HHS Public Access

Author manuscript

J Behav Health Serv Res. Author manuscript; available in PMC 2020 December 15.

Published in final edited form as:

J Behav Health Serv Res. 2014 January ; 41(1): 37–49. doi:10.1007/s11414-013-9333-3.

Increasing Hepatitis C Knowledge Among Homeless Adults: Results of a Community-Based, Interdisciplinary Intervention

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Abstract

Homeless adults have high rates of hepatitis C virus infection (HCV) and low levels of HCV knowledge. This study reports results of an interdisciplinary, community-based intervention using stakeholder cooperation, case management, risk factor identification, and modification of dysfunctional psychosocial factors to increase HCV knowledge among homeless adults (N = 747). Data are from a randomized quasi-experimental study, with the major goal of evaluating the effectiveness of a Nurse Case Managed Intervention compared to a Standard Intervention, encouraging completion of a three-series hepatitis A/hepatitis B vaccination program. Increased HCV knowledge was measured with an 18-item questionnaire discerning risk factors for HCV and common misconceptions about individuals with HCV. A significant increase in HCV knowledge resulted regardless of intervention format. Receiving the Nurse Case Managed Intervention

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Conflict of Interest The authors wish to confirm that there are no known conflicts of interest associated with this publication, and there has been no significant financial support for this work that could have influenced its outcome. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing, we confirm that we have followed the regulations of our institution concerning intellectual property.

predicted greatest gain in HCV knowledge ($p<0.000$). Successfully engaging key stakeholders, outreach workers, community organizations, and homeless people themselves proved most efficacious in increasing HCV knowledge.

Introduction

Needle exchange programs and risk reduction education have not been successful in changing practices that cause transmission of hepatitis C virus infection (HCV) among homeless adults,[1-3] a group at increased risk for acquiring the virus due to high rates of injection (IDU) and noninjection drug use (NIDU).[4-7] Reports of the prevalence of HCV infection among homeless adults range from 17 % to 44 %, compared to approximately 1.6 % in the general population.[4,5,8-10] In 2001, the Centers for Disease Control and Prevention (CDC) began implementation of the National Hepatitis C Prevention Strategy in order to lower the incidence of acute HCV in the United States and to reduce the disease burden from chronic HCV infection (CDC).[11] A principal component of the Strategy concerned provision of education to the public, as well as persons at risk for infection, about risk factors for HCV transmission and the need for testing and medical evaluation. Despite implementation, barriers to health care access, such as lack of transportation, child care issues, work schedule inflexibility, limited health care facility hours, lack of respect or discrimination from clinic personnel, and continued involvement in substance abuse prevent homeless adults from accessing and benefiting from HCV education programs.[12,13] Although HCV education is often provided within drug abuse treatment programs,[14,15] participants often fail to take advantage of such education[16] or consider issues related to income, housing, and non-HCV-related health care as more important.[17,18]

Despite accessibility to substance abuse programs and specialty care for HCV, knowledge of HCV among IDUs in both general and homeless adult populations remains low.[19] Researchers have further noted misconceptions and inaccuracies regarding HCV risk factors, prevention, transmission, and treatment. For example, a small study of IDUs in Australia revealed significant gaps in knowledge of HCV transmission risks: 19 % of HCV-positive participants believed they could not infect others or were immune, while 42 % believed HCV antibodies gave protection against HCV infection.[20] Hepatitis C-positive adults referred for possible treatment through San Francisco's safety net health care system had an overall mean score of 61 % correct on an HCV questionnaire covering HCV general knowledge, diagnosis, transmission, treatment, and health care maintenance.[21] Needle exchange users from Connecticut, Illinois, and California scored less than 60 % correct on an HCV questionnaire assessing knowledge of routes of infection, detection of virus, viability of the virus in ambient environments, potential treatments, and prevention measures.[22] Although 46 % of needle exchange users in a New York City program knew that HCV was transmitted through shared needles and syringes, or that HCV could be transmitted by unprotected sex, only 17 % were aware of the risk associated with the sharing of cookers, cottons, and rinse water. Additionally, only 4 % knew that HCV could be transmitted through tattooing and body piercing.[23]

