Antipsychotic Medication Prescriptions for Homeless and Unstably Housed Veterans in the Veterans Affairs Health Care System

Jack Tsai, PhD[a,b,c,*]; Dorota Szymkowiak, PhD[a]; and Rajiv Radhakrishnan, MD[c,d]

ABSTRACT

Objective: Many homeless and unstably housed (HUH) adults have severe mental illnesses that are managed with antipsychotic medications. The US Department of Veterans Affairs (VA) is the largest provider of homeless services, but there has been little study of psychotropic medication prescriptions for HUH veterans.

Methods: Using national VA administrative data in 2017, rates and characteristics associated with prescriptions for antipsychotic medications for veterans using VA health care services (N = 2,882,993), including HUH veterans (n = 266,855), were analyzed.

Results: Among HUH veterans, 17.6% had an antipsychotic prescription within 1 year of indication of HUH and 4.3% had prescriptions for 3 or more antipsychotic medications, which was higher than the 2.2% of non-HUH veterans with 3 or more antipsychotic prescriptions. Controlling for sociodemographic and clinical characteristics, HUH veterans were more than 3 times as likely to have an antipsychotic prescription as other veterans. However, among HUH veterans with an *ICD-10*–documented psychotic or bipolar disorder, HUH veterans were less likely to have prescriptions for first-generation and second-generation antipsychotics compared to their non-HUH counterparts (odds ratios for any antipsychotic < 0.5). Less than 2% of both HUH and non-HUH veterans had received long-acting injectable second-generation antipsychotic medications, and less than 0.2% were on clozapine treatment.

Conclusions: These findings provide a snapshot of antipsychotic prescription practices for HUH veterans in the VA health care system. The higher rates of antipsychotic prescriptions for HUH veterans overall, but potential underprescribing of antipsychotics for HUH veterans with severe mental illness, suggest there are opportunities for improving antipsychotic prescription practices in this population, including increasing use of long-acting injectable medications.

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[a]National Center on Homelessness Among Veterans, Homeless Program Office, US Department of Veterans Affairs, Tampa, Florida

[b]School of Public Health, University of Texas Health Science Center at Houston, San Antonio Campus, San Antonio, Texas

[c]Department of Psychiatry, Yale University School of Medicine, New Haven, Connecticut

[d]Yale Institute for Global Health, New Haven, Connecticut

**Corresponding author:* Jack Tsai, PhD, 7411 John Smith Drive, Ste 1100, San Antonio, TX 78229 (Jack.Tsai@uth.tmc.edu).

Severe mental illnesses such as schizophrenia and bipolar disorder have been found to be more prevalent among homeless adults than in the general population in studies worldwide.[1,2] Epidemiologic and population-based studies in the United States estimate that 22%–73% of homeless adults have a severe mental illness[3–6]; schizophrenia and bipolar disorder are some of the strongest risk factors for homelessness.[7,8]

Antipsychotic medications are a mainstay first-line treatment for adults with schizophrenia-spectrum disorders and bipolar disorder.[9] While there remain concerns about side effects and variability in response to antipsychotic medications, rigorous large-scale studies[9,10] have found that antipsychotic medications are effective in preventing symptom relapse and rehospitalization among adults with schizophrenia. However, access to and use of antipsychotic medications among homeless adults remain a concern. Several studies have found that being homeless can make it difficult to obtain and securely store medications, adhere to medication regimens, and stay engaged with treatment and regularly refill medications.[11–13] There has been little empirical examination of antipsychotic prescription patterns among homeless adults with severe mental illness.

The US Department of Veterans Affairs (VA) operates the largest comprehensive health care and homeless service system in the United States. An array of service models including supported housing, transitional housing, and rapid rehousing services have been developed and evaluated in the VA system.[14] However, how antipsychotic medications are being prescribed for homeless veterans is not well understood, although many can and do benefit from them. Only 1 previous national study[15] has examined the psychopharmacology of homeless veterans. Using VA administrative data from 2010, the study found that homeless veterans with severe mental illness had 16% fewer psychotropic prescription fills than non-homeless veterans. Homeless veterans were also found to be more likely to use residential/inpatient mental health care, which was associated with psychotropic prescriptions, but there was no specific examination of antipsychotic medication prescriptions and no analysis of interaction effects between homeless status and sociodemographic and clinical characteristics. These omissions are important because homeless veterans with certain characteristics may be more likely to be underprescribed antipsychotic medications.

In the current study, we used contemporary, national VA administrative data to examine antipsychotic medication use

Clinical Points

- Although a considerable proportion of homeless adults have severe mental illness, there is little research on how often and what types of antipsychotics are prescribed to them.
- Homeless veterans should have documented clinical diagnoses before antipsychotic medications are prescribed to prevent over- or underprescribing practices for this population.
- Special dispensation may be needed to help homeless veterans obtain access and adhere to antipsychotic medications, including increasing the use of long-acting injectable medications.

and correlates of antipsychotic medication prescriptions among homeless and unstably housed (HUH) veterans in comparison to non-HUH veterans. We also examined differences in prescriptions of first-generation and second-generation antipsychotics for HUH veterans. The results may inform ongoing efforts to treat severe mental illness among HUH adults, particularly in the VA health care system.

