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# Use of Syringe Service Programs in Rural vs Urban Maine: A Harm-Reduction Study

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## ORIGINAL RESEARCH

# Use of Syringe Service Programs in Rural vs Urban Maine: A Harm-Reduction Study

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**Introduction:** Syringe service programs (SSPs) reduce HIV and viral hepatitis transmission, as well as the prevalence of improperly disposed needles and needle stick injuries among first responders. Infections associated with injection drug use are rising in rural areas, including Maine, leading to concerns that SSP services are difficult to access for rural residents.

**Methods:** A cross-sectional survey of 101 participants hospitalized with infections associated with injection drug use at 4 hospitals in Maine was collected over a 15-month period. Descriptive analyses were performed. Statistical analyses were completed using Fisher's exact tests, Pearson's chi-squared tests, and Student's t tests.

**Results:** Of 101 participants, 66 (65%) lived in urban areas, and 35 (35%) lived rurally. Participants living in rural areas reported less SSP use in the past 3 months (76% urban vs 43% rural). Rural participants also had a higher prevalence of injecting buprenorphine than urban participants (6% urban vs 12% rural). Rural participants were also more likely to obtain needles from pharmacies than urban participants (40% urban vs 71% rural).

**Discussion:** SSP programs are underrepresented and accessed less in rural areas of Maine. Rural populations of people who inject drugs have unique health characteristics and syringe-use practices.

**Conclusions:** These findings highlight the need to develop rural SSP programs that address the unique needs of rural populations.

**Keywords:** syringe service programs, syringe-exchange programs, substance use disorder, harm reduction, people who inject drugs

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The overdose crisis has reached the stage of being a public health emergency.<sup>1</sup> Due to the COVID-19 pandemic, worsening social isolation, widespread economic hardship, and increasing use of substances for coping, deaths related to injection drug use have reached catastrophic proportions.<sup>2,3</sup> From 2019 to 2021, national overdose deaths rose from 67,697 to 107,480, representing a 55% increase.<sup>4</sup> Critical to understanding this increase relates to the type of substances used. Since 2000, there has been a gradual transition from opioid analgesics in the form

of pills to intravenous (IV) heroin to IV intravenous fentanyl often mixed with methamphetamines.<sup>5</sup> This transition to injection drug use has led to increases in viral hepatitis, HIV, and serious bacterial and fungal infections (e.g., infective endocarditis, cellulitis, abscesses) among people who inject drugs (PWID).<sup>6-9</sup>

Syringe service programs (SSPs; also known as syringe exchange programs, needle exchanges, needle exchange programs, or syringe needle access programs) provide complementary services to their clients. These programs often include syringe disposal services, education about safe injection practices, testing for sexually transmitted infections, hepatitis and tuberculosis screening,

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referrals to programs for substance use treatment, safe sex education, case management, abscess and wound care, overdose education, naloxone distribution, and drug-testing supplies, among many other services.<sup>10</sup> SSPs are most often operated by nonprofit organizations or health departments and are underused in rural settings.<sup>11</sup>

The benefits of having SSPs in a community have been well researched and documented. Included in these findings are reduced HIV and hepatitis C and B transmission among SSP clients (SSPs have been shown to reduce new hepatitis C and HIV cases by an estimated 50%).<sup>12-14</sup> There is also no evidence of increased drug use frequency or initiation associated with these programs in communities.<sup>15</sup> Decreases in (1) the prevalence of improperly disposed hypodermic needles on the street and (2) needle stick injuries among first responders are benefits of these programs.<sup>16-18</sup> Furthermore, when PWID use an SSP, they are more likely to remain in treatment and decrease or stop injection drug use.<sup>19</sup>

In this study, we aimed to better understand the health characteristics and injection practices of PWID in Maine as stratified by rural versus urban locations. At the time of this study, there were 7 operational SSPs from 2019 to 2020, only 1 of which was classified as rural.<sup>20</sup> Our hypothesis was that social determinants of health, such as homelessness, health characteristics, SSP use, and injection practices would differ between rural and urban populations.