Identifying misbeliefs and incorrect assumptions about HCV infection, and having current, accurate knowledge of HCV transmission and prevention are critical for preventing HCV infection among homeless adults.[24-26] Most HCV education programs have focused on risk factor identification and/or behavioral interventions such as needle exchange programs, encouraging use of clean needles, and not sharing drug injection equipment such as filters, spoons, cookers, and rinse water; yet their results have been mixed in terms of preventing HCV infection. Injection drug use is a complex behavior involving social, psychological, cultural, economic, and biological factors.[27-29] Among a nationwide sample of 595 drug abuse treatment programs, only 50 % provided HCV education to participants, and the education provided consisted primarily of risk factor identification and behavior modification.[14,15] As a result, novel, comprehensive, community-based intervention programs accessible to homeless individuals, like the Nurse Case Managed Intervention from the current study, are being developed that target the complex and multidimensional factors linking homelessness to HCV infection, focusing on problem solving skills and strategies to remain uninfected, rather than on risk factor identification.[30-32]

Homelessness Intensifies HCV Risk Behaviors

As a result of an unstable living environment, homeless adults may exacerbate an existing drug problem or other dysfunctional conditions, which can predispose to HCV infection.[33,34] High rates of co-occurring mental illness also intensifies risk for HCV infection. Data from the 2010 National Homeless Assessment Report to Congress show that 26 % of adults residing in shelters have a history of severe mental illness, while 34 % have a history of chronic substance abuse.[35] For instance, depression, low self-esteem, and dysfunctional coping patterns may enable risk behaviors for HCV. High rates of depression correlate positively with increased injection frequency and more risky injection behaviors in homeless adults.[36] Being homeless or living in a homeless shelter contributes to low self-esteem, high-risk behaviors, substance abuse, and needle sharing.[32,37,38] Poor coping behaviors such as use of drugs or alcohol are common and are associated with more risky behaviors for HCV infection.[39-41] A meta-analysis of interventions to prevent HCV seroconversion among IDUs indicated that multidisciplinary programs may be more beneficial than single intervention programs.[42] For instance, an HCV intervention program for homeless youth, focusing on problem solving skills and strategies to remain HCV uninfected, produced a 29 % greater decline in overall injection risk 6 months post-intervention relative to the control group.[32] Interdisciplinary programs that incorporate community organizations, case management, and behavioral health specialists from the disciplines of nursing, medicine, psychology, and public health have greater ability to successfully prevent new HCV infection among homeless adults than do standard risk factor/behavior intervention programs.

This current study assesses the success of a Nurse Case Managed Intervention compared to a Standard Intervention for delivery of HCV education that engaged an interdisciplinary team of nurses, physicians, psychologists, and public health specialists as well as community stakeholders. The Nurse Case Managed Intervention coordinated case management, but also provided risk factor identification and risk reduction techniques education, referrals to local mental health providers, information on and referral to local homeless health care clinics for free medical care for HCV testing, evaluation, and management, and tracked participant

compliance among a large group of inner city homeless adults residing in several community shelters, substance abuse programs, and homeless encampments. The purpose of the current study is to (1) assess knowledge of HCV infection among homeless adults attending a three-series hepatitis A/hepatitis B (TwinRix®) (HAV/HBV) vaccine program for homeless adults, (2) determine how risk factors for HCV infection influenced HCV knowledge, and (3) evaluate the effectiveness of the interdisciplinary Nurse Case Managed Intervention for increasing HCV knowledge. It was hypothesized that a community-based comprehensive, interdisciplinary Nurse Case Managed Intervention would be more effective for increasing HCV knowledge and modifying dysfunctional behaviors than a Standard Intervention program.

