62PS924764).

**Potential conflicts of interest.** All authors: No reported conflicts of interest.

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