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## Feasibility of Completing an Accelerated Vaccine Series for Homeless Adults

**Adeline M. Nyamathi, ANP., PhD., FAAN,**

University of California, Los Angeles, School of Nursing

**Karabi Sinha, PhD,**

University of California, Los Angeles, School of Nursing

**Sammy Saab, MD, MPH, AGAF,**

University of California, Los Angeles, Medical Division of Digestive Diseases

**Mary Marfisee, MD, MPH,**

University of California, Los Angeles, David Geffen School of Medicine

**Barbara Greengold, PhD,**

University of California, Los Angeles, School of Nursing

**Barbara Leake, PhD, and**

University of California, Los Angeles, School of Nursing

**Darlene Tyler, PhD (c)**

University of California, Los Angeles, School of Nursing

### Abstract

Homeless adults are at high risk for HBV infection. In addition to culturally-sensitive programs designed to enhance vaccination compliance, accelerated HBV vaccination (three doses over 21 days) have also been suggested to improve compliance among high-risk groups. In this paper, we examined predictors of completers of two of three doses of a HAV/HBV vaccine series, normally delivered over a six-month period, to simulate compliance with an accelerated series, dosed over four weeks. A convenience sample of 865 homeless adults were randomized into a nurse case-managed approach (NCMIT) versus standard programs with (SIT) and without tracking (SI). Each group was assessed for completion of two of the three dose HAV/HBV vaccine series as well as the full three dose vaccine series. Sixty-eight percent of the NCMIT participants completed the three dose vaccination series at 6 months compared to 61% of SIT participants and 54% of SI participants. Eighty-one percent of the NCMIT participants completed two of the vaccinations compared to 78% of SIT participants and 73% of SI participants. The NCMIT approach resulted in greater numbers of completers of two of three doses and of the full three dose vaccine series. Predictors of completers of two doses and the full three dose vaccine series are provided. A greater number of homeless persons completed two doses across the three groups compared to the three-dose vaccine series. The use of nurse case-management and tracking, coupled with an accelerated HAV/HBV vaccination schedule, may optimize vaccination compliance in homeless adults.

### Keywords

HAV; HBV; HCV; homeless

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\* Corresponding author, Adeline M. Nyamathi, ANP, PhD, FAAN, Professor, UCLA School of Nursing, Box 951702, 2-250 Factor Bldg, Los Angeles, CA 90095-1702.

## INTRODUCTION

Hepatitis B Virus (HBV) infection continues to be a significant public health problem, despite the fact that, for the past two decades, comprehensive vaccination strategies have been implemented throughout the U.S.<sup>1</sup> Homeless adults are a population at high risk for HBV infection due to their disproportionate rates of injection drug use (IDU) and unprotected sexual activity<sup>2</sup>. Studies have reported that chronic HBV infection rates among homeless populations range from 17 to 31 per 100,000<sup>1,3</sup>.

Among IDUs, including those who are homeless, poor medication adherence has been identified as a deterrent to HBV vaccination, as only 5–10% of this population has been immunized for HBV<sup>4</sup> compared with 34.6% of adults 18–49 years of age<sup>5</sup>. Several strategies have been adopted in an attempt to improve HBV vaccination completion in this population; these include providing HBV vaccination in community-based centers<sup>1</sup>, using monetary incentives<sup>3,6</sup>, hiring outreach workers to help promote compliance<sup>7</sup>, and providing on-site vaccination at syringe exchange programs<sup>6</sup>. These interventions have had variable results, such as completion rates of 77% and 66% among syringe exchange site attendees who completed two and three vaccinations, respectively<sup>1</sup>. Although monetary incentives were also associated with improved compliance<sup>7</sup>, vaccination completion was more a function of whether the vaccination program was conveniently located to the participants<sup>6,8</sup>.

