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Prevalence and correlates of specialty substance use disorder treatment for Department of Veterans Affairs Healthcare System patients with high alcohol consumption

Joseph E. Glass^{a,b,*}, Brian E. Perron^{b,c}, Mark A. Ilgen^{b,d}, Stephen T. Chermack^{b,d},
Scott Ratliff^b, Kara Zivin^{b,d}

^a George Warren Brown School of Social Work, Washington University, 1 Brookings Drive, Campus Box 1196, St. Louis, MO 63130, USA

^b VA National Serious Mental Illness Treatment Research and Evaluation Center, 11H 2215 Fuller Rd, Ann Arbor, MI 48105, USA

^c School of Social Work, University of Michigan, 1080 South University Avenue, Room 3849, Ann Arbor, MI 48109, USA

^d Department of Psychiatry, University of Michigan, 4250 Plymouth Road, Ann Arbor, MI 48109-5740, USA

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ABSTRACT

Objective: Current substance use disorder (SUD) treatment guidelines suggest that SUD treatment may be indicated for individuals with elevated levels of alcohol consumption. The Department of Veterans Affairs (VA) considers patients with AUDIT-C scores of ≥ 8 as candidates for specialty care, however rates of SUD treatment based on AUDIT-C cutoffs remain understudied. We sought to identify SUD treatment rates and to identify patient characteristics that were associated with SUD treatment for VA patients with elevated AUDIT-C scores.

Methods: The study sample included 10,384 ambulatory care VA patients with AUDIT-C scores of ≥ 8 , who had not received SUD treatment in the past 60 days. Data were ascertained from the 2005 Survey of Health Experiences of Patients, a confidential mailed patient satisfaction survey (results were not available to providers). The outcome variable was the receipt of VA specialty SUD treatment in the year after the survey completion, as ascertained by VA administrative data. We identified rates of SUD treatment, and conducted unadjusted *F* tests and adjusted logistic regression analyses to identify patient characteristics that were associated with treatment entry.

Results: Approximately 3.9% of veterans with AUDIT-C scores of ≥ 8 received SUD treatment in the year after being surveyed. Adjusted analyses revealed that treatment was more likely among persons with a mental health diagnosis (OR = 3.31, CI = 2.30–4.76) and among racial/ethnic minority groups.

Conclusions: Very few veterans who reported elevated alcohol consumption on SHEP received specialty SUD treatment in the year after being surveyed. Increased efforts should be made to intervene with patients who have elevated levels of alcohol consumption.

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1. Introduction

Although many effective treatments exist for alcohol use disorders, few of those who might benefit from these services actually receive specialty addictions treatment. In the United States general population, rates of specialty substance use disorder (SUD) treatment for persons with past-year alcohol abuse or dependence were estimated at 8.1% (Substance Abuse and Mental Health Services Administration, 2008).

While addictions treatment programs have traditionally been geared towards individuals with alcohol use disorders (AUDs), current Department of Veterans Affairs (VA) treatment guidelines recommend that clinicians offer specialty treatment referral to patients who have high levels of alcohol consumption even when an AUD is not present (The Management of Substance Use Disorders Working Group, 2009). VA represents the largest integrated health-care system in the United States. Their recommendation includes patients with scores of ≥ 8 on the three-question consumption version of the Alcohol Use Disorders Identification Test (AUDIT-C) (The Management of Substance Use Disorders Working Group, 2009). These recommendations acknowledge that alcohol-related problems are common in patients with AUDIT-C scores of ≥ 8 , regardless of whether or not an AUD is present (Bradley et al., 2004).

* Corresponding author at: George Warren Brown School of Social Work, Washington University, 1 Brookings Drive, Campus Box 1196, St. Louis, MO 63130, USA. Tel.: +1 734 678 3709; fax: +1 314 934 8511.

E-mail address: jeglass@wustl.edu (J.E. Glass).

Although VA treatment guidelines recommend that SUD treatment referral be offered to patients with AUDIT-C scores of ≥ 8 , no studies to date have documented the rates of specialty SUD treatment utilization for VA patients based on these cutoffs. Furthermore, the characteristics of patients with AUDIT-C scores of ≥ 8 who receive SUD treatment remain unknown. Understanding these factors may inform efforts to target patients for SUD referral.

To address these gaps in the literature, this study aims to identify the rates of specialty SUD treatment and to determine the clinical and sociodemographic characteristics associated with treatment entry for VA patients with AUDIT-C scores of ≥ 8 . This study used data from the 2005 Survey of Health Experiences of Patients (SHEP). By linking SHEP to VA medical records, we were able to supplement self-report data with information on clinical diagnoses, and determine if specialty SUD treatment occurred within VA in the year after being surveyed.