## METHODS

This study is a cross-sectional analysis of PWID who were hospitalized at 4 hospitals in Maine for infections associated with IV drug use from January 2019 to March 2020. Data were collected from the electronic health record (EHR) and an audio computer-assisted survey as part of a larger initial 18-month cross-sectional study.<sup>21</sup> We focused our sub-analysis on survey questions specific to injection practices, SSP use, and the health characteristics of the participants in the study. The MaineHealth Institutional Review Board approved this study and participants gave consent to participate. Statistical analyses were conducted using R (v3.6.2) and involved Fisher's exact tests, Pearson's chi-squared tests, and Student's t tests.

## Covariates

Having used an SSP in the past 3 months included participants who (1) replied "yes" to using an SSP in the past 3 months or (2) responded to the question about most common ways the participant accessed an SSP in the past 3 months.

Rurality was categorized as either rural (small, isolated rural, and large rural) or urban (metropolitan) using the rural-urban commuting area codes.<sup>22</sup> Other variables were collected through self-report or EHR review. EHR variables included insurance status, infectious disease diagnosis, Charlson Comorbidity Index,<sup>23</sup> and prescribed medication for opioid use disorder (MOUD) before admission. MOUD before admission was defined as buprenorphine, buprenorphine/naloxone, naltrexone, or methadone as indicated on the pre-admission medication list. Self-report demographic and health variables included sex, history of incarceration, willingness to take pre-exposure prophylaxis for HIV, discussed pre-exposure prophylaxis with provider, condomless sex, and homelessness. Other self-report variables about substance use included overdose history, and injectable and non-injectable drug(s) of choice. In addition to the prescribed oral medications, we asked about injection of heroin/fentanyl, cocaine/crack, speedball (heroin and crack), amphetamines, "prescription narcotic pain killers", prescription stimulants, and "other drugs". Other covariate definitions have been described elsewhere.<sup>24</sup>

## RESULTS

This study included 101 participants. Of these, 66 (65%) lived in urban areas and 35 (35%) lived rurally. Participants living in rural areas reported less SSP use in the past 3 months (76% urban vs 43% rural,  $P = .0001$ ) (Table 1). Participants living in urban areas were more likely to report homelessness (56% urban vs 26% rural,  $P = .004$ ), having a history of incarceration (94% urban vs 80% rural,  $P = .045$ ), and having a known negative HIV status (89% urban vs 74% rural,  $P = .038$ ). There was no significant difference between MOUD use before admission nor the Charlson Comorbidity Index between rural and urban participants (Table 1).

**Table 1.** Demographics and Health Characteristics of Participants

Characteristic	No. (%) of participants*			P value
	Overall (N = 101)	Urban (n = 66)	Rural (n = 35)	
Demographics				
Age, y, median (SD)	35 (7)	35 (8)	35 (6)	>.9
Sex				
Female	56 (55)	35 (53)	21 (60)	.5
Male	45 (45)	31 (47)	14 (40)	
Insurance				
Commercial	5 (5)	5 (8)	0 (0)	.032
Dual Medicare/Medicaid	3 (3)	2 (3)	1 (3)	
Medicaid	60 (61)	33 (51)	27 (79)	
Medicare	6 (6)	6 (9)	0 (0)	
No Insurance	25 (25)	19 (29)	6 (18)	
Has a primary care physician	68 (67)	43 (65)	25 (71)	
History of incarceration	90 (89)	62 (94)	28 (80)	.045
Unhoused	46 (46)	37 (56)	9 (26)	.004
Education†	77 (76)	51 (78)	26 (72)	.5
Medication history				
MOUD prior to admission	47 (70)	36 (71)	11 (69)	>.9
Methadone	11 (16)	11 (22)	0	.054
Buprenorphine	7 (10)	4 (8)	3 (19)	.3
Buprenorphine/Naloxone	26 (39)	20 (39)	6 (38)	>.9
Naltrexone	0 (0)	0 (0)	0 (0)	NA
Prescribed MOUD during admission	50 (75)	41 (80)	9 (56)	.10
HIV Status				
HIV negative	85 (84)	59 (89)	26 (74)	.038
No HIV test available	15 (15)	6 (9)	9 (26)	
HIV positive	1 (1)	1 (1)	0 (0)	
Hepatitis C positive	46 (46)	31 (47)	15 (43)	.7
Hepatitis B positive	8 (8)	4 (6)	4 (11)	.4
Exposed to hepatitis C	73 (72)	49 (74)	24 (69)	.5
Condomless sex	76 (75)	51 (77)	25 (71)	.5
Pregnant	3 (3)	0 (0)	3 (9)	.039

