

# Psychopharmacologic Services for Homeless Veterans: Comparing Psychotropic Prescription Fills Among Homeless and Non-Homeless Veterans with Serious Mental Illness

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**Abstract** Using national Veterans Health Administration (VHA) administrative data, this study evaluated differences in psychotropic medication use between homeless and non-homeless adults with serious mental illness (SMI) who used VHA services in 2010. The adjusted mean number of psychotropic prescription fills associated with homeless individuals were identified using regression models adjusted for socio-demographics, diagnoses, and use of health services. Of the 876,989 individuals with SMI using VHA services, 7.2 % were homeless at some time during 2010. In bivariate analysis, homeless individuals filled more psychotropic medication prescriptions compared with non-homeless individuals. However, after adjusting for potentially confounding variables, homeless individuals were found to have filled 16.2 % fewer prescriptions than non-homeless individuals when all psychotropics were analyzed together ( $F = 6947.1$ ,  $p < .001$ ) and for most individual classes of psychotropics. Greater use of residential/inpatient mental health services by the homeless was the most important single factor associated with filling more psychotropic prescriptions than non-homeless individuals.

**Keywords** Homeless persons · Residential treatment · Veterans · Veteran Health Administration · Pharmacology · Pharmaco-epidemiology

## Introduction

A recent U.S. Department of Housing and Urban Development assessment found that at least 1.5 million Americans used homeless services in 2011 (Office of Community Planning and Development 2011). Of the current homeless population, 30 % of men and 4 % of women are veterans, proportions which moderately over represent their share of the U.S. population (Gamache et al. 2001, 2003). In response to these findings, the Secretary of the Department of Veterans Affairs (VHA), identified a policy goal of ending homelessness among veterans by 2015, committing substantial resources toward this effort and making VHA the largest single provider of homeless services in the U.S. (VA Office of Public Affairs 2013).

Although estimated rates vary, approximately one-half of homeless Americans, including veterans, have a psychiatric or substance use disorder, with most psychiatric disorders being over-represented in the homeless population (Greenberg and Rosenheck 2010a, b; Koegel et al. 1988; Tessler et al. 2002). In addition, multiple studies have found increased use of acute/safety-net medical and mental health services by homeless persons in the form of inpatient psychiatric admissions, as well as unscheduled outpatient and emergency department visits (Adams et al. 2007; Salit et al. 1998; Stovall et al. 1997; Tsai et al. 2013).

In light of these findings, there is a need to comprehensively examine the specific health services used by homeless persons, especially those services that may

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prevent further use of acute care services, such as psychotropic medications in the case of individuals with serious mental illness (SMI) (Doering et al. 1998; Goodwin et al. 2003). This need is especially relevant for VHA and other agencies that have developed specialized multimodal approaches for service delivery, including hundreds of housing and residential treatment programs specifically designed to address the needs of homeless individuals (Rosenheck 2001). (<http://www.hudhre.info>) Such programs provide much needed shelter, case management, and treatment services, but may also cause health systems to incur substantially higher service use and related costs, at least in some domains (Rosenheck and Seibyl 1998).

A broad literature has evaluated the medical and mental health services used by homeless individuals, especially emergency and other safety-net services, such as residential and inpatient treatment services. However, to date, no study has evaluated the pharmacologic services provided to homeless individuals or compared this treatment to that of their non-homeless counterparts. Such information is critical not only in accounting for the cost of care, but also as the use of such medications may prevent illness exacerbation and the further use of safety-net services (Doering et al. 1998; Goodwin et al. 2003). The current study used national VHA data to evaluate differences in the number and type of psychotropic prescription fills between homeless and non-homeless individuals with SMI, while adjusting for potentially confounding factors such as residential and inpatient service use. Our hypothesis was that homeless veterans would fill fewer psychotropic prescriptions than non-homeless veterans, due to difficulty accessing and engaging in treatment, as well as problems finding adequate housing and stable living conditions.