2. Methods

2.1. Study population

Data for this study involved linking the ambulatory care SHEP survey to VA administrative medical records. A total of 262,003 patients returned the 2005 survey with a response rate of 59.9%, and we were able to link 261,996 of these respondents to administrative data via unique patient identifiers. Survey data includes a final weighting variable that adjusts for sampling selection and non-response by age, gender, treatment site, and patient group. On a monthly basis, VA created a national sampling frame for SHEP consisting of patients completing ambulatory healthcare visits at 800 VA treatment facilities in the prior 60 days (Wright et al., 2006). A complex sampling design selected equal numbers of patients from primary care and specialty ambulatory care sections across VA facilities using a stratified approach (Bradley et al., 2006). The results of SHEP are confidential, and were not available to treatment providers.

Further information on survey design and data collection of SHEP exists in previous studies (Dobscha et al., 2009; Kahwati et al., 2007; Wright et al., 2006). SHEP data were made available by the VA Office of Quality and Performance, and analysts at the VA National Serious Mental Illness Treatment Research and Evaluation Center (SMITREC) linked SHEP data to VA administrative databases. The use of these data for research was approved by the Institutional Review Board at the VA Ann Arbor Healthcare System.

2.2. Measures

2.2.1. SUD treatment. The outcome used in our analyses was a dichotomous variable indicating the receipt of specialty SUD treatment for alcohol and/or drug problems during the year after SHEP completion in any VA outpatient, residential, or inpatient setting. The date of SHEP completion served as an index, and we identified whether visits occurred in the following year using administrative data. Outpatient visits were identified by database codes that designate SUD clinic visit locations. Residential and inpatient visits were identified by SUD bed section codes (Dalton and McKellar, 2007). Using a 60-day washout period, we excluded patients who were receiving SUD treatment at the time of being surveyed. While treatment after the survey was our dependent variable, we also wanted to measure prior treatment as an independent variable (see Section 2.2.3). Essentially, the washout period avoided double-counting treatment episodes that were active at the time of the survey. This approach for identifying new episodes of care in administrative data is based on the work of Garnick et al. (2006)

2.2.2. Alcohol consumption. SHEP included the three-question Consumption version of the Alcohol Use Disorders Identification Test (AUDIT-C). The AUDIT-C assesses the severity of alcohol use and misuse for patients in clinical settings and has been used in research (Bradley et al., 2004; Bush et al., 1998). AUDIT-C scores range from 0 to 12, with higher scores indicating greater levels of alcohol consumption. The VA clinical practice guideline recommends that referral be offered to patients with AUDIT-C scores of ≥ 8 , thus we used this cutoff to define our sample. One could minimally achieve this score, for example, by drinking on average three drinks per day four times per week, and having one weekly episode of drinking six drinks

2.2.3. Past-year SUD treatment. Patients with SUD treatment visits occurring in the 365 days prior to completing SHEP were identified using administrative data.

2.2.4. Clinical diagnoses. We searched the administrative medical records for ICD-9-CM codes assigned in any VA outpatient, residential, or inpatient visits during the 365 days prior to being surveyed. Alcohol and drug use disorders included ICD-9-CM codes that indicate abuse, dependence, and substance-induced problems (we

excluded nicotine use disorders and substance use disorders in remission.) We identified the presence of any of the following mental health disorders: depression, PTSD, other anxiety disorders, personality disorders, bipolar disorders, and schizophrenia or schizoaffective disorders. The identification of medical disorders utilized a modified version of the Charlson comorbidity index which is based on a count of 19 medical conditions identified by ICD-9-CM codes (Charlson et al., 1987; Valenstein et al., 2006) which was dichotomized to indicate the presence of any medical disorder.

2.2.5. Demographic characteristics. We categorized race and ethnicity questions from SHEP into five groupings: (1) White, not Hispanic; (2) Black, not Hispanic; (3) Hispanic; (4) American Indian or Alaskan Native; Asian, Native Hawaiian, or Pacific Islander; and (5) multiracial. Marital status was collapsed to examine categories of presently married versus unmarried (divorced, separated, widowed, and never married). Education was represented by two categories: less than high school, and high school graduate or greater (collapsed from high school graduate, GED, some college, and college graduate and beyond). Employment status included employed (employed for wages, self-employed, student, homemaker) versus not employed (looking for employment, disabled, and retired). We gave precedence to employment when multiple selections were marked. Total household income was also included in the analyses.

2.3. Analytic plan

We used the survey package of STATA 10 (StataCorp LP, 2007) to conduct all statistical analyses, which facilitated the calculation of population-representative estimates. A Taylor series linearization adjusted the standard errors of estimates to take into account the stratified sampling methodology and survey non-response rates.