Theoretical Framework

A modified version of the Comprehensive Health Seeking and Coping Paradigm (CHSCP)[43] served as the theoretical framework for this intervention study. The basic framework originated from the Lazarus & Folkman Stress and Coping Model[44] and the Schlotfeldt Health Seeking Paradigm.[45] The CHSCP has been applied to investigations focusing on understanding HIV, hepatitis, and tuberculosis risk, as well as protective behaviors and health outcomes among homeless and impoverished individuals.[5,46,47] The CHSCP is composed of a number of independent variables, identified as antecedent, mediating, or health-seeking factors, in addition to outcome variables. In this study, baseline antecedent factors include the socio-demographic factors of age, sex, education, race/ethnicity, HCV status, alcohol use, IDU, and NIDU. Mediating factors included homelessness (situational factor), depression and self-esteem (personal factors), coping behavior (social factor), baseline HCV knowledge (cognitive factor), and health-seeking behaviors (residence in a substance abuse shelter). The outcome variable was 6-month HCV knowledge.

Methods

Design

This study uses data collected as part of a large, prospective, randomized, quasi-experimental study evaluating the effectiveness of a Nurse Case Managed Intervention, compared to a Standard Intervention, for completion of the three-series HAV/HBV (TwinRix®) vaccine among homeless adults. The UCLA Human Subjects Protection Committee approved of all study activities. Readers are referred to the parent study for discussion of the effectiveness of Nurse Case Managed Interventions, completion of the HAV/HBV (TwinRix®) vaccine series among homeless adults, and cost effectiveness of the Nurse Case Managed approach.[48-50]

Setting

Directors of homeless encampments and homeless shelters in the recruitment area were contacted and agreed to participate. Recruitment flyers were posted within these sites. The Medical Director of the John Wesley Community Health Medical Clinic assured provision of medical care to all participants referred for HCV infection, and acute and chronic health conditions arising during the study period. Homeless adults were recruited from 12 homeless

shelters, four residential substance abuse shelters, and outdoor homeless encampments within the Skid Row area of Los Angeles. Using simple random selection of recruitment locations stratified by type (homeless shelter, residential substance abuse shelter, or outdoor homeless encampment), participants were randomized originally into one of three groups: (1) Nurse Case Managed Intervention with tracking, (2) Standard Intervention with tracking, and (3) Standard Intervention without tracking. The current study combines both Standard Intervention groups into a single group (collectively the Standard Intervention group). Because of the transient nature of homeless adults, a tracking locator guide was developed to allow community outreach workers to search for and encourage reengagement of participants who had not returned as scheduled for study visits.

Sample

Homeless persons were eligible if they were between the ages of 18 and 65 and self-reported as homeless; willing to be tested for HAV, HBV, HCV, and HIV antibodies; and had not previously completed the HBV vaccination series. HIV testing was included because of shared routes of infection and the potential for faster progression of liver disease.[51-53] A total of 2,086 homeless adults were screened for the original study; 46 were ineligible to undergo HAV, HBV, HCV, and HIV testing due to a history of Guillain-Barre syndrome or an allergy to eggs on which the vaccine is based, and four refused testing. An additional 1,171 individuals were excluded because of HBV positivity or prior HBV vaccination, failure to return for test results, and inability to be located for the 6-month follow-up visit. The final sample consisted of 747 participants, of whom 107 (14 %) were HCV positive.

Procedure

All participants completed a baseline questionnaire for demographic data including age, education level, race/ethnicity, gender, HCV status, alcohol use, IDU, NIDU, and recruitment location. Instruments measuring depression (Center for Epidemiology Studies Depression Scale),[54] self-esteem (Coopersmith Self Esteem Inventory),[55] positive coping (Brief COPE Inventory),[56] and HCV knowledge were also incorporated into the baseline questionnaire. At the 6-month follow-up visit, participants again completed the HCV knowledge questionnaire. A tracking locator guide contained the participant's photograph, along with current shelter or encampment location, participant aliases and hangouts, and the names and contact information of individuals who would always know the location of the participant. Participants who indicated interest in receiving research results were contacted at the completion of the study and provided the study results and findings. To reinforce program participation, financial incentives (or equivalent value food vouchers) were provided equally to all participants for completing the baseline and 6-month questionnaires ($10).