In our study of 865 homeless persons assigned to a program offering a comprehensive nurse case-managed program including targeted hepatitis education, incentives, and tracking compared to two standard programs offering targeted hepatitis education and incentives, with or without tracking, HBV completion resulted in 68, 61% and 54%, respectively, over a six-month period<sup>9</sup>. The nurse case-managed participants were significantly more likely than the standard group without tracking to result in completion of the HAV/HBV vaccine series. These findings reveal that in order to achieve at least two-thirds completion of the hepatitis vaccine series, significant costs in terms of staff time in tracking and incentives were critical. Most challenging is the ability to maintain homeless persons in a long-term program for completion of the vaccination series.

Recently, accelerated HBV vaccination schedules have been suggested as a means to improve vaccination compliance among high-risk groups<sup>10</sup>. Accelerated HBV vaccination can be delivered over the course of 21 days (0–7–21 days; or 0- 10- 21 days), versus the standard vaccination scheme (0–1–6 months)<sup>11–13</sup>. Accelerated HBV has also been delivered on a 0–7–21 day regimen, followed by a fourth vaccination at 12 months<sup>14,15</sup>.

Accelerated vaccination was designed in the hope that greater vaccination compliance was possible among high-risk groups, such as injection drug users (IDUs)<sup>14,16</sup> and homeless drug users<sup>17</sup>; the latter of which 39% completed the third vaccine dose. Among a sample of IDUs, the accelerated HBV vaccination schedule resulted in a 71% completion rate<sup>10</sup>. While no differences in vaccine completion were observed among a group of primary health center attendees who received the accelerated versus the standard six month vaccine series (21%)<sup>16</sup>, Christensen et al.<sup>18</sup> revealed that among incarcerated IDUs, a three-week accelerated vaccine schedule was superior to a standard six-month schedule in terms of reaching anti-HBs sero-positive status.

Studies have also shown that an accelerated schedule of HBV vaccination confers equal protection compared with standard HBV vaccination; over 80% of healthy adults receiving accelerated HBV vaccination were seroprotected at month 1, and 95% were seroprotected at month 3<sup>12</sup>. While less is known about seroprotection among high risk populations,

Christensen and colleagues<sup>18</sup> found that 67% of prisoners vaccinated with the accelerated three-week vaccination schedule were seroprotected at month 7.

Van Herck and colleagues<sup>19</sup> advise that the accelerated schedules should be reserved for persons who are likely to be less compliant or difficult to stay in contact with, such as homeless and drug users. Moreover, while the long-term protection of accelerated vaccines is still under investigation, there is a need for balancing the need for more rapid protection against the need for offering long-term protection.

Thus far, there have been no clinical trials assessing the ability of homeless adults, who are highly mobile and difficult to reach, to complete an accelerated two or three dose HBV vaccine. The purpose of this study is to present data on our larger study of standard three-dose completers compared with completers of two of three doses of the HAV/HBV vaccine series over a six month period. In addition, we present data on completers of two doses over a two month period as compared with baseline completers of one dose. The time-frame for those who complete two doses of the HAV/HBV vaccine series is fairly similar with that of an accelerated three-dose accelerated (0–7–21) schedule. The sub-analysis presented below will provide some evidence of the future success of rapidly protecting homeless persons with an accelerated hepatitis vaccination schedule.

## METHODS

### Design

This study, conducted with a convenience sample of 865 homeless adults residing in the Skid Row area of Los Angeles, utilized a three-group, prospective, quasi-experimental design to evaluate the effectiveness of a theoretically-based intervention. The eligible participants were randomized into a nurse case-managed approach or one of two standard programs, with and without tracking, and were assessed for completion of the three-series hepatitis A and B virus (HAV/HBV) vaccine. Data was collected at baseline and at six-month follow-up between September 2003 and August 2007. The UCLA Human Subjects Protection Committee approved all study activities.