Abbreviations: MOUD, medication for opioid use disorder; NA, not applicable; STI, sexually transmitted infection.

\* Unless otherwise indicated.

† High school/General Educational Development test or higher degree.

Rural participants also had a higher prevalence of injecting buprenorphine (6% urban vs 12% rural,  $P = .11$ ) and using cocaine and heroin (“speedball”; 15% urban vs 39% rural,  $P = .023$ ) (Table 2). Rural participants were less likely to “ever inject” amphetamines (90% urban vs 71% rural,  $P = .042$ ), acquire their equipment from SSPs (54% urban vs 11% rural,  $P < .001$ ), and dispose of their needles in a safe disposal box (56% urban vs 32% rural,  $P = .024$ ). Rural participants were more likely to acquire new needles from pharmacies than SSPs (40% urban vs 71% rural). Rural participants also had less interest in using a supervised injection facility/overdose prevention site, though most of

these participants still showed interest in these services (82% urban vs 54% rural,  $P = .004$ ).

Table 3 shows the results of a sub-analysis of all participants who used an SSP ( $n = 67$ ), stratified by urban and rural designation. Rural participants were more likely to identify “stigma/worried what people might think” as the main reason for having trouble getting to an SSP (38% vs 3.9%,  $P < .001$ ). Rural participants were also more likely to identify “no car” and “public transportation not convenient” as the main reason for having trouble getting to an SSP (25% vs 20%,  $P < .001$ ) (Table 3).

**Table 2.** Select Differences in Injection Practices of Participants

Characteristic	No. (%) of participants			P value
	Overall (N = 101)	Urban (n = 66)	Rural (n = 35)	
Homelessness	46 (46)	37 (56)	9 (26)	.004
Used SSP (past 3 months)	65 (64)	50 (76)	15 (43)	.001
History of incarceration	90 (89)	62 (94)	28 (80)	.045
HIV status: negative	85 (84)	59 (89)	26 (74)	.038
Have you ever injected amphetamine	72 (85)	55 (90)	17 (71)	.042
What is your most recent or current injection drug of choice: buprenorphine	8 (8)	4 (6)	4 (12)	.11
Injected speedball* within 30 days before admission	16 (23)	7 (15)	9 (39)	.023
Uses safe disposal box	47 (48)	36 (56)	11 (32)	.024
Very or somewhat interested in using a supervised injection facility/overdose prevention site	72 (72)	53 (82)	19 (54)	.004
Where new needles usually acquired from				
Needle exchange program/outreach workers who exchange	39 (39)	35 (54)	4 (11)	<.001
Pharmacy	51 (51)	26 (40)	25 (71)	

Abbreviation: SSP, syringe service programs.

\* Heroin + Cocaine.

**Table 3.** Participant Barriers to Using Syringe Service Programs

Characteristic	No. (%) of participants			P value
	Overall (N=67)	Urban (n=51)	Rural (n=16)	
SSP use				
Has trouble getting to SSPs	33 (49)	23 (45)	10 (62)	0.2
Main reason for having trouble getting to SSPs				<0.001
No car	14 (21)	10 (20)	4 (25)	<0.001
Public transportation not convenient	2 (3)	1 (2)	1 (6)	
Too far	17 (25)	13 (25)	4 (25)	
Stigma/Worried what people might think	8 (12)	2 (4)	6 (38)	
Don't think I need any services it offers	2 (3)	1 (2)	1 (6)	
Does not apply; I use the needle exchange regularly	16 (24)	16 (31)	0 (0)	
Other	8(12)	8 (16)	0 (0)	

Abbreviation: SSP, syringe service programs.

