KNOWLEDGE OF HEPATITIS C AND TREATMENT WILLINGNESS AMONGST PEOPLE WHO INJECT DRUGS IN AN ERA OF DIRECT ACTING ANTIVIRALS

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ABSTRACT

Background: Knowledge of hepatitis C virus (HCV) is believed to be important in altering risk behaviour, improving engagement in care, and promoting willingness to initiate HCV treatment. We assessed factors associated with HCV knowledge and treatment willingness amongst people who inject drugs (PWID) in an era of direct acting antivirals.

Methods: Data were derived from three prospective cohort studies of PWID in Vancouver, Canada, between June 2014 and May 2015. HCV knowledge and treatment willingness were assessed using a Likert scale. Multivariable linear regression identified factors associated with higher HCV knowledge and treatment willingness.

Results: Amongst 630 participants, mean scores for HCV knowledge and treatment willingness were 25.41 (standard deviation [SD]: 2.52) out of 30, and 6.83 (SD: 1.83) out of 10, respectively. In multivariable analyses, Caucasian ancestry (adjusted linear regression model estimate [β] 0.50; 95% confidence interval [CI] 0.17, 0.82), employment (β 0.76; 95% CI: 0.38, 1.13), diagnosed mental health disorder (β 0.44; 95% CI: 0.11, 0.78) and previous HCV treatment (β 0.94; 95% CI: 0.46, 1.43) were independently associated with higher knowledge. Downtown Eastside (DTES) neighbourhood (i.e., epicenter of Vancouver's drug scene) residence was independently associated with lower knowledge (β -0.48; 95% CI: -0.81, -0.15). Greater HCV knowledge (β 0.12; 95% CI: 0.07, 0.17) was independently associated with higher HCV treatment willingness. DTES residence (β -0.31; 95% CI: -0.56, -0.06) and daily crack cocaine smoking (β -0.52; 95% CI: -0.92, -0.13) were independently associated with lower treatment willingness.

Conclusion: Factors that may reflect greater socioeconomic stability, such as neighborhood residence and employment, were associated with HCV knowledge. Higher HCV knowledge was associated with more HCV treatment willingness. Our findings suggest that providing PWID greater access to HCV education may be an integral component of the HCV cascade of care and that efforts might be best targeted to areas of greater socioeconomic disadvantage.

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INTRODUCTION

Chronic hepatitis C virus (HCV) infection is a leading cause of end-stage liver disease in North America (Kim et al., 2015). People who inject drugs (PWID) compose a large subset of individuals infected with HCV (Hajarizadeh, Grebely, & Dore, 2013). Among PWID, up to 90% of individuals may be HCV-seropositive (Ng et al., 2013). PWID populations face multiple barriers to accessing treatment, with treatment uptake rates ranging from 1.5% to 2.0% per year (Alavi et al., 2014; Iversen et al., 2014). Barriers to care are multifactorial at the patient, provider, treatment regimen, and health care system levels. Until recently, complex therapy based on interferon and ribavirin have presented a significant barrier to treatment. These medications have been associated with multiple toxicities and side effects, while associated with low rates of cure (Ray & Thomas, 2015).

Knowledge of HCV transmission, natural history and treatment is believed to be an important step in altering transmission risk behaviour, enhancing health maintenance and increasing engagement with HCV treatment (Kwiatkowski, Fortuin Corsi, & Booth, 2002). Previous studies have shown that lower HCV knowledge amongst PWID, with or without HCV, is linked to markers of socioeconomic disadvantage such as lower levels of formal education (Surjadi, Torruellas, Ayala, Yee, & Khalili, 2011; Treloar et al., 2011). Factors associated with increased healthcare exposure such as opioid agonist treatment (OAT) and more frequent visits to general practitioners have been associated with increased HCV knowledge (Dunn et al., 2013; Treloar et al., 2011). An important finding for treatment programs is that willingness to undergo HCV therapy has been associated with higher baseline HCV knowledge (Surjadi et al., 2011; Zeremski et al., 2014). Assessment of treatment readiness has been shown in the HIV literature to be an important factor associated with treatment compliance (Balfour et al., 2007).

Willingness to initiate treatment, while not as comprehensive as an assessment of readiness, is required for treatment readiness, and is an important factor in HCV treatment success.