METHODS

Sample

The total sample comprised veterans in the VA health care system who responded to the VA's universal screen for housing instability and/or had an indication of homelessness (N = 2,882,993) in calendar year 2017. The date of a housing instability screen or indication of homelessness was considered the index date. Indications of HUH included endorsing housing instability on the VA's universal screen; having an *International Classification of Diseases, Tenth Revision* (*ICD-10*), code of Z59.0; and participating in any VA Homeless Program, including Health Care for Homeless Veterans (HCHV), Contracted Emergency Residential Services (CERS), Domiciliary Care for Homeless Veterans (DCHV), Compensated Work Therapy/Transitional Residence (CWT/TR), Grant and Per Diem (GPD), Low Demand Safe Haven (LDSH), Supportive Services for Veteran Families (SSVF), and US Department of Housing and Urban Development–VA Supportive Housing (HUD-VASH). Data were collected from veterans' electronic medical records stored in the VA's Corporate Data Warehouse and entries in the VA's Homeless Operations Management and Evaluation System (HOMES), which are available to VA researchers through the VA's Data Access Request Tracker. Study procedures were approved by the VA institutional review board.

Measures

Veterans were determined to have a prescription for antipsychotics if, within a year following their index date, they received a new prescription at the VA, had a preexisting refillable prescription at the VA, and/or reported having a prescription outside of the VA. A study dataset was created that included the following sociodemographic variables: age as a 5-category variable (18–34, 35–44, 45–54, 55–64, and 65+ years), race/ethnicity (non-Hispanic Black, non-Hispanic White, Hispanic, mixed race/other), sex, marital status, and service-connected disability rating. We also assessed variables related to veterans' military service, including service in Operations Enduring Freedom/Iraqi Freedom/New Dawn (OEF/OIF/OND), exposure to combat, or experience of military sexual trauma. We extracted veterans' electronic medical records for 1 year before and 1 year after the index date; scanned them for the presence of mental health, substance use, and chronic health conditions; and computed the Elixhauser comorbidity index score.[16] Psychotic disorders were categorized as schizophrenia-spectrum disorder or other nonmood psychotic disorders and determined by the presence of *ICD-10* codes F20–F25, F28, and F29; bipolar disorder was determined by *ICD-10* codes F31 and F34.0; major depressive disorder was determined by *ICD-10* codes F20.4, F31.3–F31.5, F32, F33, F34.1, F41.2, and F43.2; and posttraumatic stress disorder (PTSD) was determined by *ICD-10* code F43.1. The Elixhauser comorbidity index score was calculated based on the algorithm provided by the Agency for Healthcare Research and Quality. We also extracted 3 measures of mental health services use, which was based on service use within a year following their index date and included length of inpatient stay, number of psychiatric emergency department visits, and number of outpatient visits.

Data Analysis

First, in the total sample of veterans, those with and without antipsychotic medication prescriptions were compared. Second, the sample was stratified by HUH and non-HUH status, and within each stratification, veterans with and without any antipsychotic prescription were compared. Given the large sample size and statistical power to detect even minor differences as statistically significant, we relied on tests of effect size instead of statistical significance and focused on notable effect sizes (differences > Δ5.0%; odds ratio [OR] > 1.5 or < 0.7). In bivariate comparisons for categorical variables, differences in proportions between categories were calculated as an effect size measure. Third, we conducted multivariable logistic regression analyses to assess characteristics associated with prescriptions for antipsychotic medications, including HUH status. Only variables that had notable effect size differences (> Δ5.0%) between HUH and non-HUH veterans in bivariate comparisons were included in the multivariable analyses. Odds ratios were calculated as effect size measures. Supplementary logistic regression analyses were also conducted to examine characteristics associated with prescriptions for first-generation antipsychotics and second-generation antipsychotics. Finally, descriptive analyses were conducted to examine prescriptions for first-generation and second-generation antipsychotic medications for HUH and non-HUH veterans separated

Table 1. Bivariate Comparison of Sociodemographic and Clinical Characteristics of Veterans With and Without a Prescription for Any Antipsychotic Medication (N = 2,882,993)

Variable	No Rx (n = 2,695,068), %	Rx (n = 187,925), %	Δ%[a]
HUH	8.2	23.8	**−15.6**
Age, y			
17–29	4.3	4.6	−0.3
30–39	9.8	14.0	−4.2
40–49	9.7	13.6	−3.9
50–59	15.0	22.8	**−7.8**
60+	61.2	45.1	**16.1**
Race/ethnicity			
Non-Hispanic White	71.3	62.6	**8.7**
Non-Hispanic Black	18.4	25.5	**−7.1**
Hispanic	6.8	8.3	−1.5
Mixed race/other	3.4	3.6	−0.2
Sex			
Male	91.2	86.9	4.3
Female	8.8	13.1	−4.3
Marital status			
Married	55.0	39.1	**15.9**
Single/never married	13.8	22.4	**−8.7**
Divorced/separated	26.1	34.9	**−8.8**
Widowed	5.1	3.6	1.6
Percent service-connected disability			
None/%	42.7	27.8	**14.9**
10%–40%	19.7	10.8	**8.9**
50%–100%	37.6	61.5	**−23.8**
Combat exposure	8.6	9.1	−0.5
Military sexual trauma	4.2	12.0	**−7.8**
Psychiatric diagnoses			
Psychotic disorder[b]	0.3	21.6	**−21.3**
PTSD	11.2	38.1	**−26.9**
Major depressive disorder	12.2	39.0	**−26.8**
Bipolar disorder	0.9	18.7	**−17.8**
Drug use disorder	2.1	14.2	**−12.1**
Alcohol use disorder	3.5	15.4	**−11.9**

[a]Bolded values are > Δ5.0%.
[b]Psychotic disorder included schizophrenia-spectrum disorder and non-mood psychotic disorders.
Abbreviations: HUH = homeless or unstably housed, PTSD = posttraumatic stress disorder, Rx = prescription.

by long-acting injectable, short-acting injectable, and oral medications.