### Setting and Sample

Homeless persons were eligible if they met the following eligibility criteria: 1) age 18–65 and self-reported as homeless; 2) willing to be tested for the hepatitis A virus (HAV), HBV, HCV and Human Immunodeficiency Virus (HIV) antibody at baseline and at six-month follow-up; and 3) had not previously completed the HBV vaccination series. A homeless person was defined as one who had slept in one of the 16 homeless shelters or drug rehabilitation study sites or on the street the previous night. HBV antibody positive persons were excluded from the study and were referred to the Weingart Medical Clinic for assessment and medical follow-up.

The final sample consisted of 865 homeless persons with baseline and six-month follow-up data. Initially, 2,086 persons were screened; of these, 2,036 were tested for antibodies of HBV core antigen and surface antibody, and HAV, HCV and HIV. Forty percent ( $n = 820$ ) persons had serological evidence of HBV exposure, and were excluded. Another 351 failed to return for the test results or were excluded for medical reasons. Participants were randomized by recruitment site into the NCMIT ( $n = 332$ ), SIT ( $n = 281$ ) or SI ( $n = 252$ ) group.

## Procedure

Homeless participants were recruited by research staff who visited each of the participating sites and posted flyers about the study. On scheduled visits, the research staff would return to the sites and provide detailed information about the study to interested persons. All sites were located within five miles of the Weingart Clinic where the study was conducted.

Persons who continued to be interested were provided informed consent for screening; which was followed by administration of a brief questionnaire covering basic socio-demographic characteristics and a hepatitis risk factor-related health history designed to assess eligibility for the study. Among homeless persons found to be eligible, a second informed consent process was conducted to allow pretest counseling and a venous blood draw for HAV, HBV, HCV and HIV assays. At the two-week follow-up visit with the research nurse, all potential participants found to be HBV antibody negative completed the final informed consent form and were randomized into one of three treatment groups. Separate teams of nurses and outreach workers were assigned exclusively with participants in the intervention or control programs

### Nurse Case-Managed with Incentives and Tracking (NCMIT)

The culturally-sensitive NCMIT program was delivered by a research nurse in group format over eight- thirty minute sessions during the first three months of the intervention and included the following: 1) facts about hepatitis A, B and C infection, and HIV; 2) details about the Twinrix™ HAV/HBV vaccine series; and 3) strategies for enhancement of personal (self esteem), social and behavioral coping skills, and communication skill competencies that would be useful in successfully challenging barriers to completion of the HBV vaccination series and implementing risk behavior change. In addition, case management approaches were critical in ensuring that participants were linked to needed mental health and physical health services.

### Standard with Incentives and Tracking (SIT) and Standard with Incentives (SI) Programs

Participants randomized to the SIT and SI groups received a brief, 20-minute basic presentation on hepatitis and HIV, the Twinrix™ vaccination series, and the importance of treatment adherence, along with a local community resource guide. The SIT group participants received tracking and incentives similar to the NCMIT group, while the SI group received similar incentives, but no tracking. At six-month follow-up, outreach workers not involved in the program implementation provided tracking and follow-up on all participants, based upon the locator guide<sup>20</sup>. For all groups, the incentive for receiving each dose of the vaccine was \$5. Additional financial incentives were provided equally for blood draw and return for test results, and completion of the baseline and six-month follow-up questionnaire.

## Measures

The measures utilized in the study have been validated in impoverished and/or homeless African-American, Latino, and White adults<sup>21–25</sup>.

Sociodemographic Variables collected at baseline included age, ethnicity, gender, education later (dichotomized into > 12 years versus < 12 years), employment status (yes or no), having children, recruitment site (homeless shelter, drug recovery shelter, or street), veteran status (Yes or No), and having an intimate partner (yes or no). Intention to Adhere was assessed by asking how committed respondents were to taking the vaccine doses over the six-month period and how likely they were to do so. Both questions used a 5-point scale that was dichotomized into “definitely would” versus “other” for analysis.