## Methods

### Data Source and Population

The sample included all veterans who used VHA services and received an SMI diagnosis in fiscal year (FY) 2010 (Oct 1, 2009–Sept 30, 2010). SMI was determined by the presence of the International Classification of Disease Volume 9 (ICD-9) codes for Schizophrenia and other psychotic disorders (298.0–298.9 and 295.0–295.9); major depressive disorder or bipolar disorder (296.0–296.8); or posttraumatic stress disorder (PTSD) (309.81). Socio-demographic and clinical data were obtained from VHA databases which document all outpatient and inpatient treatment episodes. Psychotropic prescription data were obtained from a database which contains data on all prescriptions filled at VHA pharmacies.

## Measures

Because specific measures of homelessness are not available in VHA administrative databases, the variable of primary interest reflects a proxy indicator of current or recent homelessness as indicated by the presence of one or more of the following: an ICD-9 code representing homelessness (v60b), an outpatient homeless program stop code, a bed-section code indicating discharge from a domiciliary program specifically for homeless veterans, or a discharge summary from a community-based residential treatment program for homeless veterans funded by VHA. A second dichotomous variable of interest represented a major potentially confounding variable, the use of any residential or inpatient mental health services including programs for either homeless or non-homeless veterans provided directly by VHA or under contract with a community provider.

The dependent variable of interest was the total number of psychotropic prescriptions filled over the year, and the total number within six subcategories of antidepressants, antipsychotics, anxiolytics/sedative hypnotics, stimulants, lithium, and mood stabilizers (a list of medications included in each class are available from the first author). As this was a study of the services provided within a health-care system, we used number of prescriptions filled rather than the number written or patient compliance with prescriptions.

Factors evaluated for their potentially confounding association with both homelessness and psychotropic medication use included socio-demographic, diagnostic, and non-pharmacologic service use measures. Socio-demographic variables included age, gender, urban versus rural location, income, VHA service connected disability, pension status, and recent service in Iraq or Afghanistan. Race/ethnicity was not included because of the high proportion of missing data for this variable (67 %) in the 2010 VHA Outpatient Encounter File. Urban–rural residence was classified by zip code using Rural Urban Commuting Area Codes clustered into two groups (Urban and other) (Morrill et al. 1999). Income, service connected disability, and pension status are all associated with a Veteran's ability to fill prescriptions in VHA pharmacies. Income is the total income from all sources as recorded at the time of application for services and updated yearly. Service connected disability describes the amount of compensation awarded to the individual based their level of disability associated with military service and was categorized as no service connection, <50 %, and ≥50 % (≥50 % used as the reference). Pension status is a dichotomous variable describing a means-tested income benefit to low-income veterans who served during a wartime era who are totally disabled from a condition not related to military service.

Deployment in support of operations in Iraq and/or Afghanistan was determined by a database obtained through collaboration with the Department of Defense. Clinical measures of interest included psychiatric and substance abuse diagnoses identified by ICD-9 codes. The number of VHA outpatient primary care, specialty medical-surgical care, general psychiatric, substance abuse, and emergency department visits were enumerated using relevant clinic codes.

### Analysis

Bivariate comparisons of homeless and non-homeless veterans on socio-demographic, diagnostic, healthcare utilization, and pharmacologic variables were evaluated as unadjusted odds ratios (ORs) for categorical variables and effect sizes using Cohen's  $d$  for continuous variables (Cohen 1988). Inferential statistics were not used to test these associations because the study sample included the entire population of interest (those diagnosed with SMI and receiving VHA services in FY 2010) and was very large (over 800,000 individuals), making even small differences statistically significant.