Standard Intervention

Participants assigned to the Standard Intervention received a single, brief, 20 minutes basic presentation on HAV, HBV, HCV, and HIV risk factors delivered by a trained research nurse during the baseline visit.

Nurse Case Managed Intervention

The Nurse Case Managed Intervention utilized a strengths-based model of case management which focuses on a broad range of needs, advocates on behalf of the client by interceding with service agencies, and seeks to develop an ongoing relationship with the client.[57] The Nurse Case Managed Intervention was conducted by a trained research nurse and consisted of three 40 minutes sessions, delivered in a group format. Content included education about HAV, HBV, HCV, and HIV infection, diagnosis, prevention, transmission, and the importance of medical follow-up. Case management consisted of enhancement of self-esteem, social and behavioral coping skills, and training in self-management and communication skills for reducing substance use and risky sexual practices. Coping scenarios were used to discuss the importance of positive social relationships, how to change behaviors that put individuals at risk for contracting hepatitis and HIV, dealing with triggers to risky behaviors, and how to deal with partner's and friend's objections to safe behaviors. Skill building included communication and negotiation techniques to encourage successful strategies for refusing offers to use drugs or engage in unprotected sex. Each session began with a participant needs assessment that included referrals and arrangements to facilitate appointments for medical and mental health care, food, shelter, transportation, or other social services.

Statistical Analysis

Chi-square test and Fisher's exact test analyzed demographic variables. Hierarchical regression was performed to identify predictors of HCV knowledge gain among demographic and psychosocial variables. A *t* test for dependent means was used to determine the change in HCV knowledge over time, comparing those participants receiving the Nurse Case Managed Intervention to those receiving the Standard Intervention. Statistical analyses were performed with STATA (version 9; StataCorp, College Station, TX, USA). All tests of significance were at the alpha = 0.05 level.

Measures

Hepatitis C knowledge was measured with a modified, 18-item instrument originally designed for tuberculosis.[58] An expert panel determined face validity and content validity for the modified questionnaire. Pilot testing was performed with 24 homeless persons and showed that the items were clearly understood and were sensitive and clear to the culture of the respondents. During analysis, four items were dropped due to ambiguity. Positive coping was assessed with the sum of six items from the Brief COPE Inventory reflective of positive coping actions including active coping, positive reframing, and planning.[56] Self-esteem consisted of the sum of responses to the 23-item Coopersmith Self Esteem Inventory (SEI).[55] The SEI was modified slightly to make it more understandable for the study population. Item responses were coded "true" and "false" instead of "like me" or "unlike me" as in the original version.[59] Items were reversed when necessary so that higher responses indicated more self-esteem. Depression consisted of the sum of responses to the Center for Epidemiology Studies Depression Scale (CES-D).[54] The measurement properties of the CES-D were evaluated in a probability sample of homeless adults residing in a large and demographically diverse community.[60]

Results

Participant Demographics

Participants were predominantly male (76 %) and African American (71 %). The mean age was 43 years. The mean education level was 12 years. During the 6 months prior to study commencement, 44 % had used alcohol, 47 % had NIDU, and 3 % had IDU. Forty-one percent of participants received the Nurse Case Managed Intervention; 33 % were residing in a residential substance abuse shelter (see Table 1).

Hepatitis C Knowledge

All participants showed a significant ($p \leq 0.02$) increase in HCV knowledge, regardless of HCV education format. At baseline, the mean HCV knowledge score of participants receiving the Nurse Case Managed Intervention was 7.8 out of 14 (55 %), which increased to 12.5 (89 %) at the 6-month follow-up visit. The mean baseline score for participants receiving the Standard Intervention was 7.9 (56 %), which increased to 9.9 (70 %) at follow-up. Similar increases in HCV knowledge were seen in the subsets of HCV-positive and HCV-negative participants. The mean baseline knowledge score for HCV-positive participants receiving the Nurse Case Managed Intervention was 8.2 (58 %), which increased to 12.4 (88 %) at follow-up. The mean baseline knowledge score for HCV-positive participants receiving the Standard Intervention was 8.6 (61 %), which increased to 9.9 (70 %) at follow-up. The greatest increase in HCV knowledge occurred among HCV-negative participants who received the Nurse Case Managed Intervention, in whom the mean baseline knowledge score was 7.7 (55 %), which increased to 12.6 (90 %) at follow-up. For HCV-negative participants receiving the Standard Intervention, the mean baseline HCV knowledge score was 7.8 (56 %), which increased to 9.9 (70 %) at follow-up (see Table 2).

