Understanding Associations between Serious Mental Illness and Hepatitis C Virus among Veterans: A National Multivariate Analysis

Seth Himelhoch, MD, MPH[1,2], **John F. McCarthy, PhD, MPH**[3,4], **Dara Ganoczy, MPH**[3], **Deborah Medoff, PhD**[1,2], **Amy Kilbourne, PhD**[3,4], **Richard Goldberg, PhD**[1,2], **Lisa Dixon, MD, MPH**[1,2], and **Frederic C. Blow, PhD**[3,4]

[1]University of Maryland, School of Medicine, Department of Psychiatry

[2]Veterans Affairs VISN 5, MIRECC

[3]Veterans Affairs Serious Mental Illness Treatment Research and Evaluation Center

[4] University of Michigan, School of Medicine, Department of Psychiatry

Abstract

Background—Although individuals with serious mental illness (SMI) have a high prevalence of Hepatitis C (HCV), the nature of this relationship is unclear.

Methods—To determine crude and adjusted recorded prevalence of HCV among a national sample of veterans with and without SMI.

Results—HCV was recorded in 8.1% of patients with bipolar disorder, 7.1% of patients with schizophrenia, and 2.5% of patients without SMI. Substance use increased HCV risk among SMI patients. Patients with bipolar disorder had greater risks than patients with schizophrenia.

Conclusions—Efforts to address HCV among patients with SMI and co-occurring substance abuse are warranted.

Background

HCV virus (HCV) is a leading cause of hepatocellular carcinoma and cirrhosis in the United States (1) and is known to be transmitted via pathways associated with substance use (e.g., injection drug use and intranasal drug use). (2) Individuals with serious mental illness (SMI) are reported to be at high risk for HCV infection. Rosenberg et al. reported the prevalence of HCV to be 19.5% among a convenience sample of 931 individuals with SMI receiving mental health treatment. (3) Dinwiddle et al. reported the prevalence of HCV to be 8.5% among a convenience sample of 1,556 patients admitted to a single public-sector psychiatric institute. (4) Persons with schizophrenia and bipolar disorder were reported to have a prevalence of HCV of 10.5% and 23.3%, respectively. Pirl et al. reported the prevalence of HCV to be 18.0% among a convenience sample of 655 patients admitted to a state psychiatric hospital. (5) Although individuals hospitalized in state hospitals are likely to have SMI, information regarding psychiatric diagnosis was not reported. Meyer et al. used administrative data to find a 20.3% prevalence of Hepatitis C among a sample of 507 persons with SMI in an Oregon State Hospital. (6) Finally, Klinkenberg et al. reported a

Corresponding Author: Seth Himelhoch, MD, MPH VA Capital Health Care Network MIRECC University of Maryland School of Medicine Department of Psychiatry Division of Services Research 773 W. Lombard Street, Room 516 Baltimore, Maryland 21201 Phone: (410) 706-2490 Fax: (410) 706-0022 shimelho@psych.umaryland.edu.

30% prevalence of HCV among a sample of 114 homeless individuals who volunteered to participate in hepatitis C testing and who were participating in a randomized clinical trial evaluating the effectiveness of assertive community treatment among individuals with SMI and substance use disorders.(7)

The prevalence of HCV in these studies represents a 6–16 fold increase over the prevalence of HCV in the general population, which is reported to be 1.8%.(8;9) Although such HCV rates are alarming, these studies have significant limitations that may affect both the reliability and generalizability of their findings. They include use of non-representative, convenience samples, use of narrow sampling frames, and the absence of a non-SMI comparison group. Finally, although veterans are reported to be at even greater risk of HCV compared to the general population (10), no previous studies have examined the prevalence of HCV among veterans with SMI.