To determine independent associations with psychotropic prescription fills, a series of five hierarchical analyses of covariance were used to evaluate the association between homelessness and the number of psychotropic prescriptions filled overall and in each specific medication class, while adjusting serially for groups of potentially confounding factors, selected according to the magnitude of their association with homelessness in bivariate analysis [OR of  $\geq 2.0$  or  $\leq .50$  for categorical variables, or a Cohen's  $d$  of  $\pm \geq .3$  (corresponding to a moderate effect size) for continuous variables]. Socio-demographic and diagnostic variables (other than drug and alcohol use diagnoses) were included in the first model. Because drug and alcohol use diagnoses are known to be especially prevalent among homeless people, these diagnostic variables were added separately, in the second model. In model 3, measures of non-pharmacologic outpatient services use (outpatient and residential/inpatient care) were added. In the final two models, a variable representing residential/inpatient mental health treatment in addition to the interaction of homelessness and residential/inpatient mental health treatment was added to the other measures. The number of days from the beginning of the fiscal year to the first outpatient visit was used to control for time of exposure in all models. Statistical analysis was completed with SAS<sup>®</sup> Version 9.2 (SAS Institute, Cary NC).

The institutional review boards of the VA Connecticut Healthcare System and the Yale University School of Medicine approved this study. Both authors have contributed to, read, and certify responsibility for this

manuscript. Neither author reports any known potential conflicts of interest associated with this work.

### Results

In FY 2010,  $n = 876,989$  individuals using VHA services received an SMI diagnosis. Among these individuals with SMI, 91 % were male with a mean age was 55 years ( $SD = 14.4$ ). A total of  $n = 62,899$  (7.2 %) met criteria for homelessness, while  $n = 69,002$  (7.9 %) used residential/inpatient mental health services. The group with an SMI diagnosis received a mean of 16 psychotropic prescriptions per individual over the year ( $SD = 32.7$ ).

### Factors Displaying a Strong Association with Homelessness in Bivariate Analysis

#### *Socio-demographics*

Homeless individuals displayed a lower mean age compared to non-homeless individuals (Cohen's  $d = -.3$ ). Receiving a VA pension and no service connected disability compensation were strongly associated with homelessness, with ORs of 3.5 and 3.4, respectively. With increasing income, the proportion of individuals who were homeless decreased (Cohen's  $d = -.4$ ). Urban location also displayed a strong association with homelessness (OR 5.5).

#### *Diagnoses*

Diagnoses related to substance use disorders were most strongly associated with homelessness. The odds of homelessness were over ten and five times higher in those with a drug or alcohol related disorder, respectively. Of the non-substance use mental health disorders, personality disorders (OR 4.0) and adjustment disorders (OR 3.0) displayed the strongest associations with homelessness. While among medical disorders, the odds of being homeless was almost four times higher (OR 3.7) for those diagnosed with HIV/AIDS and three times higher (OR 2.6) for those diagnosed with liver disease.

#### *VHA Service Use*

The OR representing the association between the use of residential/inpatient treatment services and homelessness was 12.8, the highest of any variable. Of individuals classified as homeless,  $n = 26,156$  (41.6 %) had used such services, while only  $n = 42,846$  (5.3 %) of non-homeless individuals used them. Residential treatment displayed a much stronger association with homelessness compared to

inpatient treatment (ORs of 28.8 and 12.8, respectively). Homeless individuals attended a mean of 35.1 more outpatient psychiatric or substance abuse visits ( $SD = 31.9$ ) compared to their non-homeless counterparts, corresponding to a very large Cohen's  $d$  of 1.2. The mean number of emergency department and primary care visits for homeless individuals was also larger than the number for non-homeless individuals, corresponding to moderate effect sizes of .7 and .4, respectively.

### Mean Number of Psychotropic Prescriptions Associated With Homelessness

In bivariate analysis, homeless veterans filled an average of 12.4 more prescriptions ( $SD = 17.9$ ) than non-homeless when all psychotropics were evaluated together, corresponding to a moderate effect size of .4. Specifically, homeless individuals filled an average of 5.1 ( $SD = 9.2$ ) and 4.6 ( $SD = 6.4$ ) more antidepressant and antipsychotic prescriptions, respectively. No differences were found for stimulants and sedative-hypnotics.