Hierarchical regression was performed to examine the effects of depression, self-esteem, positive coping, residential substance abuse shelter, alcohol use, IDU, NIDU, demographic factors, and prior HCV knowledge on the follow-up HCV knowledge score. Step 1 included demographic factors, substance abuse factors, being housed in a residential substance abuse shelter, and prior HCV knowledge. Step 2 included positive coping, self-esteem, and depression. Step 3 added the effect of the Nurse Case Managed Intervention. At step 1, being female ($p \leq 0.001$; 95 % CI=−1.08, −0.558) and NIDU ($p \leq 0.05$; CI=−1.81; −0.172) predicted less HCV knowledge. Residing in a residential substance abuse shelter ($p \leq 0.05$; CI=0.067; 0.121) predicted greater HCV knowledge. Positive coping, self-esteem, and depression were added at step 2. Again, female gender and NIDU predicted less HCV knowledge, and residing in a residential substance abuse shelter predicted more HCV knowledge, all at their same levels of significance as in step 1. Positive coping skills, higher self-esteem, and less depression failed to predict increased HCV knowledge. With the addition of the Nurse Case Managed Intervention at step 3, NIDU predictive less HCV knowledge gain ($p \leq 0.010$; CI=−1.80; −0.239), while residing in a residential substance abuse shelter became only marginally significant for increased HCV knowledge ($p=0.049$; CI=0.060; 1.20). Receiving the Nurse Case Managed Intervention predicted the greatest gain in HCV knowledge of all variables ($p \leq 0.001$; CI=2.02; 3.06). Also at step 3, female gender failed to be a significant predictor of HCV knowledge gain. In all, demographic factors,

substance abuse factors, and residing in a residential substance abuse shelter explained 3.9 % of the variance in follow-up hepatitis C knowledge. Less than 0.1 % was explained by the combination of positive coping skills, higher self-esteem scores, and less depression, but receiving the Nurse Case Managed Intervention explained an additional 10 % of the variance (see Table 3).

Discussion

Hepatitis C Knowledge

A longstanding problem in community health care for homeless individuals has been the difficulty of delivering services to individuals with multiple life problems who find it difficult to maintain compliance with public health prevention and treatment programs.[61] This research focused on knowledge of HCV infection by a large group of homeless inner city adults. Results indicated that low baseline levels of HCV knowledge found in the current study were consistent with levels reported in prior research.[20-23] Regardless of education intervention program, all participants experienced a significant increase in HCV knowledge, with the largest increase in knowledge among those who received the Nurse Case Managed Intervention. However, receiving the Nurse Case Managed Intervention in multiple sessions over the 6-month study period resulted in a statistically significant increase in HCV knowledge compared to the Standard Intervention ($p<0.000$; data not shown). Nurseled interventions have previously proved useful for increasing hepatitis knowledge and tuberculosis knowledge among homeless adults.[62-64] Clearly these results demonstrate the benefit of mounting an intensive HCV knowledge campaign that engages at-risk homeless adults, coupled with crucial support from available community infrastructure.

Non-injection drug users gained significantly less knowledge of HCV after receiving HCV education than did IDUs and alcohol abusers, and therefore may be at even greater risk for contracting HCV than are IDUs. A recent review of HCV noted that NIDUs have not been extensively studied with respect to HCV risk factors and disease transmission, and may therefore be at considerable risk for infection and for transmitting HCV to others.[6] It remains crucial to continue providing HCV education to all homeless adults, regardless of IDU status. This will require engagement and implementation of more outreach programs at a community level.