RESULTS

All Veterans

As shown in Table 1, in the total sample of veterans (N = 2,882,993), veterans with prescriptions for any antipsychotic medication in the year following the index date were more likely to be HUH, under 60 years old, non-Hispanic Black, not currently married, and receiving VA disability compensation and to have various psychiatric diagnoses including psychotic disorders, posttraumatic stress disorder, major depressive disorder, and bipolar disorder than veterans with no prescriptions (all > Δ5.0%). Among these factors, psychiatric diagnoses and VA disability compensation were the largest differentiators (all > Δ10.0%). Veterans with prescription antipsychotics also had higher Elixhauser comorbidity index scores than those with no prescriptions (mean [SD] = 3.64 [5.72] compared to mean [SD] = 0.37 [4.16]) and had more outpatient mental health visits (mean [SD] = 16.71 [26.99] compared to mean [SD] = 3.62 [8.49]), inpatient mental health visits (mean [SD] = 0.08 [1.40] compared to mean [SD] = 0.00 [0.28]), and psychiatric emergency department visits (mean [SD] = 0.14 [0.73] compared to mean [SD] = 0.01 [0.13]).

In the total sample of veterans, 9.26% (n = 266,855) were HUH. Among veterans with prescriptions for any antipsychotic medications, 24.13% were HUH and 75.87% were not. Conversely, among veterans who were HUH, 17.60% had prescriptions for antipsychotic medications and 82.40% did not.

HUH Versus Non-HUH Veterans

Table 2 shows the sociodemographic and clinical characteristics of veterans with and without antipsychotic prescriptions by HUH versus non-HUH status. Similar to in the total sample, higher rates of psychiatric diagnoses and VA disability compensation were the largest factors differentiating veterans with and without antipsychotic prescriptions among both HUH and non-HUH veterans. Interestingly, while rates of alcohol and drug use disorder were much higher among HUH veterans with antipsychotic prescriptions compared to HUH veterans without antipsychotic prescriptions (Δ17.8%–22.9%), the difference was much smaller among non-HUH veterans (Δ6.2%–7.4%).

Among veterans with antipsychotic prescriptions, HUH veterans had a mean (SD) of 1.26 (0.57) antipsychotic prescriptions and non-HUH veterans had a mean (SD) of 1.17 (0.45) antipsychotic prescriptions (Cohen $d = 0.18$). Among HUH veterans with antipsychotic prescriptions (n = 45,347), 79.2% had prescription for only 1 antipsychotic, 16.5% had prescriptions for 2 antipsychotics, and 4.3% had prescriptions for 3 or more antipsychotics. Among non-HUH veterans with antipsychotic prescriptions (n = 142,582), 85.6% had prescription for only 1 antipsychotic, 12.2% been prescriptions for 2 antipsychotics (Δ4.3% compared to HUH veterans), and 2.2% had prescriptions for 3 or more antipsychotics (Δ2.1% compared to HUH veterans).

In examining the proportion of HUH and non-HUH veterans with antipsychotic prescriptions by psychiatric diagnoses (ie, row percentages), we observed that 82.0% of HUH veterans with a psychotic disorder diagnosis had an antipsychotic prescription, similar to 84.9% of non-HUH veterans in the same diagnostic category. Among veterans with a psychotic disorder, the difference between veterans with and without antipsychotic prescriptions was similar among HUH and non-HUH veterans (ie, difference in row percentages was Δ64.0% versus Δ69.8%, respectively). Among HUH veterans with bipolar disorder, 65.3% had an antipsychotic prescription, which was higher than the 58.7% of non-HUH veterans with a bipolar disorder diagnosis and a prescription. Among veterans with bipolar disorder, the difference between those who did and did not have an antipsychotic prescription was greater among HUH veterans than among non-HUH veterans (ie, difference in row percentages was Δ30.6% versus Δ17.4%, respectively).

Table 2. Bivariate Comparison of Sociodemographic and Clinical Characteristics of Veterans With and Without a Prescription for Any Antipsychotic Medication by HUH Status[a]