Much of the literature to date has examined factors associated with HCV knowledge and treatment willingness prior to the current direct acting antiviral (DAA) era. Interventions tailored to the needs of PWID will be an important component of efforts to roll out HCV treatment and prevention programs. As Interferon sparing DAA-based therapies were introduced in Vancouver, Canada in the summer of 2014, the objective of this study was to assess HCV knowledge in a cohort of PWID in this setting, between June 2014 and May 2015. We aimed to identify factors that were associated with greater HCV knowledge as well as a greater willingness to undergo HCV treatment in the current DAA era in order to better inform future education and treatment efforts.

METHODS

Study design

The Vancouver Injection Drug Users Study (VIDUS), AIDS Care Cohort to Evaluate exposure to Survival Services (ACCESS) and At-Risk Youth Study (ARYS) are open prospective cohorts of drug users in Vancouver, Canada. These cohorts, including detailed sampling and recruitment procedures, have been described elsewhere (Strathdee et al., 1998; Tyndall et al., 2003; Wood et al., 2006). VIDUS enrolls human immunodeficiency virus (HIV)-negative adults (≥18 years of age) who injected drugs in the month prior to enrolment; ACCESS enrolls HIV-positive adults (≥18 years of age) who used illicit drugs (other than or in addition to cannabis) in the month prior to enrolment; and ARYS enrolls street-involved youth aged 14-26 years who used illicit drugs in the previous month. The primary modes of recruitment in all

cohorts are self-referral, word of mouth, and street outreach. Participants are required to reside in the Greater Vancouver region at enrolment and provide written informed consent.

The follow-up procedures for these studies were harmonized to allow for analyses of merged data. At baseline and semi-annually thereafter, participants completed an interviewer-administered questionnaire collecting data on demographics, drug use patterns, healthcare access, and other exposures. Venous blood samples were drawn at each visit for HCV and HIV serologic testing and HIV disease monitoring as appropriate. Referral for free HIV/AIDS care was provided to those found to be HIV positive, and these individuals were subsequently followed in ACCESS. In addition, a complete HIV-related clinical profile, including exposure to antiretroviral agents, was obtained for all ACCESS participants through a confidential linkage with the provincial Drug Treatment Program (Hogg et al., 1998, 2001). Participants were given a stipend ($40 CDN) at each study visit. The cohort studies have received annual approval from the University of British Columbia/Providence Healthcare Research Ethics Board.

Participants and HCV knowledge and willingness assessment

For this analysis, questionnaire responses collected from June 1, 2014 to May 30, 2015 were queried for all cohort participants who self-reported ever testing positive for HCV. Those who did not report a history of injection drug use or being HCV-seronegative were excluded. Self-report was used for exclusion as only those respondents who self-reported being HCV-positive were asked specific HCV knowledge and treatment willingness questionnaire items.

HCV knowledge and treatment willingness were assessed with a series of questions (14 items) pertaining to HCV transmission, natural history and treatment willingness. These questions were developed by local healthcare providers who are involved in the treatment of individuals with HCV. Responses were recorded using a Likert scale from 1 (“strongly

disagree") to 5 ("strongly agree") with most questions worded such that a higher score reflected a greater level of HCV knowledge or willingness to participate in HCV therapy. Questions that were worded such that a lower numeric response reflected more knowledge or willingness were imputed with a reversed scale to allow comparison between questions. Respondents were also permitted to decline answering a questionnaire component or to answer "not applicable" or "I don't know."

For the assessment of factors associated with HCV knowledge and treatment willingness, participants were excluded if they had missing or inadequate responses (responding "not applicable", "I don't know" or declining to respond) for at least one question, due to inability to calculate consistent total knowledge scores with these responses. For the assessment of treatment willingness analysis, individuals who had been successfully treated or who were on treatment at the time of the questionnaire were also excluded from further analysis. If a participant completed two study visits during the study period, we used the most recent observation only.

Study variables

The primary outcomes of interest were the composite scores for knowledge and treatment willingness, respectively, based on the summation of responses to the remaining questionnaire items following a factor analysis (see Table 2).