The goal of this study, then, is to determine the recorded prevalence of HCV among a national population of Veterans Affairs (VA) health system patients with schizophrenia or bipolar disorder, as compared to patients without these conditions. This approach has two important strengths. First, having a large sample of patients with serious mental illness allows us to overcome some of the methodological limitations of previous studies (i.e., small, region-specific convenience samples) making it possible to generate more precise prevalence estimates. This also enables us to report separate prevalence estimates for both schizophrenia and bipolar disorder as opposed to aggregating patients with serious mental illness. Second, including a random sample of patients without serious mental illness as a comparison group allows us to adjust for important HCV-related risk factors (e.g., substance use) in order to more clearly understand the relationship between having recorded diagnoses of serious mental illness and HCV.

Methods

Design

This was a cross-sectional study of all veterans who received a diagnosis of schizophrenia or bipolar disorder from Veterans Affairs (VA) health system providers in Fiscal Year 2002 (FY02) or who were included in a national random sample of VA patients in FY02 and did not receive these diagnoses. In addition, to be included in the study patients had to have had at least 3 separate VA health services encounters (visit days or inpatient stays) in FY02, as individuals with fewer VA encounters may have too few opportunities for an HCV diagnosis to be recorded.

Data Source

The VA's National Psychosis Registry (NPR) was developed and is maintained by the VA Serious Mental Illness Treatment Research and Evaluation Center (SMITREC). The NPR is an ongoing registry of all VA patients who received an SMI diagnosis from VA providers at some point from FY88 to the present. The NPR includes comprehensive diagnosis and utilization data, as well as information regarding patient characteristics and location of services. Previous studies using NPR data include evaluations of mental health epidemiology, patterns of mental health services utilization and use of psychotropic medications. (11;12)

Using NPR data, we identified all patients with diagnoses of schizophrenia or bipolar disorder in FY02. Patients' SMI diagnosis was categorized as either schizophrenia (ICD-9 codes 295.0–4, 295.6–9) or bipolar disorder (296.0–1; 296.4–8), based on which diagnosis category was observed in the most number of health services encounters in FY02, with ties classified as schizophrenia. (12)

To derive a comparison group, we used SMITREC's national random sample of 100,000 VA patients with some VA services use in FY02. From this sample we identified patients who met inclusion criteria and had not received a serious mental illness diagnosis in FY02. These individuals constituted a non-serious mental illness comparison group. Inclusion in either the serious mental illness or the non-serious mental illness patient group was limited to individuals with at least 3 VA health encounters in FY02. We chose to limit our sample to veterans with 3 encounters as individuals with fewer VA encounters may have fewer opportunities to receive an HCV test or to have an HCV diagnosis recorded. Our study sample included 89,189 individuals with schizophrenia, 65,983 with bipolar disorder and 67,965 in the comparison group. The VA Ann Arbor Healthcare System Human Subjects Committee approved analyses such as those in this study with a waiver of informed consent.

Definitions

We used ICD-9 codes from inpatient and outpatient administrative encounter data to identify patients with a diagnosis of HCV during FY02. HCV infection was identified using ICD-9 codes 070.41, 070.44, 070.51, and 070.54. HCV diagnoses are based on HCV encounters recorded in the NPR administrative dataset and as such we use the terms "recorded prevalence of HCV" and "risks for recorded diagnoses for HCV" throughout the text of this paper.

We assessed patient age, gender, race, marital status, region, locale, military service connected disability status, and homelessness in FY02. To be consistent with previous studies of HCV using VA administrative data, we categorized race/ethnicity into 4 groups: (1) black, (2) Hispanic, (3) unknown or missing, and (4) white. Region where the veteran received VA services was defined, as in previous studies, as Central, Northeast, South, and West. (13;14)

Metropolitan statistical areas were used to determine whether patients received the majority of their VA services in an urban or rural setting. Homelessness was based on diagnoses using the V code V60 or confirmed use of VA specific services that target homeless veterans (15).

