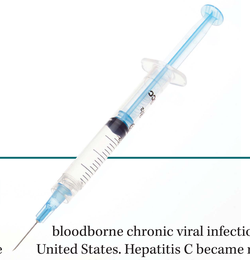

Prevalence of HCV among Persons Who Inject Drugs (PWID): Comparison of Urban Versus Rural Oregon Counties

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Background

Hepatitis C is the most common bloodborne chronic viral infection and the leading cause of chronic liver disease in the United States. Hepatitis C became reportable in Oregon in July 2005 with no investigation required by local health departments (LHDs). Injection drug use is a well-known risk factor for hepatitis C. However, most investigations into the roles of injection drug use in transmission of HCV have focused on urban populations. We compared the prevalence of hepatitis C among persons who inject drugs (PWID) in urban and rural settings in Oregon.

Method

From March 2007 to November 2009, 19 local health departments in both urban and rural Oregon were selected to perform targeted anti-HCV screening on high-risk individuals. Selection criteria for LHDs included the ability to perform testing without requiring additional funding for administrative costs of screening, ability to integrate HCV testing within existing HIV screening programs, and availability of post-test counseling for individuals undergoing screening. LHD staff followed the CDC's recommendations for screening. Testing was indicated for those that met at least one of the following criteria:

- Ever injected illegal drugs;
- Received transfusion or transplant prior to 1992;
- Ever been on hemodialysis;
- Received clotting factor concentrates made before 1987; or
- Showed evidence of liver disease.

Outreach settings included needle exchange sites, jails, HIV testing sites, alcohol and drug treatment sites, as well as county health department clinics. Basic demographic and risk factor data were collected at the time of testing. Sera obtained through phlebotomy underwent EIA testing at the Oregon State Public Health Laboratory (OSPHL) using the Ortho HCV version 3.0 ELISA assay (Ortho-Clinical diagnostics, Raritan, NJ). At selected sites, specimens were obtained via finger stick and tested by a commercial assay, Home Access® Hepatitis C test (Home Access Health Corporation, Hoffman Estates, IL), for antibodies to HCV. Positive anti-HCV results with signal-to-cutoff ratios not predictive of a true positive were considered negative. Values <3.8 for tests performed at OSPHL and values below 4.2 without RIBA confirmation for Home Access® results did not meet criteria for a true positive. Risk factor questionnaires were linked to positive test results by a unique study ID. Urban and rural classifications of counties were based on urban and rural population estimates from the 2000 U.S. Census and counties were divided into three groups: Group 1, 0 to 21% rural; Group 2, 22 to 36% rural; Group 3, 37 to 76% rural.

Data were entered into an MS Access database and analyzed using SPSS® 17.0 (Chicago, IL) and SAS® 9.1 (Cary, NC). We first calculated the prevalence of HCV in different demographic and risk factor groups overall and with persons who inject drugs (PWID) excluded. Since the vast majority of persons with positive HCV tests were among those admitted to injection drug use (95%), we limited the rest of our analyses to this subgroup (n=1142). We compared proportions using the Chi-square test, and calculated crude odds ratios and 95% confidence intervals for the presence of HCV antibodies for different demographic and risk groups. We performed a logistic regression analysis to examine the risk for HCV using a backward stepwise elimination model, starting with all of the variables that had a p >0.10 in the crude analysis. Since injection drug use is likely to correlate with many of the other exposures of interest and the number of HCV-positive persons who denied injection drug use was very small, we again restricted the multivariable model to PWID.

Results

From March 2007 to November 2009, 1,607 anti-HCV screening tests were performed, and 325 (20%) of individuals tested had detectable antibodies to hepatitis C. Of those tested, 1,142 (71%) reported injection drug use and 1,160 (72%) were under the age of 40. Of the 325 individuals that tested positive, 310 (95%) were among admitted injection drug users.

Among PWID, 310 (27%) tested positive overall, while the prevalence of HCV among PWID under the age of 40 was 20% (n=171). Reported risk factors for those testing anti-HCV positive are shown in Table 1. No significant differences were seen between males (186/894; 21%) and females (138/707; 19.5%). Injection drug use was the most commonly reported risk factor, and transfusion, incarceration, sexual and household contact with a person with hepatitis were reported by >20% of individuals. However, after excluding PWID, these other risk factors were reported by <5% (Table 1).

Figure 1 illustrates the prevalence of HCV by age group and sex. Seropositivity increased with age for males, with the highest prevalence in men over 40 years old (30.6%), whereas HCV was more common in females 30-39 of age (28.3%). The median age in years was 38 (range: 19 – 60).

Six participating counties offered needle exchange (NEX) services; 50% of those counties were in the most rural group. Rural group designation and NEX counties are presented in figures 2 and 3. Between counties, the prevalence of HCV among persons who inject drugs (PWID) ranged from 0% to 80%. The prevalence of HCV among PWID was highest in the most urban group (Group 1: 31%), followed by 25.6 percent in Group 2 and lowest in Group 3 (22.1%, OR comparing Group 1 to Group 3: 1.5, 95% CI: 1.2 - 2.2).

