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## METHAMPHETAMINE INJECTION INDEPENDENTLY PREDICTS HEPATITIS C INFECTION AMONG STREET INVOLVED YOUTH IN A CANADIAN SETTING

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### Abstract

Street-involved youth are an important population with respect to Hepatitis C. We therefore undertook this study to determine factors associated with HCV-antibody-positive status among street-involved youth. Vulnerabilities included injection drug use, 1 daily heroin and crystal methamphetamine injection. Implementing injection drug use prevention, evidence-based opioid substitution and crystal methamphetamine treatment programs for street-involved youth is critical.

### INTRODUCTION

The vast majority of newly acquired Hepatitis C (HCV) infections in North America are attributable to intravenous drug use<sup>1</sup>. Street-involved youth are an important population with regards to HCV surveillance and prevention due to their younger age and the disproportionate number who use injection drugs. Among young people who use injection drugs and are coping with multiple risk factors, the average time from injection initiation to HCV infection is estimated to be 1–2 years<sup>2</sup>.

Street-involved youth represent one of the most marginalized and stigmatized populations worldwide<sup>3</sup>. They may be fleeing physically, sexually and/or psychologically violent homes and subsequently may face exploitative, criminalizing and demoralizing experiences living in the community at large<sup>4</sup>. Many street-involved youth may turn to injection drug use as a coping strategy and some engage in sex work as a survival strategy. These factors place street youth at higher risk for adverse health outcomes such as HCV-infection.

At present, there is scant information regarding HCV-prevalence and associated risks among street-involved youth. Thus, we sought to evaluate HCV-antibody prevalence and related needs of street-involved youth.

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## METHODS

The At Risk Youth Study (ARYS) is a prospective cohort of street-involved youth in Vancouver, Canada that has been described in detail previously<sup>5</sup>. Briefly, young people aged 14 to 26 years who have used drugs other than marijuana in the 30 days prior to enrollment interview were recruited from areas and resources frequented by street-involved youth in Vancouver, BC, Canada. Semi-annually, subjects provided blood samples for measurement of HIV- and HCV-antibodies and completed an interviewer-administered questionnaire. The study has been approved by the University of British Columbia's Research Ethics Board. This present study was conducted to determine the prevalence of HCV-antibodies and associated socio-demographic and risk behaviors at baseline enrollment between September 2005 and February 2007 using Pearson's Chi-square test (dichotomous variables) and the Wilcoxon rank sum test (continuous variables). To determine independent predictors of HCV-antibody positive status, we built separate multivariable logistic regression models based on available data and a review of the literature. All *p*-values are two sided.

## RESULTS

519 street-involved youth were included in these analyses among whom 152 (29%) were female and 124 (24%) were Aboriginal. Median age was 22 years. In total, 66 (13%) participants were HCV-antibody positive at baseline and 219 (42%) reported injection drug use.

Table 1 depicts the characteristics of HCV-antibody positive youth. They were more likely to be older, engage in sex work, have experienced sexual abuse and have ever injected drugs. In multivariable analysis, the sole factor remaining associated with HCV-antibody positive status was ever injecting drugs (Adjusted Odds Ratio [AOR]: 26.88; [95%CI: 9.54–75.68]). We therefore undertook a sub-analysis to explore factors associated with HCV-antibody positive status among youth reporting injection drug use (IDU).

Table 2 compares HCV-antibody positive and negative young IDUs (N=219). In multivariable analysis, factors associated with HCV- antibody positive status were: a greater number of years injecting, 1 per day heroin injection and 1 per day crystal methamphetamine injection in the previous 6 months.

## INTERPRETATION

Among street-involved youth in our setting, 13% were HCV-antibody positive at enrollment and not surprisingly, injection drug use was the strongest predictor<sup>1</sup>. Almost half of the young people reported injection drug use, among whom almost 30% were HCV-antibody positive. This study underscores this population as critical for continued and innovative evidence-based drug injection prevention and targeted harm reduction education and practice tools to avert a widespread HCV epidemic.

Youth who were injecting heroin frequently were at increased risk of HCV-infection. Previous research has shown that young people in this setting were more likely to inject heroin than older people who use inject drugs, however they were less likely to access methadone maintenance therapy<sup>6</sup>. This study underscores the vulnerability of heroin dependent youth to blood-borne infection and the need to ensure that opioid treatment services (eg. methadone programs), are available and accessible to this vulnerable group<sup>7</sup>.

The rise of crystal methamphetamine use among street-involved youth in this setting has been previously documented, but we are unaware of any prior study to report an association

between methamphetamine use and hepatitis C.<sup>5</sup> The present study highlights the dangers of this drug and its potential association with HCV spread. Furthermore, almost half of the youth who reported injection drug use were using injection crystal methamphetamines on an at least daily basis. These findings are worrisome considering the drug's toxicity, widespread availability and association with blood-borne infection.<sup>8</sup>

Injecting on a daily basis, difficulty finding a syringe and having a syringe taken were also associated with HCV-positive status. These factors underscore the need to ensure that street-involved youth have access to harm reduction services including needle exchanges and that service providers, including the police, are supportive of their access.<sup>9</sup> Youth may avoid and/or live in locations away from harm reduction services to avoid arrest or to stay away from negative influences as a self-protective behaviour<sup>10</sup> thus services such as a peer needle exchange, may be appropriate.<sup>11</sup>

Generalizability may be a limitation in this study given the challenging nature of working with hidden populations, thus, our findings may under represent the level of risk in this population. However, similarity between the findings of this study and those from Roy et al. suggest they are representative.<sup>12</sup> Participants were informed of legislation requiring reporting of all sexual abuse disclosure among persons under 19, thus the association between HCV seroprevalence and sexual abuse may not be fully described. In addition, testing for HCV was conducted using antibody testing methods, therefore the number infected with HCV may be lower due to self-clearance of the virus.