Drug and Alcohol Use Behaviors. The modified TCU Drug History form measured Drug and Alcohol Use<sup>25</sup>. This questionnaire has been tested using men and women with histories of drug addiction, prostitution, and homelessness. It records lifetime and past six-month use of 16 drugs, including cocaine, heroin and methamphetamine, and elicits information about current frequency of non-injection and injection drug use. This instrument has been validated with men and women with a history of drug addiction, prostitution, and homelessness and revealed two-week test-retest reliabilities in an acceptable range of .63 to .71<sup>20</sup>. The 4-item CAGE screener assessed alcohol dependency. Additional items assessed quantity of alcohol consumed in the past six months.

Mental Health was assessed with the Center for Epidemiological Studies Depression (CES-D) scale<sup>26</sup>. The 20-item self-report instrument is designed to measure depressive symptomology in the general population and has been validated for use in homeless populations<sup>27</sup>. Each item measures the frequency of a symptom on a 4-point response scale from 0 "Rarely or none of the time (Less than 1 day)" to 3 "Most of the time (5–7 days)". Item scores were summed, giving an overall scale that could range from 0 to 60. Higher scores indicate more depression. The internal reliability of the scale in this sample was .90. The five-item mental health index, which has well-established reliability and validity, was used to measure Emotional Well-Being<sup>28</sup>.

Social support was assessed by an 18-item scale used in the RAND Medical Outcomes Study<sup>24</sup>. The items elicit information about how often respondents had friends, family or partners available to provide them with food or a place to stay, etc., on a 5-point Likert scale. The instrument has demonstrated high convergent and discriminant validity and internal consistency reliability coefficients ranging from 0.91 to 0.97 for the four subscales<sup>24</sup>. In one of our previous baseline studies with this dataset<sup>29</sup>, internal consistency, as measured by Cronbach's alpha, was .97. Perceived Health Status was measured on a 5-point scale from "excellent" to "poor" and a dichotomous item inquired about recent hospitalization.

## Dependent Variables

The primary dependent variable was a dichotomy that compared those that completed all three doses of the HAV/HBV vaccine over a six month period versus those that completed only two doses. The second dependent variable was also a dichotomous variable comparing those that completed two doses over a two month period versus those who completed only the first baseline dose. A participant was considered to have completed only two of the three vaccines if he/she completed the second vaccination within two months from onset of the study and did not get the third vaccine (at all or within eight months from the study onset). On the other hand, a participant was considered to have completed all three vaccine doses if he/she had all three vaccines within eight months from onset. The latter category included some participants who did not complete the second vaccine within two months, but still completed the series within eight months. All participants received the first vaccine dose at baseline.

## Statistical Analyses

Preliminary analyses, including chi-square, tests for categorical variables, analysis of variance methods for normally distributed continuous variables, and non-parametric methods such as the Kruskal-Wallis tests for non-normally distributed variables, were used to assess comparability of the three programs at baseline with regard to demographic characteristics, substance use and psychological resources. Associations between completing all three versus only two of the vaccine doses and baseline characteristics were assessed by t-tests for normally distributed continuous variables, non-parametric Mann-Whitney test for

non-normally distributed continuous variables and chi-square and Fisher's Exact Tests (2-sided) for categorical variables. Stepwise multiple logistic regression modeling was used to assess program effects on treatment completion (all three vaccines versus only two as well as two vaccine completion versus only one at baseline), controlling for potential confounders. Predictors in the initial model included variables that were associated with vaccine completion at the 0.15 level in preliminary analyses. Indicators for NCMIT and SIT assignment were included in all models; other covariates were retained if they were significant at the .10 level. Variables that were not included in the stepwise modeling were then tested one at a time for inclusion in the model; these additional covariates were retained if they were significant at the .10 level or they had a strong impact on the coefficients of other variables in the model. Multicollinearity was assessed and model fit was examined with the Hosmer-Lemeshow test. Statistical analyses were performed with SAS/STAT and all tests of significance were at alpha = .05 level.