Finally, substance use was defined using the following ICD-9 codes for abuse of or dependence on alcohol, cocaine, opiate, cannabis, and combinations of drugs (303.0, 303.9, 304.0–9, 305.0, and 305.2–9). We included substance use disorders as previous work suggest that substance use may be an important moderator between risk of HCV infection and SMI diagnosis. (19) The substance use variable was based on administrative data of patients who had substance abuse diagnoses recorded in their encounters. We acknowledge the potential for measurement error in assessing the presence or absence of conditions using administrative data; however, we note that the quality of VA diagnosis data has been examined in several studies and found to be in close agreement with chart data. (16–18)

Analysis

Chi-square tests were used to compare the crude prevalence rates of HCV among schizophrenia and bipolar patients to the non-SMI group and to assess the association of HCV with age, gender, ethnicity, marital status, homelessness, locale, region and substance abuse. We then compared the two SMI groups to each other. Univariate analyses included percentages for categorical variables and means for continuous variables. The Wilcoxon rank-sum test was used for continuous measures having non-normal distributions and chi-square tests were used to compare categorical measures. Bivariate and multivariable logistic regression models were used to estimate the relative odds ratios and 95% confidence intervals of having a diagnosis of HCV and to adjust for differences in patient demographic

and HCV-related risk factors. A dummy variable that included schizophrenia, bipolar disorder, and the comparison group was used to compare HCV risks by diagnosis group. An interaction term between the diagnoses and substance use was included in the final logistic regression model as previous work suggests that substance use may be an important moderator between risk of HCV infection and SMI diagnosis.(19) As the interaction term proved to be significant, stratified results based on the interaction term are presented in the final logistic regression model.

All analyses were completed using SAS system for Windows, Release 8.02 by SAS Institute Inc., Cary N.C. All reported p-values are two-sided.

Results

Demographic and Clinical Characteristics

Patients with schizophrenia as well as patients with bipolar disorder were more likely to be younger, unmarried or divorced, homeless, black or Hispanic, to have a co-occurring substance use diagnosis, and to live in an urban area, as compared to patients without SMI diagnoses. Those with schizophrenia were significantly more likely to be male while those with bipolar disorder were significantly more likely to be female compared to patients without SMI diagnoses (Table 1).

Crude Recorded Prevalence of HCV

The crude recorded prevalence of HCV was 7.1% for patients with a diagnosis of schizophrenia and 8.1% among patients with a diagnosis of bipolar disorder. These were significantly greater than the observed recorded prevalence of HCV among the comparison group (χ^2=1600, p<0.001, and χ^2=2100, p<0.001, respectively). As compared to those with a diagnosis of schizophrenia, those with a diagnosis of bipolar disorder were significantly more likely to have HCV (χ^2=62.5, p<0.001).

Other characteristics significantly associated with a recorded diagnosis of HCV included being older than 40 years old, male, black or Hispanic, divorced or never married, homeless, living in an urban area, and having received a substance use diagnosis.

Adjusted Odds Ratios of Reported Prevalence of HCV

The final model adjusted for age, race/ethnicity, gender, marital status, service connection, substance use, homelessness, region and locale and included an interaction term between substance use and the SMI diagnosis variable (Table 2). Patients with a diagnosis of schizophrenia with a co-occurring substance use diagnosis had nearly 6 times the adjusted odds (AOR [95% CI]: 5.95 [5.51–6.43]) of a recorded diagnosis of HCV, compared to patients without both of these conditions. In contrast, patients with a diagnosis of schizophrenia without substance use diagnosis had approximately a 50% increase in the adjusted odds (AOR [95% CI]: 1.47 [1.36–1.59]) of a recorded diagnosis of HCV.

Patients with a diagnosis of bipolar disorder with a co-occurring diagnosis of substance use had over 7 times the adjusted odds of HCV compared to the patients without SMI (AOR[95% CI]: 7.02 [6.50–7.57]). In contrast, patients with a diagnosis of bipolar disorder without a co-occurring diagnosis of substance use had over a 60% increase in the adjusted odds of having a recorded diagnosis of HCV compared to the comparison group (AOR [95% CI]: 1.64 [1.51,1.78]).