Being female predicted less gain in HCV knowledge as a result of receiving HCV education. Low levels of HCV knowledge were noted among women in a short-term substance abuse treatment program, despite receiving "constant" education.[24] Being female and living on Skid Row generally indicates that women are more lacking in resources and services than are men, and as a result have less opportunity to obtain HCV education.[65-67] Homeless women are less likely than homeless men to have a regular source of health care.[68] Women suffering from drug abuse, violence, or depression seem to have the greatest unmet health care needs.[69] Homeless women may not view health care as a priority because of competing needs: finding a place to sleep, enough food to eat, a place to wash, or a place to go to the bathroom,[70] or may experience stigmatization from health care workers,[71] resulting in decreased access to health care in general and for HCV infection in particular. While homeless men also experience similar needs, research suggests that impoverished women

may prioritize safety and survival over health care.[72] For women with children, not having access to childcare increases the odds of not being able to access health care.[66]

Residing in a substance abuse shelter was marginally significant for greater HCV knowledge at the 6-month follow-up visit. Although education on HCV and other blood-borne infections is often incorporated into substance abuse rehabilitation programs, this education is often inadequate and participants often fail to take advantage of such education.[16,73] Most programs focus on risk factor identification and risk behavior modification, without incorporating counseling and treatment for more complex psychosocial factors and high risk behaviors.[14,15] Interestingly, methadone maintenance programs are more likely than drug-free programs to provide participants with information about HCV infection.[14,15]

Limitations

This study has several limitations. The setting included homeless shelters and substance abuse rehabilitation shelters located in a large urban area, and may not be representative of homeless adults in other areas of the country, reducing the ability to generalize results. Self-report data were used for assessing IDU, NIDU, and alcohol use, results of which are subject to reporting bias. However, previous research has shown strong correlations between objective measures of substance use and self-report data in homeless populations.[74] Participants were randomized for the study by recruitment location, not by intervention group; therefore, results of the effectiveness of the Nurse Case Managed Intervention for increasing HCV knowledge should be further investigated using other appropriate randomization procedures.

Conclusion

Although several non-profit organizations have been conceived to improve HCV awareness in both the general population and at-risk groups, the effect of these intervention efforts on HCV knowledge remains unknown. This study adds to the growing body of knowledge on HCV in homeless adults by demonstrating the effectiveness of an interdisciplinary, community-based, comprehensive Nurse Case Managed HCV education intervention that addressed psychosocial issues common to homeless adults such as self-esteem building, and behavioral factors preventing adoption of safe injection practices, in addition to providing standard risk factor education. Because homeless adults may be extremely transient, engagement with community shelters allowed outreach workers access to locations frequented by participants and increased completion rates for the Nurse Case Managed Intervention. This study also adds to the sparse research base of HCV in NIDUs.

Implications for Behavioral Health

Because homeless individuals often lack access to health care, HCV infection may remain undetected for years, causing liver damage. Directly related health care costs for HCV infection are expected to reach $10.7 billion during the period 2010–2019.[75] Among homeless adults in the study area, Stein, Andersen, Robertson, and Gelberg[76] found that 43 % were HCV-positive, 72 % of whom did not know that they were HCV-positive. This highlights an important public health policy issue: only one third of HCV-negative

participants in the current study, and even less HCV-positive participants (22 %), had ever received any type of information on HCV infection from a health care professional. This failure may be partly responsible for the low level of baseline HCV knowledge among participants. It remains, therefore, important to include HCV education as a part of every health care visit for homeless adults. Behavior change for HCV risk prevention in homeless adults is complex and multidimensional, requiring both interventions on an individual level, combined with public health supported interventions. Results of this study have demonstrated that innovative, community-based interventions that engage homeless adults with case management, psychosocial skills building, and multidisciplinary education programs that focus on problem solving skills and strategies to remain HCV-negative are cost effective for preventing HCV infection, as well as useful in decreasing the societal and health care system associated financial burdens associated with HCV infection in this vulnerable population.

Acknowledgments

Financial support for this research was provided by the National Institute of Drug Abuse grants DA 01070-35, DA01070-38, and DA016147.