	HUH					Non-HUH				
	Column %			Row %		Column %			Row %	
Variable	No Rx (219,756)	Rx (47,099)	Δ%[b]	No Rx (219,756)	Rx (47,099)	No Rx (2,465,364)	Rx (150,774)	Δ%[b]	No Rx (2,465,364)	Rx (150,774)
Age, y										
17–29	5.6	5.7	−0.1	82.0	18.0	4.2	4.2	−0.1	94.2	5.8
30–39	14.5	17.7	−3.2	79.3	20.7	9.4	12.9	−3.5	92.3	7.7
40–49	12.6	15.2	−2.7	79.4	20.6	9.4	13.1	−3.7	92.2	7.8
50–59	27.9	31.4	−3.5	80.6	19.4	13.8	20.1	−6.2	91.9	8.1
60+	39.5	30.0	**9.5**	86.0	14.0	63.1	49.8	**13.4**	95.4	4.6
Race/ethnicity										
Non-Hispanic White	49.2	52.5	−3.3	81.4	18.6	73.3	65.8	**7.5**	94.8	5.2
Non-Hispanic Black	39.2	36.6	2.7	83.4	16.7	16.5	22.0	**−5.5**	92.5	7.5
Hispanic	7.5	7.3	0.2	82.8	17.2	6.8	8.7	−1.9	92.8	7.3
Mixed race/other	4.1	3.7	0.4	83.9	16.1	3.4	3.5	−0.2	94.0	6.0
Sex										
Male	88.4	87.2	1.2	82.6	17.5	91.5	86.8	4.7	94.5	5.5
Female	11.6	12.8	−1.2	80.8	19.2	8.5	13.2	−4.7	91.3	8.7
Marital status										
Married	19.7	16.8	2.9	84.5	15.5	58.1	46.1	**12.1**	95.4	4.6
Single/never married	28.7	31.7	−3.1	80.8	19.2	12.4	19.5	**−7.1**	91.3	8.8
Divorced/separated	47.9	48.4	−0.5	82.2	17.8	24.2	30.7	**−6.5**	92.8	7.2
Widowed	3.7	3.0	0.7	85.2	14.8	5.3	3.7	1.5	95.8	4.2
Percent service-connected disability										
0%	52.0	38.6	**13.3**	86.3	13.7	41.9	24.4	**17.5**	96.6	3.4
10%–40%	19.0	15.7	3.3	85.0	15.0	19.7	9.3	**10.5**	97.2	2.8
50%–100%	29.0	45.7	**−16.7**	74.8	25.2	38.4	66.4	**−28.0**	90.4	9.6
Combat exposure	5.8	6.0	−0.3	81.7	18.3	8.9	10.1	**−1.2**	93.5	6.5
Military sexual trauma	8.7	16.0	**−7.3**	71.7	28.3	3.8	10.8	−7.0	85.3	14.7
Psychiatric diagnoses										
Psychotic disorder[c]	1.2	25.5	**−24.3**	18.0	82.0	0.2	20.4	**−20.2**	15.1	84.9
Bipolar disorder	2.6	23.2	**−20.5**	34.7	65.3	0.7	17.3	**−16.6**	41.3	58.7
PTSD	15.3	36.2	**−21.0**	66.3	33.7	10.8	38.7	**−27.9**	82.0	18.0
Major depressive disorder	25.2	44.7	**−19.6**	72.4	27.6	11.1	37.3	**−26.2**	82.9	17.1
Drug abuse	13.4	36.3	**−22.9**	63.2	36.8	1.1	7.3	**−6.2**	71.5	28.5
Alcohol abuse	15.4	33.2	**−17.8**	68.3	31.7	2.4	9.8	**−7.4**	80.3	19.7

[a]Column and row percentages for some variables do not appear to total 100% due to rounding.
[b]Bolded values are > Δ5.0%.
[c]Psychotic disorder included schizophrenia-spectrum disorder and non-mood psychotic disorders.
Abbreviations: HUH = homeless or unstably housed, PTSD = posttraumatic stress disorder, Rx = prescription.

As shown in Table 3, multivariable analyses including sociodemographic and clinical characteristics along with HUH status and their interactions found that HUH status, VA service–connected disability, psychotic disorder, bipolar disorder, posttraumatic stress disorder, major depressive disorder, drug use disorder, and more frequent psychiatric emergency department service use were all strongly associated with a prescription for antipsychotics (OR > 1.5). Moreover, there were notable interaction effects between psychotic disorder, bipolar disorder, posttraumatic stress disorder, major depressive disorder, and HUH status in their association with antipsychotic prescriptions. Supplementary Table 1 shows the multivariable analyses stratified by HUH status (without interactions), which revealed that HUH veterans with psychotic disorder or bipolar disorder were less likely to have antipsychotic prescriptions than non-HUH veterans with those conditions.

First- and Second-Generation Antipsychotics

Also shown in Table 3 are separate multivariable analyses examining characteristics associated with prescriptions of first-generation or second-generation antipsychotics. HUH status was more strongly associated with prescriptions of second-generation antipsychotics than first-generation antipsychotics (OR = 3.29 vs 3.11, respectively). Certain age groups were notably associated with lower likelihood of prescriptions of first-generation antipsychotics (ie, ages 17–39 years), and being single was associated with higher likelihood, but there was not such notable association between age, marital status, and prescriptions for second-generation antipsychotics (OR > 1.5 or < 0.7). Psychotic disorder and bipolar disorder were the most strongly associated variables with both first-generation and second-generation antipsychotic prescriptions. PTSD, major depressive disorder, and drug use disorder were notably associated only with second-generation antipsychotic prescriptions (OR > 1.5). Number of emergency department visits was also notably associated with second-generation antipsychotic prescriptions but not first-generation antipsychotic prescriptions.