Those with a diagnosis of bipolar disorder and a co-occurring diagnosis of substance use disorder were significantly more likely to be reported to have a recorded diagnosis of HCV

compared to those with a diagnosis of schizophrenia and a co-occurring diagnosis of substance use disorder (AOR[95% CI]:1.12 [1.06–1.18]).

Other characteristics significantly associated with a recorded diagnosis of HCV were similar to those identified in the bivariate analyses and they include being older than 40 years old, male, black or Hispanic, divorced or never married, being homeless, and living in an urban environment and having a substance use disorder.

Discussion

This study is among the first to report elevated rates of HCV among veterans with SMI. Specifically, we found that among a national sample of VA patients, the crude recorded prevalence of HCV was 7.1% for those with schizophrenia and 8.1% for those with bipolar disorder. The recorded prevalence of HCV among those with schizophrenia and among those with bipolar disorder was each significantly greater than the crude recorded prevalence of 2.5% for HCV found among the comparison group. The findings of elevated crude rates of HCV are consistent with previous studies that have reported on the prevalence of Hepatitis C among individuals with SMI (3–7;10). Although the recorded prevalence in this study fell in the lower range of previous prevalence studies, an important strength of our findings was it was based on a national population of patients with SMI and may not be subject to the biases associated with regionally specific increased risk of HCV.

Another strength of our study was that it could generate separate prevalence estimates for both schizophrenia and bipolar disorder as opposed to aggregating patients with serious mental illness. As such we found that those with bipolar disorder were significantly more likely to have HCV than patients with schizophrenia. This is consistent with one previous report that found that those with bipolar disorder had nearly twice the crude prevalence of HCV as those with schizophrenia. (4)

By having a control group, we were also able to evaluate the degree to which substance use modifies the relationship between having a serious mental illness and HCV. As HCV is transmitted via pathways associated with substance use (e.g., injection drug use and intranasal drug use) (2) and as it is well known that co-occurring substance use disorders are common among those with SMI (20;21), it is not surprising that adjusted analysis revealed that those with schizophrenia and a co-occurring substance use diagnosis as well as those with bipolar disorder and a co-occurring substance use diagnosis had striking elevations in their risk for HCV. This additional risk may be associated with issues relating to poverty, or disease specific issues such as distractibility, impulsivity or the vulnerability of these patients in general.(22)

Our adjusted analysis also found that those with schizophrenia as well as those with bipolar disorder were each significantly more likely to be diagnosed with HCV even in the absence of a substance use diagnosis. This suggests that these groups may be at risk for HCV due to factors that are not included in our model (e.g., blood transfusion, sharing razors, and sharing toothbrushes). Or it may indicate that as HCV is infectious, even experimentation with injection drugs (e.g., use of intranasal cocaine) can lead to HCV infection.

The finding of increased risk associated with substance use was consistent with previous studies that have found significant associations between substance use and HCV risk among those with SMI. For example, Rosenberg et al., found that among those testing positive for HCV, 75% reported using injection drugs. Pirl et al. found that heroin and cocaine were both independent predictors of HCV status. Finally, Klinkenberg et al., found that those with SMI with an HCV diagnosis were reported to be more likely to have a history of injection drug use or a diagnosis of substance dependence compared to those without HCV diagnosis.

Finally, similar to our results, Huckans et al. found that those with schizophrenia and co-occurring substance use disorder were significantly more likely to have been tested for HCV compared to those without schizophrenia or substance use disorder.(23)

Unlike most previous studies, our study was able to compare our results to a non-SMI comparison group and thus could evaluate differential risk between SMI subgroups. Specifically, it appears that those with bipolar disorder and substance use were significantly more likely to be infected with HCV compared even to those with schizophrenia and substance use disorders. As those with schizophrenia and co-occurring substance use disorders are more likely to be at greater risk of not using medical services, we believe we are most likely underestimating the effect of the interaction (i.e., those with schizophrenia and co-occurring substance use are likely to be even at greater risk for HCV infection) rather than overestimating the effect of the interaction. Future studies may need to evaluate those with bipolar disorder separate from those with schizophrenia when evaluating HCV risk.