We considered a range of explanatory variables. Sociodemographic characteristics included age (per year older), sex (male vs. female), Caucasian ancestry, ≥high school completion, homelessness, Downtown Eastside (DTES) residence, and employment. The DTES is an area in Vancouver with an increased density of poverty and illicit substance use. Drug use behaviours included ≥daily heroin injection, ≥daily cocaine injection, ≥daily crack smoking, years of injecting (per year longer), and heavy alcohol use as defined by the National Institute for

Alcohol Abuse and Alcoholism (National Institutes of Health, 2015). Healthcare access included receipt of OAT, accessing any health or social service, HIV coinfection (stratified by ≥95% or <95% antiretroviral adherence, as in previous studies) (Milloy et al., 2016), ever diagnosed with a mental health disorder, and ever taking HCV treatment. HCV knowledge scores were added to the analysis of treatment willingness. All behavioural variables referred to the past 6 months and were dichotomized as yes vs. no unless otherwise stated.

We also assessed attitudes towards HCV treatment by asking participants "Which is more important to you if you were to consider treatment?" with response options of "How long it lasts" or "Types of side effects".

Statistical analysis

First, exploratory factor analysis using varimax rotation was used to determine the number of factors present among the 14 items, using a maximum likelihood method. These calculations were performed using SAS software, version 9.3 (SAS Institute, Cary, North Carolina, USA). Factors were then retained if: they had an Eigenvalue of greater than 1 and preceded the elbow in a Scree plot, and if the set of items collectively accounted for 70-80% of the variance. Factor loadings were used to determine the number of items included within each factor and items with factor loading >0.4 were retained. Additionally, Tucker and Lewis's reliability coefficient was calculated and yielded a score of close to 1 (0.93). In the analysis sample, the final subscales of knowledge and treatment willingness had Cronbach's alpha's of 0.81 and 0.64 and were composed of 6 and 2 items, respectively. The individual item scores were combined to come up with the total knowledge and willingness scores (maximum scores of 30 and 10, respectively). Both knowledge and willingness were assessed as continuous variables

using these composite scores with higher scores corresponding to higher knowledge or willingness, respectively.

Next, we examined differences between the sample eligible for the analyses on HCV knowledge levels and the group excluded due to inadequate or missing questionnaire responses, using Chi-squared and Mann-Whitney test. Bivariable and multivariable linear regression analyses were performed to assess factors associated with HCV knowledge and willingness to undergo therapy, respectively. We used an *a priori*-defined backward model selection procedure based on examination of the Akaike Information Criterion (AIC) and p-values to construct a multivariable model. Specifically, variables were included in the full multivariable model if they were significantly associated with knowledge or willingness in the bivariable analyses at a p-value of <0.1. After examining the AIC of the full model, we removed the variable with the largest p-value and built a reduced model. We continued this iterative process until no variables remained for inclusion. We selected the multivariable model with the lowest AIC score for each outcome.

Further, two sensitivity analyses including the group who answered "I don't know" to any knowledge or willingness item were performed by imputing "I don't know" as corresponding to a response of either 1 ("strongly disagree") or 3 ("neutral"), respectively. This component of the statistical analysis was performed using RStudio, version 0.99.892 (R Foundation for Statistical Computing, Vienna, Austria). All p-values were two-sided.

RESULTS

As shown in Figure 1, 1192 PWID who self-reported being HCV-seropositive completed a study visit during the study period. Of these, 630 (53%) participants were included in the analysis of factors associated with HCV knowledge level (knowledge sample) after exclusion of

those with missing or inadequate responses. Assessment of factors associated with willingness to undergo HCV treatment (willingness sample) was performed in 584 (49%) individuals after excluding those previously successfully treated or those currently on treatment. Characteristics of the knowledge sample and those excluded from the analyses due to missing or inadequate responses (n = 562) are shown in Table 1. The majority of the knowledge sample were male (67%) with a median age of 49.1 years (interquartile range [IQR]: 42.2-54.9) and were more likely to be HIV-positive compared to the missing responses group (p = 0.02). The missing responses group was more likely to be homeless, and less likely to have been engaged in HCV care as demonstrated by less contact with a physician regarding HCV, fewer HCV specialist referrals, fewer transient elastography assessments and less offers of HCV treatment (all p <0.05). Among the knowledge sample, 344 (53%) had ever been offered HCV treatment and of those offered therapy, 58 (17%) had ever initiated treatment.

HCV Knowledge

As shown in Table 2, overall knowledge level in the total sample (n=1192) was high with mean responses above 4 ("agree") for all six included items. More than 88% of participants correctly answered (4 "agree" or 5 "strongly agree") each included knowledge question item. Mean composite score for HCV knowledge was 25.41 (standard deviation [SD]: 2.52) out of 30.