## RESULTS

A total of 865 HBV negative homeless adults were randomized by recruitment site into the NCMIT (n = 332), SIT (n = 281) or SI (n = 252) group. The study participants were predominantly male (77%) and African American (69%), with a mean age of 42 years (SD: 9, range 19–65). (Sociodemographic table can be made available by first author on request). About 95% of all participants verbalized an intent to adhere to the vaccine series. In terms of substance use, approximately 17% reported lifetime use of injection drugs, with nearly 7% reporting recent or current IDU, while over half (57%) maintained current use of non-injection drugs. Almost half reported attending recent self-help programs.

### Program Comparisons

There were no group differences at baseline with respect to chronic homelessness (homeless > 1 year), intention to adhere, injection drug use, methamphetamine use or education; however, gender and ethnic differences were found. Males were over represented in the NCMIT program, and Latinos were over-represented in the SIT program. NCMIT participants were most likely to report daily alcohol and drug use, and to have used non-injection drugs in the last six months. Veteran status, type of social support, recent sex trade and emotional well-being also differed between the programs, as did type of recruitment site.

### Vaccination Completion

Allowing for a two-month grace period, 68% of the NCMIT participants completed the three-series vaccination at six months, compared to 61% of SIT participants and 54% of SI participants. On the other hand, 81% of the NCMIT participants completed two of the vaccinations compared to 78% of SIT participants and 73% of SI participants. Thus, a greater number of homeless participants completed the two-dose compared to the three-dose vaccine series. The NCMIT was significantly more likely to complete two of three doses as well as the full three dose vaccination program when compared to the SI group. No differences were apparent between the NCMIT and SIT programs in completion of two of three or three series completion.

### Completion of the three versus two HAV/HBV vaccine series

Compared to the three-dose vaccine completers, two-dose HAV/HBV vaccine completers were less likely to report chronic homelessness (Table 1). They were also less likely to be male and more likely to be younger and have participated in a self-help substance abuse program.



## Multivariate Results

The multivariate analysis was done excluding the “mixed” and “other” racial group and participants greater than 60 years of age. These comprised 38 individuals; excluding them from the analysis helped to better identify predictors of completion of all three versus only two vaccinations. Adjusting for potentially confounding characteristics, the NCMIT participants had nearly one-and-three quarters times greater odds of completing two doses of the vaccine series than those in the SI group ( $p = .04$ ) (Table 2). Persons who had engaged in drug recovery programs were significantly less likely to complete two doses of the vaccine ( $p = .01$ ). Moreover, a trend was observed for younger homeless and Whites to be less likely to complete two doses of the vaccine series, while persons who had partners were almost one and a half times more likely as compared to their counterparts in completing only one of 2 doses of the vaccine series.

Similarly adjusting for confounders, the NCMIT participants had nearly one and two-thirds times greater odds of completing three rather than two doses of the vaccine series than those in the SI group ( $p < .05$ ) (Table 3). Generally, participants who were partnered, those who reported fair or poor health, and those older were more likely to complete all three doses as compared to those who completed two doses. Females were somewhat (not statistically significant) more likely to complete all three doses compared to the two dose completers ( $p < .06$ ).

## DISCUSSION

This study demonstrated that, among a group of homeless adults, a greater percentage of persons completed two doses of the HAV/HBV vaccine series, over a two-month period, as compared to the three-series vaccine over the six months. This was consistent across all three treatment groups. However, the NCMIT group was more likely to complete both two of three doses ( $p < .04$ ), as well as the full three series vaccine series ( $p < .05$ ) as compared to the SI group. While these data appear self-evident, more importantly, differences in predictors of completion were also found among homeless persons who completed the two doses over a two-month period and the full three doses of the HAV/HBV vaccine over a six-month period. This is important because with new accelerated HAV/HBV vaccines available that can be delivered over a two month period, an assessment of predictors of homeless persons who can be compliant with receiving complete vaccine series over a two-month period as opposed to a six month period will be most important in enhancing protection in this high risk population.