The increased risk of HCV among those with schizophrenia or bipolar disorder has important treatment implications. For example, patients with schizophrenia and co-occurring substance use disorders tend to have poorer psychiatric treatment compliance, and greater use of crisis-oriented services that result in higher costs of care. (24) As a result, these individuals may also be less likely to be evaluated or receive specialty care from an HCV specialist. Even if they are evaluated, those with schizophrenia or bipolar disorder may be among those that are least likely to receive prescriptions for treatment for HCV. (25) Mental health professionals may serve an important role in helping to not only maximize treatment to reduce both psychiatric and substance use co-morbidity but perhaps more importantly to serve as advocates(26;27) for those who may be denied life-saving treatment because of their mental health problems.

Mental health professionals may also be in an important position to provide primary and secondary prevention counseling regarding HCV. Results from an ongoing randomized, control trial called STIRR (Screening and Testing for HIV, HCV and Hepatitis B, Immunization for Hepatitis A and B, and Risk Reduction Counseling) that specifically targets individuals with SMI in outpatient mental health clinics may be an important and innovative first step to ensuring that HCV testing and risk reduction counseling occurs in mental health settings for this vulnerable population.(28)

Consistent with what is known about risk factors associated with HCV infection in the general population, our model suggests that the major risk factors associated with being diagnosed with HCV among veterans include history of substance use, being homeless and living in an urban environment. (5) Our results also suggest that being male, living in the West and being identified as black or Hispanic were also risk factors. Finally the observed elevated rates of HCV among VA patients without SMI is also consistent with elevated rates of HCV reported in previous samples of VA patients.(10)

There are several limitations to the study. First, as this is a cross-sectional study it is difficult to make strong inferences regarding causation. However, given that HCV has not been linked to the development of symptoms of serious mental illness it is unlikely that this would be the direction of causation accounting for our findings.

Second, it is possible that VA administrative data may not fully capture those who are engaged in treatment or those who may choose to receive that treatment from a non-VA facility.

Third, we were unable to specifically assess the risk associated with injection drug or intranasal cocaine use. Instead, we used a more global substance use variable. As a result,

we are unable to comment on the risk associated with injection drug use or intranasal cocaine use *per se*, although we were still able to adjust for important risk factors.

Fourth, as the results of this study are based on data from the Veterans Affairs health centers they may not generalize to the non-veteran population. Rosenheck et al.(29) used data from the Schizophrenia Patient Outcome Research Team (PORT) and data from the VA extension of the PORT to compare the treatment of schizophrenia in VA versus non-VA clinics and found that individuals with schizophrenia treated in VA clinics were more likely to be male, older, and were more likely to have higher income but were no different in race, marital status or education as compared to those individuals with schizophrenia treated in non-VA clinical settings. They also reported that there were no differences found with respect to alcohol or substance use, incarceration symptom distress, satisfaction with providers and community adjustment compared to individuals with schizophrenia receiving care in non-VA clinics. They did note that individuals receiving care in the VA system were less likely to utilize community based psychosocial treatment and were more likely to rely on hospital treatment compared to non-VA patients. Young and colleagues compared a random sample of outpatients with schizophrenia at a VA facility in California to a random sample of outpatients with schizophrenia at a regional mental health clinic in California.(30) They found those receiving care in the VA were more likely to be male, older, and have a higher income. They also reported that those receiving care in the VA were more likely to be ill longer.