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Table 1

Distribution of the participants by HCV status (*N*=747)

	HCV− (*n*=640)		**HCV+ (*n*=107)**		***p* value**
Age	Mean	(SD)	Mean	(SD)	
Male	42.5	(9.1)	44.0	(7.1)	0.007
Female	41.9	(9.0)	45.3	(8.9)	ns
Education	Level	(SD)	Level	(SD)	
	12.1	(1.8)	11.9	(1.6)	ns
Gender	#	(%)	#	(%)	
Male	483	(75)	84	(79)	
Female	157	(25)	23	(21)	ns
Ethnicity					
African American	464	(73)	67	(63)	
White	76	(12)	18	(17)	
Latino	83	(13)	19	(18)	
Mixed	3	(<1)	1	(<1)	
Other	14	(2)	2	(<1)	ns
		Group			
NCMIT	259	(40)	46	(43)	
SI	168	(26)	34	(32)	
SIT	213	(33)	27	(25)	ns
Recruitment site					
Homeless shelter	206	(32)	35	(33)	
Substance abuse shelter	217	(34)	27	(25)	
Homeless encampment	216	(34)	44	(41)	ns
Building or car	1	(<1)	0	(0)	
Substance use last 6 months					
IDU	18		7		0.047
NIDU	304		51		ns
Alcohol	278		51		ns
Previously received HCV information					
No	435	(68)	77	(71)	
Yes	205	(32)	30	(28)	ns

Table 2

t Test to determine the effect of the Nurse Case Managed Intervention on HCV knowledge

Group	Baseline HCV knowledge	Follow-up HCV knowledge	Change in HCV knowledge	*p* value
Total group, $N = 747$				
Nurse Case Managed Intervention	7.8	12.5	+4.7	0.0000
Standard Intervention	7.9	9.9	+2.1	0.0000
HCV positive subset, $n=107$				
Nurse Case Managed Intervention	8.2	12.4	+4.2	0.0000
Standard Intervention	8.6	9.9	+1.3	0.0211
HCV negative subset, $n=640$				
Nurse Case Managed Intervention	7.7	12.6	+4.9	0.0000
Standard Intervention	7.8	9.9	+2.1	0.0000

Table 3

Hierarchical regression analysis model to predict factors associated with increased HCV knowledge

	Block 1			Block 2			Block 3		
	p	**95 % CI**		***p***	**95 % CI**		***p***	**95 % CI**	
African American	0.139	−0.150	1.07	0.178	−0.196	1.05	0.040	−0.340	0.846
Age	0.537	−0.040	0.021	0.578	−0.040	0.022	0.582	−0.037	0.021
Female	0.000	−1.08	−0.558	0.000	−0.938	−0.564	0.219	−1.01	0.233
Education	0.457	−0.204	0.091	0.443	−0.206	0.090	0.438	−0.195	0.084
HCV+	0.989	−0.764	0.753	0.984	−0.771	0.755	0.956	−0.740	0.700
Baseline HCV knowledge	0.369	−0.038	0.086	0.415	−0.035	0.084	0.297	−0.026	0.086
IDU	0.161	−0.038	0.228	0.160	−0.038	0.231	0.114	−0.024	0.229
NIDU	0.388	−2.30	0.896	0.398	−2.30	0.917	0.345	−2.25	0.788
Alcohol use	0.018	−1.81	−0.172	0.020	−1.81	−0.156	0.010	−1.80	0.239
Substance abuse shelter	0.028	0.067	0.121	0.030	0.060	1.20	0.049	0.000	1.08
Positive coping				0.519	−0.103	0.204	0.983	−0.143	0.147
Self-esteem				0.942	−0.080	0.075	0.437	−0.044	0.103
Depression				0.949	−0.028	0.030	0.761	−0.031	0.023
Nurse Case Managed Intervention							0.000	2.02	3.06

	Block		**Residual**			
Block	***F***	***df***	***df***	**Pr>*F***	R^2	ΔR^2
1	3.00	10	736	0.0010	0.0391	
2	0.14	3	733	0.9365	0.0397	0.0005
3	90.33	1	732	0.0000	0.1452	0.1055