Notable interaction effects showed that HUH veterans aged 17–39 years were markedly more likely to have first-generation antipsychotic prescriptions than non-HUH veterans in the same age range. In addition, HUH

Table 3. Multivariable Analysis of Sociodemographic and Clinical Characteristics, HUH Status, and Their Interaction Associated With a Prescription for Any Antipsychotic Medication

		Any Antipsychotic		First Generation		Second Generation	
Variable	Reference Group	Odds Ratio[a]	95% CI[a]	Odds Ratio[a]	95% CI[a]	Odds Ratio[a]	95% CI[a]
HUH	Non-HUH	**3.24**	**(3.10–3.38)*** **	**3.11**	**(2.76–3.52)*** **	**3.29**	**(3.15–3.44)*** **
Age, y	60+						
17–29		0.92	(0.89–0.95)***	**0.36**	**(0.31–0.41)*** **	0.98	(0.95–1.02)
30–39		1.04	(1.02–1.06)***	**0.62**	(0.57–0.66)***	1.09	(1.06–1.11)***
40–49		1.16	(1.14–1.19)***	0.81	(0.76–0.86)***	1.21	(1.18–1.23)***
50–59		1.30	(1.27–1.32)***	1.03	(0.98–1.08)	1.32	(1.30–1.34)***
HUH × 17–29		1.29	(1.20–1.38)***	**2.25**	**(1.82–2.77)*** **	1.26	(1.18–1.35)***
HUH × 30–39		1.21	(1.15–1.26)***	**1.61**	**(1.42–1.83)*** **	1.18	(1.13–1.24)***
HUH × 40–49		1.13	(1.08–1.18)***	1.19	(1.05–1.36)**	1.11	(1.07–1.17)***
HUH × 50–59		0.99	(0.96–1.03)	0.96	(0.87–1.05)	0.99	(0.95–1.03)
Race/ethnicity	Non-Hispanic White						
Non-Hispanic Black		1.11	(1.09–1.13)***	1.43	(1.37–1.49)***	1.06	(1.05–1.08)***
Hispanic		1.18	(1.15–1.20)***	1.16	(1.09–1.25)***	1.16	(1.13–1.19)***
Multiracial/other		0.96	(0.93–1.00)*	1.03	(0.93–1.14)	0.96	(0.93–1.00)*
HUH × non-Hispanic Black		0.83	(0.81–0.86)***	**0.67**	(0.62–0.73)***	0.85	(0.83–0.88)***
HUH × Hispanic		0.83	(0.78–0.87)***	0.75	(0.65–0.88)***	0.84	(0.79–0.88)***
HUH × multiracial/other		0.89	(0.83–0.96)**	0.88	(0.72–1.07)	0.91	(0.85–0.98)*
Sex	Male						
Female		0.85	(0.83–0.87)***	0.91	(0.84–0.97)**	0.86	(0.84–0.88)***
HUH × female		1.01	(0.97–1.06)	1.19	(1.04–1.36)**	1.00	(0.96–1.05)
Marital status	Married						
Single		1.24	(1.21–1.26)***	**1.59**	**(1.51–1.67)*** **	1.22	(1.19–1.24)***
Separated/divorced		1.24	(1.22–1.26)***	1.22	(1.17–1.28)***	1.24	(1.22–1.26)***
Widowed		1.19	(1.15–1.23)***	1.21	(1.11–1.33)***	1.18	(1.14–1.22)***
HUH × single		0.83	(0.79–0.86)***	0.74	(0.66–0.83)***	0.83	(0.80–0.87)***
HUH × separated/divorced		0.85	(0.82–0.88)***	0.81	(0.72–0.90)***	0.86	(0.83–0.89)***
HUH × widowed		0.87	(0.80–0.95)**	1.09	(0.88–1.34)	0.85	(0.79–0.93)***
VA service-connected disability	0%						
10%–40%		0.81	(0.79–0.82)***	0.75	(0.70–0.81)***	0.81	(0.79–0.83)***
50%–100%		**1.53**	**(1.50–1.55)*** **	1.41	(1.35–1.47)***	**1.51**	**(1.49–1.54)*** **
HUH × 10%–40%		1.26	(1.21–1.32)***	1.31	(1.16–1.48)***	1.24	(1.19–1.30)***
HUH × 50%–100%		0.91	(0.88–0.95)***	1.02	(0.93–1.11)	0.90	(0.87–0.93)***
Combat exposure		0.97	(0.95–0.99)**	0.92	(0.86–0.99)*	0.97	(0.95–0.99)**
HUH × combat exposure		0.95	(0.90–1.00)	0.93	(0.79–1.09)	0.95	(0.90–1.00)
Military sexual trauma		1.21	(1.17–1.24)***	1.05	(0.97–1.13)	1.20	(1.17–1.23)***
HUH × military sexual trauma		0.99	(0.95–1.04)	0.98	(0.86–1.11)	0.99	(0.94–1.04)
Psychiatric diagnoses							
Psychotic disorder[b]		**147.32**	**(142.58–152.22)*** **	**61.82**	**(59.02–64.76)*** **	**81.80**	**(79.47–84.19)*** **
Bipolar disorder		**24.14**	**(23.61–24.69)*** **	**3.61**	**(3.36–3.87)*** **	**23.67**	**(23.14–24.21)*** **
PTSD		**2.88**	**(2.84–2.93)*** **	1.39	(1.32–1.46)***	**2.92**	**(2.88–2.97)*** **
Major depressive disorder		**3.12**	**(3.07–3.17)*** **	1.47	(1.40–1.55)***	**3.12**	**(3.07–3.17)*** **
Drug use disorder		**2.04**	**(1.97–2.11)*** **	1.48	(1.36–1.62)***	**1.95**	**(1.89–2.02)*** **
Alcohol use disorder		1.30	(1.27–1.34)***	1.10	(1.02–1.18)*	1.31	(1.27–1.34)***
HUH × psychotic disorder		**0.23**	**(0.22–0.25)*** **	**0.27**	**(0.24–0.29)*** **	**0.29**	**(0.27–0.31)*** **
HUH × bipolar disorder		**0.41**	**(0.39–0.43)*** **	**0.62**	(0.55–0.70)***	**0.41**	**(0.39–0.42)*** **
HUH × PTSD		**0.65**	**(0.62–0.67)*** **	0.80	(0.72–0.88)***	**0.64**	**(0.62–0.67)*** **
HUH × major depression		**0.57**	**(0.55–0.59)*** **	**0.65**	**(0.58–0.71)*** **	**0.57**	**(0.55–0.59)*** **
HUH × drug use disorder		0.80	(0.76–0.84)***	0.87	(0.76–0.99)*	0.83	(0.79–0.87)***
HUH × alcohol use disorder		0.87	(0.83–0.90)***	0.91	(0.81–1.02)	0.87	(0.84–0.91)***
Mental health service use[c]							
Outpatient visits		1.02	(1.02–1.02)***	1.01	(1.01–1.01)***	1.02	(1.02–1.02)***
Inpatient days		0.99	(0.98–1.00)	0.98	(0.96–1.01)	0.99	(0.98–1.00)
ED visits		**1.98**	**(1.91–2.05)*** **	1.19	(1.13–1.24)***	**1.87**	**(1.81–1.94)*** **
HUH × outpatient visits		0.99	(0.99–0.99)***	1.00	(1.00–1.00)***	0.99	(0.99–0.99)***
HUH × inpatient days		1.03	(1.01–1.04)**	1.02	(1.00–1.05)	1.02	(1.01–1.04)**
HUH × ED visits		**0.66**	**(0.63–0.69)*** **	0.91	(0.87–0.96)***	**0.67**	**(0.64–0.70)*** **
Elixhauser comorbidity index[d]		1.02	(1.02–1.02)***	1.03	(1.03–1.04)***	1.01	(1.01–1.02)***
HUH × Elixhauser comorbidity index		0.98	(0.98–0.99)***	0.97	(0.96–0.98)***	0.99	(0.98–0.99)***