Fifth, we note that it is possible that some veterans who are at risk for HCV may not have been screened and thus we may be at risk of under-reporting the screened prevalence of HCV. Since 1998, the VA National HCV Program Office has identified HCV as "an important public health issue in the veteran community… and has implemented a comprehensive National HCV Program to screen veterans for HCV" Veterans who are at risk for HCV during the time period of our study were likely to be in a system of care that was actively screening for this illness. This screening program is likely to decrease, but not eliminate, the possibility that we have underestimated the prevalence of HCV.

Finally, several reports suggest that there is acceptable concordance between VA administrative data and medical record data.(16–18)

Conclusions

Given the ongoing risk for HCV among people with schizophrenia and bipolar disorder, mental health providers may be in the best position to provide consistent primary and secondary prevention counseling as well as to provide essential advocacy for medical treatment on behalf of this vulnerable population.

Acknowledgments

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Table 1

Demographic and clinical characteristics of patients with and without serious mental illness who have at least 3 health care encounters in FY02

	Schizophrenia (N=89,189)	Bipolar (N=65,983)	Non-SMI (N=67,965)	SMI versus Non-SMI	Schiz vs Non-SMI	Bipolar versus Non-SMI
Mean age (SD)	55.1 (11.9)	53.3 (12.4)	63.9 (13.9)	WilcoxonTest Z=155.7, p<.0001	WilcoxonTest Z=132.8, p<.0001	WilcoxonTest Z=−141.0, p<.0001
Age group				χ^2=9,646.5, p<.0001, df=2	χ^2=6,917.3, p<.0001, df=2	χ^2=9,923.8, p<.0001, df=2
< 40 years	5,663 (6.4)	7,778 (11.8)	3,456 (5.1)			
40–49 years	23,635 (26.5)	18,316 (27.8)	6,962 (10.3)			
50+ years	59,890 (67.2)	39,889 (60.5)	57,508 (84.7)			
Gender				χ^2=143.7, p<.0001, df=1	χ^2=95.3, p<.0001, df=1	χ^2= 1,021.2, p<.0001, df=1
Male	84,517 (94.8)	58,493 (88.7)	63,619 (93.6)			
Female	4,672 (5.2)	7,490 (11.4)	4,346 (6.4)			
Race/ethnicity				χ^2=19,575.0, p<.0001, df=3	χ^2=20,555.2, p<.0001, df=3	χ^2=8,424.2, p<.0001, df=3
Black	24,570 (27.6)	7,548 (11.4)	7,030 (10.3)			
Hispanic	7,240 (8.1)	2,314 (3.5)	2,697 (4.0)			
White	49,233 (55.2)	46,319 (70.2)	33,611 (49.5)			
Other/Unknown	8,146 (9.1)	9,802 (14.9)	24,627 (36.2)			
Marital status				χ^2=23,755.5, p<.0001, df=3	χ^2=26,747.1, p<.0001, df=3	χ^2=10,677.1, p<.0001, df=3
Divorced/separated	26,051 (29.6)	25,083 (38.3)	12,793 (19.4)			
Married	22,174 (25.2)	24,368 (37.3)	40,751 (61.7)			
Never Married	36,772 (41.7)	13,694 (20.9)	7,710 (11.7)			
Widowed	3,117 (3.5)	2,281 (3.5)	4,802 (7.3)			
Substance Abuse				χ^2=13,482.0, p<.0001, df=1	χ^2=9,534.0, p<.0001, df=1	χ^2=15,085.8, p<.0001, df=1
Yes	22,129 (24.8)	21,586 (32.7)	4,237 (6.2)			
No	67,060 (75.2)	44,397 (67.3)	63,728 (93.8)			
Homeless				χ^2=7,160.1, p<.0001, df=1	χ^2=6,067.4, p<.0001, df=1	χ^2=7,350.4, p<.0001, df=1
Yes	11,501 (12.9)	9,923 (15.0)	1,372 (2.0)			
No	77,688 (87.1)	56,060 (85.0)	66,593 (98.0)			
HCV Infection				χ^2=2,092.7, p<.0001, df=1	χ^2=1,643.6, p<.0001, df=1	χ^2=2,105.7, p<.0001, df=1
Yes	6,287 (7.1)	5,357 (8.1)	1,708 (2.5)			
No	82,902 (93.0)	60,626 (91.9)	66,257 (97.5)			
Region				χ^2=464.2, p<.0001, df=3	χ^2=262.3, p<.0001, df=3	χ^2=855.9, p<.0001, df=3
Northeast	23,071 (25.9)	15,538 (23.6)	15,348 (22.6)			
Central	19,718 (22.1)	15,685 (23.8)	15,045 (22.2)			
South	29,974 (33.7)	19,404 (29.4)	24,722 (36.4)			
West	16,289 (18.3)	15,349 (23.3)	12,811 (18.9)			
Rural	16,385 (18.4)	13,734 (20.9)	18,569 (27.4)	χ^2=1,736.6, p<.0001, df=1	χ^2=1,785.1, p<.0001, df=1	χ^2=779.3, p<.0001, df=1
Urban	72,507 (81.6)	52,098 (79.1)	49,193 (72.6)			