However, with adjustment for potentially confounding variables in five models, the difference between the adjusted mean number of prescriptions between homeless and non-homeless individuals decreased progressively with each model. In the final model adjusted for all variables, the direction of this effect flipped to the negative direction, reflecting a statistical suppression effect. Homeless individuals filled 16 % fewer prescriptions compared to non-homeless individuals for any psychotropic ( $F = 6947.1$ ;  $p < 0.001$ ) with these adjustments. This trend was consistent for all individual medication categories except stimulants. With adjustment, homeless individuals received a mean of one less antidepressant prescription (7 %), two fewer antipsychotic prescriptions (23 %), and one fewer sedative-hypnotic prescription (25 %), compared to non-homeless individuals. For stimulants, there was no significant difference in the number of prescriptions in any adjusted model.

To further understand the effect of residential/inpatient treatment on psychotropic medication prescription fills by of homeless and non-homeless veterans, a series of interaction analyses stratified by receipt of residential/inpatient treatment were conducted. In both categories, homeless veterans filled fewer prescriptions for psychotropic medications compared to non-homeless veterans. A significantly larger difference (fewer medication fills) was found among those who received residential/inpatient treatment compared to those who did not receive residential/inpatient treatment ( $F = 6718.5$ ;  $p < 0.001$ ). However, far more homeless veterans received residential/inpatient treatment, and veterans in residential/inpatient treatment filled substantially more prescriptions than those who did not receive

such treatment, hence the greater overall use of psychotropics by homeless persons.

To further understand the relative size of the contribution of each group of variables to the decreasing difference in the adjusted mean number of prescriptions filled between homeless and non-homeless individuals, the proportion of the total change in the number of prescriptions (from no adjustment to full adjustment) corresponding to each variable group was calculated. Overall, diagnostic variables, including substance use diagnoses, accounted for the largest proportion of this difference, between 38 and for 45 % for all medications except for sedative hypnotics where the proportion was only 10 %. For all medication types, the single variable representing receipt of any residential/inpatient treatment accounted for approximately 30 % of the difference in psychotropic prescription fills between the homeless and non-homeless individuals.

### Discussion

This is the first study to directly examine psychotropic prescription fills among homeless adults with serious mental illness. Using national VHA administrative data from 2010 to compare psychotropic medication fills between homeless and non-homeless veterans with SMI, we found that homeless veterans filled more prescriptions than their non-homeless counterparts. However, after controlling for socio-demographic, diagnostic, service use, and residential/inpatient mental health service use factors, homelessness was associated with moderately fewer psychotropic prescription fills. Specifically, adjustment for use of residential and to some extent inpatient treatment was associated with a substantial reduction of the estimated difference in psychotropic prescription fills between homeless and non-homeless veterans with SMI, by approximately one-third. These results indicate that residential and inpatient service use is central to the increased access to and presumed use of psychotropic medication services by homeless individuals.

Homeless individuals with SMI fill 80 % more prescriptions compared with their non-homeless counterparts. However, adjustment for potentially confounding factors reversed this excess to reveal an adjusted mean of five fewer psychotropic prescriptions per year for homeless individuals. Although proportions vary according to medication type, this excess difference in prescription fills between homeless and non-homeless individuals can be accounted for by three groups of factors (residential/inpatient service use, outpatient service use, and diagnoses), each accounting for about one-third of the increased use. These findings underline not only the natural relationship between greater numbers of diagnoses and more

medication fills, but also the strong effect of the extensive network of residential as well as other treatment services on psychotropic prescribing among homeless individuals.

The use of this network of services can be seen in the fact that among homeless individuals with SMI, 42 %, a remarkably high, but not entirely surprising proportion, used residential or inpatient mental health services in 2010. Notably, the proportion using residential treatment was twice that using inpatient treatment. Residential/inpatient service use was the single factor accounting for the largest proportion of the greater number of psychotropic prescription fills to the homeless. In a 2005 study by Folsom et al. use of residential, inpatient, and emergency mental health services was also higher among homeless compared to non-homeless persons with SMI who used San Diego County mental health services. Likewise, a recent U.S. survey of homelessness found that 30 % of emergently sheltered homeless veterans used transitional housing services (Office of Community Planning and Development 2011). However, neither of these studies evaluated psychotropic prescription fills in these contexts.