[a]Bolded values are for odds ratio > 1.5 or < 0.7.
[b]Psychotic disorder included schizophrenia-spectrum disorder and non-mood psychotic disorders.
[c]Mental health service use was recorded within 1 year of the index date of their first indication of homelessness/housing instability.
[d]The Elixhauser comorbidity index was calculated based on the algorithm provided by the Agency for Healthcare Research and Quality.
*$P < .05$.
**$P < .01$.
***$P < .001$.
Abbreviations: ED = emergency department, HUH = homeless or unstably housed, PTSD = posttraumatic stress disorder.

veterans with a psychotic disorder, bipolar disorder, or major depressive were less likely to have first- and second-generation antipsychotic prescriptions than non-HUH veterans with the respective conditions.

As an exploratory analysis, different types of long-acting injectable, short-acting injectable, and oral antipsychotic medication prescriptions among HUH and non-HUH veterans were examined (Supplementary Table 2). Among HUH veterans with any antipsychotic prescription, 95.5% were receiving second-generation antipsychotics. Similar, among non-HUH veterans with any antipsychotic prescription, 94.5% were receiving second-generation antipsychotics. For both HUH and non-HUH veterans, quetiapine, risperidone, and aripiprazole oral medications were the most commonly prescribed antipsychotics. Less than 2% of both HUH and non-HUH veterans were receiving any long-acting injectable antipsychotics, and less than 0.2% were receiving clozapine. Among HUH veterans with any antipsychotic prescription, only 5.7% received any long-acting injectable second-generation antipsychotic. Among non-HUH veterans receiving any antipsychotics, only 2.7% received any long-acting injectable second-generation antipsychotics.

DISCUSSION

This study is the largest to date to examine rates and correlates of antipsychotic medication prescriptions among more than 250,000 veterans who are homeless or unstably housed (HUH). While studies have examined antipsychotic use among veterans in general, none have specifically focused on HUH veterans. We found that a sizable proportion (just over 17%) of veterans who were HUH were prescribed an antipsychotic within 1 year of their indication of HUH. HUH veterans may be overrepresented among those receiving antipsychotics, as we found that 24% of veterans prescribed an antipsychotic were HUH but that HUH veterans represented only 9% of the total sample. Multivariable analyses revealed that even after controlling for sociodemographic and clinical characteristics, HUH veterans were more than 3 times as likely to be prescribed antipsychotics as non-HUH veterans. There are several possible explanations for this finding. For one, prescribers may be more likely to use antipsychotic medications off-label for HUH veterans due to poor socio-occupational functioning even if they do not have a formal diagnosis that warrants antipsychotic medications. We found HUH veterans had greater medical comorbidities as well as greater use of emergency department and mental health services,[14,17,18] which may have increased their likelihood of being prescribed antipsychotics due to poor functioning. Another potential reason is that HUH veterans may be underdiagnosed with severe mental illness, so that they are being prescribed needed antipsychotic medications but the documentation of their severe mental illness may be inadequate. There is also the possibility that prescribers are more likely to inappropriately prescribe antipsychotic medications to HUH populations because of discontinuity of care[14,19] or lack of comprehensive medical training about causes and factors related to homelessness.[20] Some researchers have expressed concerns about the "medicalization of homelessness,"[21] and more research is needed to tease out exactly why HUH veterans are being prescribed antipsychotics at higher rates than other veterans.