## DISCUSSION

Prior literature concludes that rural residents have less access to harm-reduction services than those living in urban settings.<sup>11</sup> This discrepancy leads to a higher risk of complications from polysubstance use, particularly related to injection drug use.<sup>14</sup> Also, prior analysis of these data showed that among all

study participants, only a minority had accessed SSPs as many lived more than 10 miles from these services.<sup>24</sup>

Findings from this study suggest that PWID who live in rural areas of Maine have different demographics, health characteristics, and injection practices than those living in urban areas. Rural participants

were less likely to be homeless, have commercial insurance, and have a history of incarceration. Health characteristic differences included rural participants being less knowledgeable about their HIV status. Use of MOUD before admission was similar between the 2 groups. In terms of injection practices, participants living in rural areas were less likely to use an SSP in the past 3 months. Urban participants reported more occurrences of “ever have” injecting amphetamines, use of safe disposal boxes, equipment obtained from an SSP, and reported interest in the development of safe-consumption sites. We asked about the injection of other substances, most specifically heroin/fentanyl, cocaine/crack, speedball (heroin and crack), prescription narcotic pain killers, prescription stimulants, and “other drugs.” None of these results reached statistical significance. Rural participants reported more acquisition of needles from pharmacies. This finding was interesting given the transportation challenges that exist in rural areas.<sup>25</sup> In our study, these transportation challenges are further highlighted as rural participants identified transportation (no car or lack of convenient public transportation) as primary barriers to accessing SSP services.

Of clinical interest, but not statistically significant due to low numbers, was that rural participants reported buprenorphine or buprenorphine-naloxone as their injection drug of choice at a higher frequency than urban participants. This finding may reflect the lack of access to addiction medicine treatment programs or other treatment options in rural areas when these data were collected.<sup>26</sup> In terms of barriers to accessing SSPs, rural participants felt more stigma when considering use of SSP services, suggesting that efforts to reduce stigma around substance use is critically needed in these areas. These findings are consistent with other studies done in rural areas in other parts of the country.<sup>27</sup>

### Implications

The many differences between rural and urban participants highlights the importance of targeting future efforts for SSP development toward PWID in rural areas. In these areas, people have disproportionately lower education attainment and less access to services, including addiction treatment.<sup>26</sup> In our study, education attainment was similar between the 2 groups (Table 1), but access to addiction services differed. At the time of this study, there were 7 operational SSPs, of which only

1 was classified as rural, demonstrating reduced access to addiction services in rural parts of the state. Increasing the capacity of rural SSPs to explore and discuss risk behavior with PWID could help this population understand why they are at higher risk for HIV, viral hepatitis, and devastating bacterial and fungal infections related to IV drug use.

We found differences in the use of buprenorphine products between rural and urban participants. These differences suggest potential geographic challenges and a changing drug supply. For example, more rural participants reported injecting buprenorphine, a prescribed medication not designed for injection use and potentially caustic to the veins. These findings warrant further exploration, particularly as they relate to trends of infectious complications and SSP use in rural areas. In addition, rural participants were more likely to identify stigma as a barrier to getting to an SSP, highlighting the need for more support and education in this area.

### Limitations

Our study had several limitations. Although PWID in this data set may adequately represent groups at risk for SSP underuse in Maine, findings from our population may not be generalizable to other geographic regions within the United States. Similarly, because our participants were all hospitalized with an infection associated with IV drug use, our sample may not represent PWID who are at lower risk of developing infectious complications from drug use. Also, we do not have data on prior hospitalizations and surgeries related to IV drug use for study participants. These data could inform the degree of illness at the start of the study. Most participants in this study self-identified as White and heterosexual, further limiting generalizability to more diverse populations. Future research would benefit from sampling a larger, more diverse population of PWID to further assess differences between rural and urban populations who inject substances.

### CONCLUSIONS

PWID who live in rural areas of Maine have different demographics, health characteristics, and injection practices than PWID living in urban areas. This study highlights the importance of targeting future efforts for syringe service development toward PWID in rural areas.

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**Conflict of interest:** None

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