Factors associated with HCV knowledge levels are shown in Table 3. In multivariable analyses, factors independently associated with increased level of HCV knowledge included: Caucasian ancestry (adjusted linear regression model estimate [β] 0.50; 95% Confidence Interval [CI]: 0.17, 0.82), being employed (β 0.76; 95% CI: 0.38, 1.13), a history of being diagnosed with a mental health disorder (β 0.44; 95% CI: 0.44, 0.11), and previous receipt of HCV treatment (β 0.94; 95% CI: 0.46, 1.43). Attainment of high school education or greater was not associated

with HCV knowledge (unadjusted β 0.28; 95% CI: -0.06, 0.61). DTES residence was independently associated with a lower level of HCV knowledge (β -0.48; 95% CI: -0.81, -0.15).

HCV Treatment Willingness

Willingness to undergo treatment was somewhat lower (<4) compared to knowledge scores [Table 2]. Fifty-three percent of participants "strongly agreed" or "agreed" to consider starting HCV treatment within the next year. The mean composite score for treatment willingness was 6.83 (SD: 1.83) out of 10. When asked if they prioritized treatment duration versus risk of side effects, 58% reported risk of side effects as a more important treatment consideration while only 16% were more concerned about treatment duration. Fifty-seven percent of participants reported that what they have heard about the side effects of HCV treatment scares them. Only 66.3% of respondents answered "agree" or "strongly agree" to the question "Treatment for hepatitis C can cure the infection in most people", and 51.3% still believed that HCV treatment included a weekly interferon injection.

Table 3 shows the results of a multivariable linear regression analysis. As shown, participants were less willing to undergo HCV treatment if they resided in the DTES (β -0.31; 95% CI: -0.56, -0.06) or reported at least daily crack cocaine smoking (β -0.52; 95% CI: -0.92, -0.13). A greater degree of HCV knowledge was associated with an increased willingness to pursue HCV treatment (β 0.12; 95% CI: 0.07, 0.17).

Sensitivity Analysis

The results of sensitivity analyses were largely unchanged. The only difference was that older age was associated with lower HCV knowledge (β -0.02; 95% CI: -0.04, -0.01), and that DTES residence was no longer independently associated with low treatment willingness (β -0.23; 95% CI: -0.44, -0.03; p=0.06).

DISCUSSION

Overall, we found a high level of HCV knowledge amongst our sample of PWID. Caucasian ancestry, employment and residence outside the DTES were independently associated with greater HCV knowledge implying a possible role of socioeconomic and structural barriers upon knowledge. Greater healthcare exposure was associated with higher HCV knowledge scores while DTES residence and daily crack cocaine smoking were associated with less willingness to initiate HCV treatment. HCV knowledge scores were associated with willingness to initiate HCV treatment, however, study participants cited concerns regarding treatment side effects as being a major barrier. Knowledge of high sustained virologic response (SVR) rates and the interferon-sparing nature of DAA regimens appeared to be limited and this may have contributed to the cohort having only modest willingness to initiate HCV treatment.

Previous studies, mostly conducted prior to the current DAA era, have shown varying levels of HCV knowledge amongst their populations. These studies have used different questionnaires to attempt to assess HCV knowledge and have evaluated diverse populations with or without a history of HCV infection or injection drug use, respectively (Cohen-Moreno et al., 2010; Dunn et al., 2013; Stein, Maksad, & Clarke, 2001; Strauss et al., 2007; Surjadi et al., 2011; Treloar et al., 2011; Zeremski et al., 2014). Among these studies, baseline average HCV knowledge scores were reported to range from 42-71% with lower scores generally reported in studies using more rigorous assessment tools. While heterogeneous assessment tools used across the studies do not permit head-to-head comparison, knowledge amongst our sample appeared to be high relative to prior studies possibly reflecting cumulative population knowledge as HCV treatment efforts have scaled up over the years.