While HUH veterans overall were more likely to be prescribed antipsychotic medications compared to other veterans, more in-depth analysis of the data revealed several important findings. Not surprisingly, psychotic disorder and bipolar disorder emerged as the strongest correlates of antipsychotic prescriptions for both HUH and non-HUH veterans, and high rates of these disorders among HUH veterans are especially noteworthy. However, analysis of interaction effects revealed that HUH veterans with psychotic disorder and bipolar disorder were less likely to be prescribed antipsychotics compared to their non-HUH counterparts. Studies have reported that HUH clients with severe mental illness often experience difficulties with medication adherence[22,23] and thus may be less likely to follow-up with prescribers, which may at least partly explain the study finding. In addition, many HUH veterans have high rates of medical comorbidities and substance use disorders,[14,18,24] so prescribers may be more cautious to use antipsychotic prescriptions unless absolutely essential (eg, in cases of acute psychosis). This hypothesis would be consistent with at least one study[25] that found homeless clients received inadequate prescription of various psychotropic medications. It may also explain another important finding of the study, namely, that although the majority of veterans with psychotic disorder, both HUH (82.0%) and non-HUH (84.9%), had a recent prescription for antipsychotic medications, about 20% of veterans do not. Additionally, HUH veterans were more likely to be prescribed second-generation antipsychotics rather than first-generation antipsychotics. Given that the existing evidence does not support greater efficacy for second-generation antipsychotics (except clozapine) compared to first-generation antipsychotics,[26] this finding may reflect prescribing practices that are not in keeping with the current evidence. The high rates of prescription of quetiapine among HUH and non-HUH veterans may also be reflective of its use to address symptoms such as insomnia and anxiety, beyond its use for a specific diagnosis. However, more research is needed to test these explanations, and, in particular, prospective studies are needed to understand factors underlying potential underprescribing of antipsychotic medications for HUH veterans with severe mental illness.

Another area for future research that would shed light on our findings is to examine why less than 2% of HUH veterans were prescribed long-acting injectable antipsychotics given the low medication adherence rates in this population. Rates of long-acting injectable prescription in dedicated clinics for homeless individuals elsewhere are as high as 35%.[27] The use of long-acting injectables may have great benefits

for HUH veterans, as one study[28] found that switching veterans from oral to long-acting injectable antipsychotics was associated with fewer inpatient psychiatric admissions and shorter inpatient stays, and another study[29] found that use of long-acting injectable antipsychotics was associated with improved adherence, symptoms, and functioning in homeless adults. Further research is needed on procedures for and impact of increasing use of long-acting injectable antipsychotic medications for HUH populations. Equally important is the low rate of clozapine prescription (less than 0.2%) among HUH and non-HUH veterans, which is lower than the estimated need for clozapine prescriptions at the population level.[30]

There are several important study limitations. First, HUH status and clinical diagnoses were based on data recorded by clinicians in the VA medical record rather than through structured clinical interviews. The reliability of diagnoses in administrative datasets is uncertain and can be inflated or deflated depending on diagnosis.[31] Second, HUH veterans may have had prescribers or had prescription refills provided through non-VA pharmacies that were not captured in the VA medical record. Third, HUH veterans are a heterogeneous group with varying histories of homelessness and housing instability, different levels of mental health symptom severity, and differing levels of being served by different VA providers, and this study did not examine subgroup differences between HUH veterans or site-level differences, which can vary greatly. Finally, the sample included only veterans engaged in VA services in 2017, and results may not be generalizable to other HUH veterans, veterans outside the VA system, or other HUH adults. These limitations notwithstanding, the findings provide an important snapshot of antipsychotic medication prescriptions for HUH veterans in the VA health care system. The findings suggest the need for more attention on antipsychotic medications for HUH veterans with severe mental illness, as they may represent an important piece of the puzzle in addressing homelessness.

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Supplementary Material

Article Title: Antipsychotic Medication Prescriptions for Homeless and Unstably Housed Veterans in the Veterans Affairs Healthcare System

Author(s): Jack Tsai, PhD; Dorota Szymkowiak, PhD; and Rajiv Radhakrishnan, MD

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List of Supplementary Material for the article

1. Table 1 — Multivariable analysis of characteristics associated with a prescription for any antipsychotic medication stratified by homeless/unstably housed (HUH) status
2. Table 2 — Antipsychotic medication prescriptions for homeless and unstably housed (HUH) veterans and other veterans

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Supplementary Table 1. Multivariable analysis of characteristics associated with a prescription for any antipsychotic medication stratified by homeless/unstably housed (HUH) status