In the literature, there is evidence that improved HBV vaccination uptake can be achieved by way of accelerated schedules, particularly among high-risk groups with whom it is difficult to stay in touch<sup>10,17,19</sup>; as well as be safe and effective<sup>11</sup>. This finding is of critical importance as recent findings revealed that there was no superior seroprotection among adolescents who completed the two-dose HBV vaccine as compared to the three-dose vaccine series<sup>30</sup>. In addition, immunologic memory in the two-doses is as effective as a three-dose series<sup>31</sup>. Aside from our first paper which revealed predictors of the full HAV/ HBV vaccine completion<sup>9</sup>, we believe that we are the first to compare the three vs. two dose HAV/HBV vaccine completion rates and predictors of full vaccine completion as well as those more likely to return for vaccines over a two-month period (completers of two doses of the HAV/HBV vaccine over two months).

In bivariate analyses, homeless adults who were younger and male were less likely to complete all three doses than their two-vaccine completer counterparts. Multivariate findings confirmed these findings as younger persons were significantly less likely to complete the three series vaccine compared to two of three vaccines; gender revealed only a

trend. However, those who reported fair or poor health or had partners were more likely to complete the three series vaccine compared to their counterparts with better health and no social support.

In the literature, age has not been found to be a predictor of HBV vaccination completion among attendees of a primary health care facility.<sup>16</sup> However, older age was found to be a correlate of vaccination acceptance and completion among a group of drug users<sup>32</sup>. Our study provides added evidence that, among another vulnerable population, being younger was associated with a significantly lower likelihood of vaccination completion of the full three dose series.

Unlike homeless persons who only returned over a two month period, those who completed all three vaccines were more likely to report fair or poor health. This finding is consistent with our previous study that homeless persons who report poor health status are more likely to complete TB chemoprophylaxis<sup>23</sup>, as chronic illness frequently leads to increased care-seeking<sup>22</sup>, and may produce higher vaccination adherence rates.

Among persons who returned for vaccine doses over a two month period compared to those who did not, those who sought support from drug recovery programs were less likely to return for their vaccine doses. These finding is also not previously reported in the literature and suggests that homeless persons who have been severely impacted by drug use, to the point where they seek drug recovery, may be facing serious life issues which negatively impact their ability to even complete an accelerated vaccine program. Thus, additional studies are needed to investigate how this high-risk subpopulation can be safely protected.

While gender was not fully significant as a predictor of completion of three doses compared to two doses over a six-month period, our findings that males are less likely to complete the three series vaccine was similar to that of Chen & Cantrell<sup>33</sup>. Homeless males, and particularly those newly homeless, may have personal, financial, and social stressors that differ from those of homeless women, which affect their ability to complete a vaccine series<sup>34</sup>.

Measures to increase HBV completion rates among high-risk individuals have been suggested in the literature; these include enhanced outreach, free vaccination, and accelerated schedules<sup>16</sup>. We demonstrated that interventions providing nurse case management, education, tracking and incentives resulted in improved compliance with vaccines administered in an accelerated-like schedule as well as in a traditional three series time schedule. While several differential predictors were apparent, we speculate that programs like NCMIT in conjunction with an accelerated HBV vaccination schedule, will result in maximal vaccination compliance among homeless adults.

## Limitations

As homeless participants were recruited from the Skid Row area of Los Angeles, they represent a highly mobile and difficult-to-treat group which may limit generalizability of the findings to other difficult-to-treat groups. Nevertheless, our study represents a very large and well characterized cohort of homeless adults. In addition, control variables were based on self-report, which is subject to potential biases. However, we feel this approach is likely the most accurate and removes observer interpretation and assumptions.

## CONCLUSION

Several strategies to improve the compliance of difficult-to-reach at-risk groups have been suggested; these strategies included incentive schemes, outreach activities, reminder



systems, and alternative vaccine schedules<sup>19</sup>. We found that greater numbers of homeless adults completed the two versus three-dose HBV/HAV vaccination series. Further, as the two-dose has been shown to be as immunogenic and index immunologic memory as effectively as the three-dose HBV vaccine series, the two-dose vaccine may be of benefit for populations who are poorly compliant. Moreover, those who participated in the NCMIT programs were more likely to complete both two doses as well as three doses of the vaccine series. In addition, in terms of an accelerated timeframe of two months, the younger individuals, and those who attended a program of drug recovery were less likely to complete two doses of the series. Our interventions provided education, incentive, and tracking, and we believe that, coupled with accelerated vaccination, HBV/HAV compliance could be optimized. The effects of interventions (such as NCMIT) plus accelerated HBV/HAV vaccination schedules, and their impact upon homeless adults, should be further studied.