Not surprisingly, previous HCV treatment was associated with increased HCV knowledge. Individuals with a history of HCV treatment would have had multiple HCV-specific healthcare encounters, accounting for their higher knowledge levels. Similarly, participants with a diagnosis of a mental health disorder would also have more frequent healthcare contact, which may have provided the opportunity for education surrounding HCV. Treatment with interferon based therapy is generally contraindicated in comorbid mental health disorders. Providers caring for this population may be more attuned to the advancements in interferon-sparing therapy for this reason, and thus may have discussed this option more readily with this group of participants. Frequency of healthcare contacts has also been associated with greater knowledge levels in previous studies (Dunn et al., 2013; Marshall et al., 2015; Treloar et al., 2011).

Based on prior studies, we had anticipated that HIV co-infection and OAT would be associated with HCV knowledge levels in our sample. However, this was not demonstrated in our analyses. The historically poor treatment response rates to interferon and ribavirin combination therapy, particularly in HIV co-infected individuals (Chung et al., 2004), may have resulted in HIV providers prioritizing other health concerns over HCV thus potentially explaining why those co-infected with HIV did not have an increased level of HCV knowledge despite more intense healthcare contact.

Daily crack smoking was associated with less willingness to undergo HCV treatment, as was DTES residence. As summarized in the review by Fischer and colleagues, pharmacotherapy for cocaine use disorder is lacking, and while some evidence-based psychosocial interventions exist, the scalability and durability of these interventions is limited (Fischer et al., 2015). The lack of widely available treatment options and the physiologic effects of crack cocaine intoxication may contribute to the association of daily crack cocaine smoking with lower HCV

treatment willingness. As well, given the silent nature of chronic HCV infection (Smith, Combellick, Jordan, & Hagan, 2015), competing health and socioeconomic priorities may supersede individual interest in HCV treatment among some individuals living in the DTES.

Consistent with previous studies (Norton et al., 2014; Surjadi et al., 2011; Zeremski et al., 2014), we found that a greater knowledge of HCV was associated with an increased willingness to undergo HCV therapy. These same studies have also demonstrated that educational interventions can increase participant knowledge levels as well as increase treatment willingness and subsequent follow up attendance at specialist clinics suggesting that knowledge does in fact play a role in willingness to undergo therapy.

HCV treatment willingness in populations similar to ours have been reported to be as high as 97% in the pre-DAA era (Surjadi et al., 2011). While greater HCV awareness amongst PWID may explain our participants' high knowledge scores, this may also contribute to less willingness to initiate HCV treatment in our population due to the greater appreciation of treatment side effects from interferon containing regimens. This is supported by the finding that a significant amount of our sample expressed concern regarding the risk of side effects from HCV therapy. Although specific knowledge questions in our final knowledge score did not address HCV treatment side effects, this finding suggests that the significantly improved side effect profile of the new interferon-sparing DAA regimens is likely an important knowledge gap to target in future educational interventions. Further, educational interventions targeting the paradigm shift in HCV treatment with respect to both improved tolerability and treatment success needs to be prioritized in order to increase treatment enthusiasm amongst PWID.

Our study represents one of the largest cohort studies focused on assessing correlates of HCV knowledge and treatment willingness in PWID. The main limitation in our study was the

lack of a validated HCV knowledge assessment tool. No single tool exists to assess an individual's knowledge of HCV, making comparison of the findings of individual studies difficult. However, our findings identified similar factors and themes associated with a greater or lesser degree of HCV knowledge amongst PWID as seen in previous studies, suggesting that these various methods of knowledge assessment are in fact measuring similar constructs (Grau, Zhan, & Heimer, 2016; Marshall et al., 2015; Surjadi et al., 2011).

Another limitation was that a large number of study participants answered "I don't know" or declined to answer at least one of the knowledge questions. This group with missing or inadequate responses was significantly different from the final analytical sample in both socioeconomic factors and access to care. However, we note that sensitivity analyses did not significantly change our results. Nevertheless, this missing responses group warrants further study and may represent an important group for future interventions. Other limitations include reporting bias in the self-reported data. As well, there may exist unidentified confounders as in all observational studies. Finally, non-random sampling methods used in our cohorts may limit the generalizability of our findings.

In summary, our study demonstrated several markers of socioeconomic and structural factors to be associated with both HCV knowledge and treatment willingness. As interferon sparing DAA-based therapies were introduced near the beginning of the study period, wide-spread community awareness of these new therapies was likely limited, as reflected in our findings of more modest knowledge pertaining to these treatments. Our findings suggest that it will be important for HCV programs to focus on education, with an emphasis on the substantial improvement in side effect profiles and SVR rates of the current DAA treatments if expansion of HCV therapy amongst PWID is to be accomplished. In addition, our findings suggest that

programs need to continue to devote resources towards the underlying structural inequality facing PWID, which appears to affect both HCV knowledge and treatment acceptance.