	HUH			Not HUH		
Variable	**Odds Ratio**	**95% Confidence Interval**	**p-value**	**Odd ratio**	**95% Confidence Interval**	**p-value**
Age						
17-29	1.19	(1.12-1.26)	<.001	0.92	(0.89-0.95)	<.001
30-39	1.25	(1.20-1.30)	<.001	1.04	(1.02-1.06)	<.001
40-49	1.32	(1.26-1.37)	<.001	1.16	(1.14-1.19)	<.001
50-59	1.28	(1.24-1.32)	<.001	1.30	(1.27-1.32)	<.001
60+	Ref			Ref		
Race/ethnicity						
Non-Hispanic white	Ref			Ref		
Non-Hispanic black	0.92	(0.90-0.95)	<.001	1.11	(1.09-1.13)	<.001
Hispanic	0.97	(0.93-1.02)	.263	1.18	(1.15-1.20)	<.001
Mixed race/other	0.86	(0.81-0.92)	<.001	0.96	(0.93-1.00)	.040
Female	0.86	(0.82-0.90)	<.001	0.85	(0.83-0.87)	<.001
Marital status						
Married	Ref			Ref		
Single/never married	1.02	(0.99-1.06)	.224	1.24	(1.21-1.26)	<.001
Divorced/separated	1.06	(1.02-1.09)	.002	1.24	(1.22-1.26)	<.001
Widowed	1.04	(0.97-1.12)	.290	1.19	(1.15-1.23)	<.001
Percent service-connected disability						
0%	Ref			Ref		
10-40%	1.02	(0.98-1.05)	.389	0.81	(0.79-0.82)	<.001
50-100%	1.39	(1.35-1.44)	<.001	**1.53**	**(1.50-1.55)**	<.001
Combat exposure	0.92	(0.87-0.97)	.001	0.97	(0.95-0.99)	.003
Military sexual trauma	1.20	(1.15-1.25)	<.001	1.21	(1.17-1.24)	<.001
Mental health service use						
Mental health outpatient visits	1.01	(1.01-1.01)	<.001	1.02	(1.02-1.02)	<.001

Mental health emergency department visits	1.31	(1.28-1.34)	<.001		**1.98**	**(1.91-2.05)**	**<.001**
Mental health inpatient days	1.02	(1.01-1.02)	<.001		0.99	(0.98-1.00)	.083
Psychiatric diagnosis							
Psychotic disorder	**34.23**	**(32.54-36.01)**	<.001		**147.33**	**(142.58-152.22)**	<.001
Bipolar disorder	**9.82**	**(9.45-10.20)**	<.001		**24.14**	**(23.61-24.69)**	<.001
Posttraumatic stress disorder	**1.86**	**(1.80-1.92)**	<.001		**2.88**	**(2.84-2.93)**	<.001
Depression	**1.77**	**(1.71-1.82)**	<.001		**3.12**	**(3.07-3.17)**	<.001
Drug use disorder	**1.63**	**(1.57-1.70)**	<.001		**2.04**	**(1.97-2.11)**	<.001
Alcohol use disorder	1.13	(1.10-1.17)	<.001		1.30	(1.27-1.34)	<.001
Elixhauser comorbidity index	1.00	(1.00-1.01)	.280		1.02	(1.02-1.02)	<.001

Note: Schizophrenia included all schizophrenia-spectrum and non-mood psychotic disorders; PTSD = Posttraumatic stress disorder, Rx = prescription. The Elixhauser comorbidty index was calculated based on the algorithm provided by the Agency for Healthcare Research and Quality. Bolded values are odds ratio > 1.5.

Supplementary Table 2. Antipsychotic medication prescriptions for homeless and unstably housed (HUH) veterans and other veterans

	HUH veterans (n= 266,855) Count (%)	Non-HUH veterans (n= 2,616,138) Count (%)
Any antipsychotic	**47,099 (17.6)**	**150,774 (5.8)**
First generation antipsychotic	4,213 (1.58)	13,234 (.51)
Long acting injectables		
Fluphenazine	201 (.08)	551 (.02)
Haloperidol	515 (.19)	1,236 (.05)
Short-acting injectables		
Chlorpromazine	7 (.00)	25 (.00)
Fluphenazine	3 (.00)	6 (.00)
Haloperidol	223 (.08)	306 (.01)
Oral		
Chlorpromazine	591 (.22)	1,758 (.07)
Fluphenazine	386 (.14)	1,122 (.04)
Haloperidol	1,784 (.67)	5,245 (.20)
Loxapine	284 (.11)	1,055 (.04)
Perphenazine	549 (.21)	1,852 (.07)
Thioridazine	16 (.01)	181 (.01)
Thiothixene	95 (.04)	459 (.02)
Trifluoperazine	101 (.04)	460 (.02)
Second generation antipsychotics	44,968 (16.9)	142,472 (5.45)
Long-acting injectables		
Aripiprazole	519 (.19)	570 (.02)
Olanzapine	4 (.00)	8 (.00)
Paliperidone	1,753 (.66)	2,527 (.10)
Risperidone	432 (.16)	980 (.04)
Short-acting injectables		
Olanzapine	28 (.01)	32 (.00)
Ziprasidone	12 (.00)	46 (.00)
Oral		
Aripiprazole	8,414 (3.15)	30,000 (1.15)
Asenapine	50 (.02)	152 (.01)
Brexpiprazole	15 (.01)	87 (.00)
Clozapine	262 (.10)	1,699 (.06)
Lurasidone	3,879 (1.45)	10,022 (.38)
Olanzapine	6,215 (2.33)	16,386 (.63)
Paliperidone	243 (.09)	446 (.02)
Pimavanserin	8 (.00)	216 (.01)
Quetiapine	22,003 (8.25)	65,331 (2.50)
Risperidone	9,301 (3.49)	26,960 (1.03)
Ziprasidone	1,707 (.64)	5,428 (.21)

Note: Rx = prescription.