Table 2 includes results for the crude and multivariable analyses. Crude odds ratios for incarceration, sex contact with hepatitis, age over 40, transfusion, presence of NEX services, and the comparison of the least rural group to the most rural group (Group 1 vs Group 3) were significant. In the logistic regression model, PWID residing in the most urban group (Group 1) were 1.67 times more likely to be HCV positive than those residing in the most rural group (Table 2). The only other significant predictors of HCV status among IDUs were presence of NEX (OR: 1.76; 95% CI: 1.28 - 2.4) and age >40 (OR=3.8, 95% 2.8 - 5.1). (Table 2).

Discussion

In this study, we found that the prevalence of HCV among PWIDs is lower in rural settings. In this group of PWID, other traditional risk factors for HCV were found not to be significant after adjustment for age and rural/urban residence.

The findings from this study are subject to at least three limitations. Our prevalence estimates among PWID may be biased by the fact that the high-risk individuals selected for this study were part of a convenience sample at each testing location and may not reflect the PWID population in Oregon. Secondly, since this was a cross-sectional study, it is unknown when the individuals acquired their HCV infections, so these estimates of prevalence should not be used to make assumptions about current rates of HCV transmission in these Oregon locations. Thirdly, individuals receiving testing did not necessarily reside in the city or county where screening was performed, which may have resulted in a misclassification bias. Similarly, use of the census rural/urban designation may result in misclassification, since many of the counties are mixtures of urban and rural census tracts. The larger size of some counties may not appropriately reflect true urban/rural settings. Further collection of zip code data will allow consideration of more accurate rural/urban designation.

Our finding of a significant association between the presence of NEX services and seropositivity among PWID seems counter-intuitive and should be interpreted carefully. The issue of NEX effectiveness in prevention of HIV has been well documented, but the data are more equivocal on the role of NEX in prevention of HCV. Additionally, poorly funded and understaffed programs should be considered as a source of bias when interpreting these results. This study has several limitations, but the results highlight that — although the prevalence of HCV among PWID is lower in rural settings — it is high enough that routine screening of PWID statewide should continue.

Figure 1

Prevalence of HCV by Age Group and Sex, HCV Screening Program, Oregon, 2007-2009

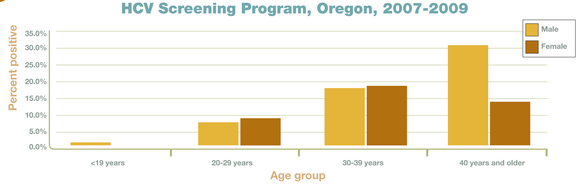

Figure 2

Rural proportion of county population

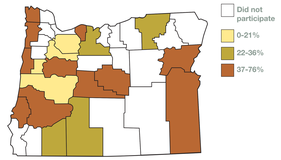

Figure 3

Prevalence of HCV among PWID

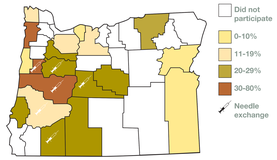

Table 1

Prevalence of anti-HCV by risk group*, overall and with injection drug users excluded, HCV Screening Program, Oregon, 2007-2009 (n=1607)

	Prevalence of anti-HCV no. (%)	Prevalence of anti-HCV, IDU excluded no. (%)
Injection drug use	310/1142 (27.1)	N/A
Ever incarcerated	271/1033 (26.2)	9/194 (4.6)
Sex contact with hepatitis	113/448 (25.2)	4/110 (3.6)
Household contact with hepatitis	108/445 (24.3)	5/109 (4.6)
Ever tx for STD	103/498 (20.7)	3/112 (2.7)
Transfusion prior to 1992	17/63 (27)	1/30 (3.3)
Total	325/1607 (20.2)	14/325 (4.3)

*Denominators contain number of individuals in each risk group; unknown and missing responses are excluded.

Table 2

HCV status by selected characteristic (among PWID only), HCV Screening Program, Oregon, 2007-2009 (n=1142*)

	Anti-HCV positive no. (%)	Crude OR (95% CI)	Adjusted OR** (95% CI)
Age			
Over 40	171 (19.9)	2.86 (2.21 – 3.69)	3.8 (2.8 – 5.1)
Under 40	137 (48.9)	-	
Sex			
Female	132 (26.2)	0.91 (0.7 – 1.2)	-
Male	177 (28.0)	-	
NEX county			
Yes	221 (30)	1.55 (1.2 – 2.1)	1.76 (1.28 – 2.4)
No	87 (22)	-	
Rural group			
Group 1) 0 to 21% rural	171 (31)	1.5 (1.2 – 2.2)	1.67 (1.19 – 2.34)
Group 2) 22 to 36% rural	63 (25.6)	1.2 (0.82 – 1.8)	1.62 (1.07 – 2.5)
Group 3) 37 to 76% rural	76 (22.1)	-	
Ever incarcerated			
Yes	261 (31.3)	2.8 (1.9 – 4.1)	-
No	34 (14)		
Sex contact with hepatitis			
Yes	109 (32.5)	1.4 (1.1 – 1.9)	
No	135 (25.1)		-
Household contact with hepatitis			
Yes	103 (31)	1.3 (0.94 – 1.7)	
No	157 (26.2)		-
Ever tx for STD			
Yes	99 (25.8)	0.89 (0.67 – 1.2)	
No	188 (28)		-
Transfusion prior to 1992			
Yes	16 (48.5)	2.6 (1.3 – 5.3)	
No	280 (26.4)		-

*Denominators may vary due to exclusion of unknown responses.

**Values shown only for variables included in the final model.

DHS Oregon Department of Human Services