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Table 1: Characteristics of self-reported HCV positive people who inject drugs in the VIDUS, ACCESS and ARYS cohorts, June 1, 2014 to May 30, 2015 (n = 1192).

Characteristics	Knowledge Cohort n=630 N (%)	Missing Responses n=562 N (%)	p-value
Age (median, IQR)	49.1 (42.2-54.9)	48.9 (39.8-55.3)	0.67
Male	422 (67.0)	333 (59.3)	0.01
Caucasian ethnicity/ancestry	366 (58.1)	316 (56.2)	0.52
≥High school diploma	305 (48.4)	249 (44.3)	0.16
Homeless[a]	90 (14.3)	106 (18.9)	0.03
DTES residence[a]	343 (54.4)	310 (55.2)	0.80
Employment[a]	155 (24.6)	146 (26.0)	0.59
≥ Daily heroin injection[a]	131 (20.8)	113 (20.1)	0.77
≥ Daily cocaine injection[a]	33 (5.2)	31 (5.5)	0.83
≥ Daily crack smoking[a]	65 (10.3)	75 (13.4)	0.11
Heavy alcohol use[a]	80 (12.7)	83 (14.8)	0.30
Years of injection drug use (median, IQR)	25.7 (18.1-35.7)	27.5 (18.1-35.7)	0.47
Accessed any health or social services[a]	503 (79.8)	449 (79.9)	0.98
Opioid agonist therapy[a]	345 (54.8)	306 (54.5)	0.97
HIV serostatus			
HIV negative	350 (55.6)	354 (63.0)	0.02
HIV positive, ART adherence <95%	111 (17.6)	76 (13.5)	
HIV positive, ART adherence ≥95%	169 (26.8)	131 (23.3)	
History of mental health disorder	408 (64.8)	343 (61.0)	0.18
Seen by physician for HCV care[a]	388 (61.6)	204 (36.3)	<0.0001
Seen by HCV specialist[a]	109 (17.3)	53 (9.4)	<0.0001
Ever undergone transient elastography	53 (8.4)	22 (3.9)	0.001
Ever offered HCV treatment	344 (53.0)	236 (42.0)	<0.0001
Ever taken HCV treatment	58 (9.2)	68 (12.1)	0.105
Cohort			
ACCESS	280 (44.4)	207 (36.8)	0.01
ARYS	34 (5.4)	44 (7.83)	
VIDUS	316 (50.2)	311 (55.3)	

IQR: interquartile range. DTES: Downtown Eastside. HIV: human immunodeficiency virus. ART: antiretroviral therapy. HCV: hepatitis C virus. VIDUS: Vancouver Injection Drug Users Study. ARYS: At-Risk Youth Study. ACCESS: AIDS Care Cohort to Evaluate exposure to Survival Services.

[a] Denotes activities in the previous six months.

Table 2: Summary scores of the HCV knowledge and willingness to undergo HCV treatment scales amongst HCV positive people who inject drugs in Vancouver, Canada (n=1192).

Questionnaire Item	Mean (SD)	% answering "strongly agree" or "agree"
HCV knowledge scale		
I know how HCV is transmitted	4.09 (0.65)	88.1%
Using clean needles, syringes and equipment reduces the risk of being infected with HCV	4.30 (0.63)	93.3%
People living with HCV must be careful about sharing toothbrushes or razors	4.21 (0.61)	91.7%
People living with HCV can live for many years without knowing they have it	4.14 (0.61)	88.8%
HCV can cause liver failure	4.25 (0.51)	93.1%
Once HCV has been cured, people could catch it again if they still share needles	4.17 (0.55)	88.0%
HCV treatment willingness scale		
I would be willing to take treatment if it meant only taking pills and no injection	3.29 (1.06)	44.2%
I would be willing to consider starting treatment for HCV in the next year	3.53 (1.08)	53.5%
Other questionnaire items		
I know a lot about hepatitis C in general	3.57 (0.95)	61.1%
My doctor has discussed treatment for hepatitis C with me	3.50 (1.12)	61.5%
Treatment for hepatitis C can cure the infection in most people	3.78 (0.81)	66.3%
Treatment for hepatitis C consists of a weekly injection and pills every day[a]	-	51.3%
What I have heard about the side effects of treatment for hepatitis C scares me	3.53 (1.03)	56.9%
Treating my other illnesses would be more important than treating hepatitis C	3.12 (1.08)	31.0%

SD: standard deviation. HCV: hepatitis C virus.