Table 2

Crude and Adjusted Odds Ratios of the Recorded Prevalence of HCV among Veterans with and without serious mental illness who have at least 3 health care encounters in FY02

	Crude Odds ratios (95%CI)	Adjusted Odds ratio (95% CI)
Characteristics		
Diagnostic Category		
Schizophrenia	2.94 (2.79,3.11)	
Bipolar Disorder	3.43 (3.24, 3.62)	
Non-SMI	1.00 (Referent)	
Schizophrenia without Substance abuse		1.47 (1.36, 1.59)
Schizophrenia with Substance abuse		5.95 (5.51, 6.43)
Bipolar Disorder without Substance abuse		1.64 (1.51, 1.78)
Bipolar Disorder with Substance abuse		7.02 (6.50, 7.57)
Non-SMI		1.00 (Referent)
Age		
50+ years	2.47 (2.22, 2.75)	3.59 (3.19, 4.03)
40–49 years	6.71 (6.02, 7.48)	5.24 (4.66, 5.89)
<40 years	1.00 (Referent)	1.00 (Referent)
Gender		
Male	2.02 (1.85, 2.20)	1.74 (1.59, 1.91)
Race/Ethnicity		
Black	2.00 (1.93, 2.08)	1.40 (1.34, 1.47)
Hispanic	1.58 (1.48, 1.68)	1.65 (1.53, 1.78)
Other/Unknown	0.40 (0.38, 0.43)	0.68 (0.63, 0.73)
White	1.00 (Referent)	1.00 (Referent)
Marital Status		
Divorced/Separated	3.13 (3.0, 3.26)	1.51 (1.43, 1.58)
Never married	2.41 (2.30, 2.52)	1.24 (1.18, 1.31)
Widowed	1.02 (0.93, 1.13)	1.02 (0.91, 1.14)
Married	1.00 (Referent)	1.00 (Referent)
Substance Abuse		
Yes	7.32 (7.07, 7.57)	5.48 (4.91, 6.12)
Homelessness		
Yes	4.79 (4.62, 4.97)	1.50 (1.43, 1.57)
Service connected		
Yes	0.87 (0.84, 0.90)	0.97 (0.94, 1.01)
Region of United States		
Central	0.67 (0.64, 0.71)	0.66 (0.63, 0.70)
Northeast	0.85 (0.81, 0.89)	0.81 (0.77, 0.85)
South	0.68 (0.65, 0.71)	0.75 (0.71, 0.79)

	Crude Odds ratios (95%CI)	Adjusted Odds ratio (95% CI)
Characteristics		
West	1.00 (Referent)	1.00 (Referent)
Urban Locale		
Yes	1.72 (1.64, 1.80)	1.19 (1.13, 1.26)