This study highlights the need for public health programming to prioritize street youth to avert blood-borne infection outbreaks. The rise in use of drugs such as crystal methamphetamines and the level of HCV prevalence among young IDUs, is cause for concern. The need to support the expansion and evaluation of evidence-based approaches to address methamphetamine use among street-involved youth is critical.

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**Table 1**

Factors associated with HCV-seropositive status among street youth participating in the ARYS at enrollment

Variable	Total N (%) (N= 519)	HCV-positive N (%) 66 (13)	HCV-negative N (%) 453 (87)	p-value
Female	152 (29)	25 (38)	127 (28)	0.105
Aboriginal	124 (24)	19 (29)	105 (23)	0.318
19 years	433 (83)	61 (92)	372 (82)	0.035
Homeless	396 (76)	51 (77)	345 (76)	0.842
Sex work	60 (12)	13 (20)	47 (10)	0.027
Childhood sexual abuse	135 (26)	24 (36)	111 (25)	0.040
Vaginal risk	272 (52)	27 (41)	245 (54)	0.045
Anal risk	50 (10)	5 (8)	45 (10)	0.544
Crack	298 (57)	41 (62)	257 (57)	0.408
Share pipe	317 (61)	47 (71)	270 (60)	0.071
Burns on lips/mouth sores	117 (23)	18 (27)	99 (22)	0.325
Intranasal/smoked crystal meth	227 (44)	29 (44)	198 (44)	0.972
Intranasal heroin	106 (20)	14 (21)	92 (20)	0.865
Intranasal coke	208 (40)	12 (18)	196 (43)	0.001
Injected ever	219 (42)	62 (94)	157 (35)	<0.001

\* All behavioral variables refer to the prior 6 months at the time of interview

**Table 2**

Factors associated with HCV seropositive status among street youth participating in the ARYS who use injection drugs (N=219)

Variable	HCV-positive IDUs N (%) <b>62 (28)</b>	HCV-negative IDUs N (%) <b>157 (72)</b>	Odds Ratio (95% CI)	Adjusted Odds Ratio (95%CI)
Female	23 (37)	40 (25)	1.73 (0.92–3.23)	
Aboriginal	17 (27)	34 (22)	1.37 (0.70–2.68)	
19 years of age	58 (94)	141 (90)	1.64 (0.53–5.13)	
Sex work	12 (19)	23 (15)	1.40 (0.65–3.02)	
<b>Years Injecting</b>				
<b>Median (IQR)</b>	<b>8.1 (4.5–10.5)</b>	<b>5.1 (2.8–8.1)</b>	<b>*1.20 (1.10–1.31)</b>	<b>*1.23 (1.11–1.37)</b>
‡ Crack	40 (65)	105 (67)	0.90 (0.49–1.67)	
1 per day	15 (24)	29 (18)	1.41 (0.69–2.86)	
‡ Crystal meth	28 (45)	86 (55)	0.68 (0.38–1.23)	
1 per day	7 (11)	20 (13)	0.87 (0.35–2.18)	
<b>Inject heroin</b>	<b>41 (66)</b>	<b>66 (42)</b>	<b>2.69 (1.46–4.97)</b>	-----
<b>1 per day</b>	<b>32 (52)</b>	<b>24 (15)</b>	<b>5.91 (3.05–11.45)</b>	<b>8.56 (3.64–20.13)</b>
Inject cocaine	17 (27)	34 (22)	1.37 (0.70–2.68)	
1 per day	2 (3)	3 (2)	1.71 (0.28–10.50)	
<b>Inject crystal meth</b>	<b>38 (61)</b>	<b>62 (39)</b>	<b>2.43 (1.33–4.43)</b>	-----
<b>1 per day</b>	<b>18 (29)</b>	<b>19 (12)</b>	<b>2.97 (1.43–6.16)</b>	<b>3.10 (1.25–7.70)</b>
Shooting gallery use	35 (56)	65 (41)	1.83 (1.01–3.32)	0.85 (0.40–1.81)
Syringe confiscated	15 (24)	20 (13)	2.19 (1.04–4.61)	0.76 (0.29–2.02)
Borrow used syringe	12 (19)	20 (13)	1.64 (0.75–3.61)	
Borrow used equipment	12 (19)	24 (15)	1.33 (0.62–2.86)	
Difficulty accessing syringes	14 (23)	18 (11)	2.25 (1.04–4.87)	1.38 (0.53–3.58)
Require help injecting	10 (16)	26 (17)	0.97 (0.45–2.15)	

All continuous variables refer to the prior 6 months at the time of interview.

‡ Refers to non-injection drug use

\* Per year increase.