Where questionnaire scored from 1 (strongly disagree) to 5 (strongly agree). Responses of not available, I don't know or refusal to answer the question were removed from the analysis for each question.

[a]Response recorded as true, false or I don't know. Proportion answering true reported, calculation of mean not performed.

Table 3: Bivariable and multivariable linear regression of factors associated with HCV knowledge and willingness to undertake treatment among HCV-positive people who inject drugs in Vancouver, Canada (2014-2015).

	Knowledge (n = 630)		Willingness(n = 584)	
	Unadjusted Model Estimate[a] (95% CI)[b]	Adjusted Model Estimate[a] (95% CI)[b]	Unadjusted Model Estimate[a] (95% CI)[b]	Adjusted Model Estimate[a] (95% CI)[b]
Age (per year older)	0.0001 (-0.02,0.02)		0.0004 (-0.01, 0.01)	
Male (yes vs. no)	0.42 (0.07,0.77)		0.28 (0.02, 0.55)	
Caucasian ancestry (yes vs. no)	0.67 (0.34,1.01))**	0.50 (0.17, 0.82)*	0.09 (-0.16, 0.35)	
≥High school education (yes vs. no)	0.29 (-0.06, 0.61)		-0.13 (-0.38, 0.12)	
Homeless[c] (yes vs. no)	-0.01 (-0.19, 0.46)		-0.02 (-0.37, 0.33)	
Downtown Eastside residence[c] (yes vs. no)	-0.68 (-1.0, -.035)**	-0.48 (-0.81, -0.15)*	-0.40 (-0.65, -0.15)**	-0.31 (-0.56, -0.06)*
Employment[c] (yes vs. no)	0.86 (0.48, 1.24)**	0.76 (0.38, 1.13)**	0.27 (-0.02, 0.56)	
≥Daily crack smoking[c] (yes vs. no)	-0.01 (-0.56, 0.53)		-0.55 (-0.96, -0.15)*	-0.52 (-0.92, -0.13)*
≥Daily heroin injection[c] (yes vs. no)	-0.30 (-0.70, 0.11)		-0.14 (-0.45, 0.16)	
≥Daily cocaine injection[c] (yes vs. no)	-0.27 (-1.02, 0.47)		0.24 (-0.30, 0.78)	
Heavy alcohol use[c] (yes vs. no)	0.14 (-0.35, 0.64)		0.44 (0.06, 0.82)	
Years of IDU (per year longer)	0.005 (-0.01, 0.02)		-0.003 (-0.01, 0.01)	
Accessed health or social services[c] (yes vs. no)	0.26 (-0.16, 0.67)		0.21 (-0.10, 0.53)	
OAT (yes vs. no)	0.02 (-0.31, 0.36)		0.01 (-0.24, 0.26)	
HIV seropositive (yes vs. no)	-0.04 (-0.37, 0.30)		0.23 (-0.02, 0.48)	
ART adherence <95% vs. HIV negative	0.17 (-0.28, 0.62)		0.15 (-0.19, 0.49)	
ART adherence ≥95% vs. HIV negative	-0.17 (-0.56, 0.22)		0.28 (-0.02, 0.57)	
History of mental health disorder (yes vs. no)	0.46 (0.11, 0.80)*	0.44 (0.11, 0.78)*	0.12 (-0.14, 0.38)	
Previous HCV treatment (yes vs. no)	1.08 (0.59, 1.57)**	0.94 (0.46, 1.43)**	0.64 (0.11, 1.18)*	
HCV Knowledge (per score increase)	-	-	0.13 (0.08, 0.18)**	0.12 (0.07, 0.17)**

HIV: human immunodeficiency virus. OAT: opioid agonist therapy. IDU: injection drug use. HCV: hepatitis C virus.
[a] Odds ratio, [b] 95% confidence interval, [c] Refers to 6 month period prior to interview, *p<0.05, **p<0.01

Figure 1: Determination of analytic samples.