Homeless individuals with SMI also utilized a higher proportion of outpatient and emergency department services, compared with their non-homeless counterparts. Greater use of emergency department services among the homeless is consistent with similar results in both VHA and general population studies (Folsom et al. 2005; Padgett and Struening 1991; Padgett et al. 1995; Stovall et al. 1997). However, this analysis showed greater use of outpatient medical, psychiatric, and substance abuse treatment services among homeless people, which stands in contrast to the recent study by Folsom et al. (2005) which found lower rates for the use of such services among the homeless. One possible explanation for this difference is that VHA provides a richer array of services than other health systems and, recognizing their urgent needs, grants homeless veterans priority access. It is also possible that veterans tend to get the largest proportion of their health services from VHA, while homeless users of county services also get services from other providers. Unfortunately, data to evaluate these hypotheses are not available.

One possible interpretation of these results is that homeless individuals, especially those who do not use residential/inpatient mental health services, are less likely to fill psychotropic prescriptions, because of their unstable living conditions or other factors associated with homelessness that make them less able to obtain medications, maintain medication regimens, or store prescribed medications. Life on the streets or in shelters is hardly conducive to behavioral routine and prior research indicates that homelessness is associated with decreased medication compliance (Baggett et al. 2010; Hwang and Gottlieb 1999; Kushel et al. 2001). Residential or inpatient mental health

treatment and use of other services appears to provide stability or more extensive monitoring allowing for more extensive psychotropic prescription use over time. However, we cannot tell from the data available whether the use of these medications predominantly occurs during the period of residential or inpatient mental health treatment or whether the experience of residential treatment shapes post-discharge filling of prescriptions.

Several limitations to this study deserve comment. First, the measures of homelessness and clinical diagnoses were based on data recorded by clinicians in the medical record rather than by psychometrically validated measures. Moreover, the sample included only those veterans in contact with VHA treatment services in 2010, and results may not be generalizable to homeless individuals who are not veterans. However, our finding that 7 % of veterans with SMI were homeless as some point during 2010 is only slightly smaller than that reported in other studies of VHA and general populations with SMI (Edens et al. 2011; Folsom et al. 2005). Second, it is possible that additional factors associated with the filling of medication prescriptions, the determination of homelessness, or the use of residential/inpatient services were not available for the analysis. For instance, homeless veterans may fill some prescriptions through non-VHA sources not measured in this study. However, given the large array of VHA treatment services for homeless veterans, the above limitation may not have had a significant effect on our results (O'Toole et al. 2003). Fourth, a very large sample size was available for this study, inflating statistical power and magnifying the statistical significance of minor differences, especially for the number of prescriptions filled. However, our focus on effect sizes rather than inferential statistical testing addressed this problem. Finally, the current findings may not be generalizable to non-VHA populations, as VHA populations are largely composed of older men, or among VHA populations without SMI, for whom the use of psychotropic medications or residential treatment is likely to be less frequent.

VHA is the largest single provider of homeless services in the U.S., devoting substantial resources to this population. As such, VHA must comprehensively evaluate the needs of homeless veterans and the resources it currently uses to serve them. This study found that homeless veterans with SMI fill more psychotropic prescriptions than non-homeless veterans with SMI, which is largely explained by their more extensive use of residential in addition to inpatient and outpatient treatment services. These findings highlight the complex nature of relationships between service use and the number and type of psychotropic medications filled by homeless veterans, pointing to synergies in service use which facilitate the use of more services. Rather than one type of service reducing the need for

others, as in some healthcare contexts, here it appears that the use of residential and inpatient services by homeless veterans may increase access to psychotropic prescriptions. Future pharmaco-epidemiologic studies of treatment programs for homeless veterans should investigate whether the increased access to psychotropic medications is prospectively associated with a decline in the use of safety-net services. Such studies should also go beyond the use of administrative data to evaluate the nature and quality of the pharmacologic treatment provided to homeless individuals.

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