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**Table 1**

Associations between Baseline Characteristics and Completing all three versus only two of Hepatitis A and B Vaccine

Characteristic	Percent, Mean (SD) or Median (Range)		p-value
	Completed all 3 Vaccines (N = 530)	Completed only 2 Vaccines (N=187)	
<u>Background</u>			
Mean Age ** (SD)	43.8 (8.7)	38.8 (8.8)	<.0001
Male *	81.8	74.7	.049
Ethnicity			
African American	71.9	63.1	
White	12.3	17.7	.24
Latino	13.2	16.0	
Other	2.7	3.2	
High School Grad	75.1	71.7	.38
Partnered	32.1	26.2	.14
Employed	9.3	7.5	.55
Recruitment Site:			
Homeless Shelter	33.3	33.2	
Drug Recovery Shelter	28.9	34.8	.38
Street	37.6	32.1	
Veteran Status	13.8	11.2	.45
Homeless 1 year *	64.8	55.9	.03
Intended to Adhere	95.9	94.1	.32
<u>Substance Use</u>			
Lifetime IDU	15.9	18.2	.49
Recent † IDU	5.5	9.1	.09
Recent † Daily Alcohol Use	16.8	15.6	.73
Recent † Daily Drug Use	28.3	32.6	.26
Recent † Non-IDU	57.6	55.6	.67
Recent † Self-help Prog *	40.4	49.2	.04
MSM	4.7	8.6	.07
Recent † Trade Sex	21.2	17.2	.29
<u>Psychosocial Resources</u>			
Depressive Sxs	47.0	48.7	.73
Poor Emotional Well-Being	47.7	43.3	.30
Social Support			
Primary Drug User	4.2	5.4	
Primary Non Drug User	68.3	65.8	.82
Both	22.1	24.1	
No one	5.5	4.8	

<sup>+</sup> recent refers to past six-month period

\*  $p < 0.05$ , chi-square or t test for differences between treatment completers and non-completers

\*\*  $p < 0.001$ , chi-square or t test for differences between treatment completers and non-completers

**Table 2**

Logistic Regression Results for Completion of Two Doses of the Hepatitis A and B Vaccination Series at 2 months

	Adjusted Odds Ratio	95% CI	P Value
Intervention Programs (vs. SI)			
NCMIT	1.72	1.14, 2.60	.04
SIT	1.44	.94, 2.19	.63
Site Type vs Street			
Homeless Shelter	.68	0.44, 1.06	.74
Rehab/Drug Recovery	.53	0.34, 0.81	.01
Age (< 45 years vs 45 – 60 years)			
Ethnic Background (vs African American)			
White	.67	0.67, 1.85	.059
Hispanic	1.43	0.43, 1.05	.25
Partnered	1.43	0.98, 2.10	.066

**Table 3**

Logistic Regression Results for Completion of all three Hepatitis A and B Vaccination Series versus completing only two of the vaccines.

	Adjusted Odds Ratio	95% CI	P Value
Intervention Programs (vs. SI)			
NCMIT	1.62	1.03, 2.56	.048
SIT	1.38	0.78, 1.91	.82
Age <sup>a</sup> (<45 years vs 45 – 60 years)	.35	0.24, 0.52	< .0001
Female	1.55	0.98, 2.47	.06
Partnered	1.50	1.00, 2.25	.048
Fair/Poor Health <sup>a</sup>	1.64	1.03, 2.62	.04

<sup>a</sup> compared to good/very good/excellent health