We excluded 19,272 (7.4%) respondents (from those who were linked to administrative data) who had missing data on AUDIT-C scores and calculated the prevalence of AUDIT-C scores of ≥ 8 . Remaining analyses included only respondents with AUDIT-C scores of ≥ 8 and no treatment in the prior 60 days. Weighted percents and standard errors were calculated to describe sociodemographic and clinical characteristics and the rate of SUD treatment in the sample. Design-based *F* tests were used to determine if significant differences existed between veterans who received SUD treatment within one year versus those who did not. Last, we used an adjusted logistic regression model to identify characteristics that were associated with SUD treatment. AUD was included as a control variable to acknowledge that at-risk drinkers with an identified alcohol diagnosis would be more likely to receive treatment.

3. Results

An estimated 3.9% (SE = 0.08) of the VHA population had AUDIT-C scores of ≥ 8 ($n = 10,384$ SHEP respondents). A total of 225 (2.2%) of these SHEP respondents received treatment during the 60-day washout period, thus were excluded from further analyses.

3.1. Descriptive statistics

Table 1 includes population-representative descriptive statistics for veterans with AUDIT-C scores of ≥ 8 . The majority of veterans were between the ages of 45 and 64, male; and white, not Hispanic. Most were unmarried, had an income of \$30,000 or less, were not employed, and had at least a high school education. Based on medical record data, an estimated 2.5% (SE = 0.33) of veterans who were not already enrolled in VA SUD treatment (in the 60-day washout period) had received VA SUD treatment in the year prior to being surveyed. Rates of identification of past-year clinical diagnoses were approximately 23.0% (SE = 0.89) for a mental health disorder, 20.6% (SE = 0.88) for a medical disorder, 15.6% (SE = 0.78) for an alcohol use disorder, and 3.4% (SE = 0.40) for a drug use disorder.

Table 2 provides descriptive statistics for those who received SUD treatment ($n = 320$) and for those who did not ($n = 9839$) in the year after completing the AUDIT-C. Among veterans with AUDIT-C scores of ≥ 8 , only 3.9% (SE = 0.42) received SUD treatment within VA in the year after being surveyed (not shown). Veterans who received SUD treatment were predominant within the age category of 45–65 years, and were underrepresented in the ≥ 65 age category. Black, not Hispanic and Hispanic veterans were overrepresented in the group that received SUD treatment, and white, not Hispanic veterans were underrepresented. Veterans who received treatment

Table 1
Descriptive statistics for VA ambulatory care patients endorsing AUDIT-C scores of ≥ 8 .

Characteristic	Weighted % (SE)
Age (years)	
19–44	6.8 (0.55)
45–64	62.8 (1.01)
≥ 65	30.4 (0.96)
Gender	
Male	98.3 (0.30)
Female	1.6 (0.30)
Race/ethnicity (excludes 75 cases with missing data)	
White, not Hispanic	74.9 (0.98)
Black, not Hispanic	13.0 (0.78)
Hispanic	8.2 (0.63)
Other	3.9 (0.42)
Marital status (excludes 142 cases with missing data)	
Not married	54.2 (1.06)
Married	45.8 (1.06)
Household income (excludes 396 cases with missing data)	
\$30,000 or less	77.9 (0.88)
Greater than \$30,000	22.0 (0.88)
Education (excludes 81 cases with missing data)	
Less than high school	15.8 (0.77)
High school or greater	84.3 (0.77)
Employment (excludes 72 cases with missing data)	
Unemployed	70.9 (0.95)
Employed	29.1 (0.95)
Received SUD treatment in the past year	
None	97.5 (0.33)
Received SUD tx	2.5 (0.33)
Alcohol use disorder diagnosis in the past year	
None	84.4 (0.78)
Alcohol dx	15.6 (0.78)
Drug use disorder diagnosis in the past year	
None	96.6 (0.40)
Drug dx	3.4 (0.40)
Mental health diagnosis in the past year	
None	77.0 (0.89)
MH dx	23.0 (0.89)
Charlson medical comorbidity index (past year)	
0 medical dx	79.4 (0.88)
≥ 1 medical dx	20.6 (0.88)

All table values are weighted column percentages (standard errors). Standard errors (SE) were calculated using a Taylor series linearization.

were more likely to be unmarried, to have a lower household income, to not be employed, and to have received SUD treatment in the past year. Additionally, they were more likely to have an identified past-year alcohol, drug, mental health, or medical diagnosis.

3.2. Veteran characteristics associated with the receipt of SUD treatment

Results from the adjusted logistic regression model are displayed in Table 3. Black, not Hispanic (OR = 3.36, CI = 1.79–6.30) and Hispanic veterans (OR = 3.35, CI = 1.43–7.83) were significantly more likely than white, not Hispanic veterans to receive treatment. Being employed (OR = 0.42, CI = 0.24–0.75) and having a household income above \$30,000 (OR = 0.26, CI = 0.12–0.56) were significantly associated with receiving SUD treatment. Gender, marital status, and education were not associated with SUD treatment in the adjusted model. The receipt of past-year SUD treatment (OR = 2.92, CI = 1.27–6.72), and the presence of a past-year AUD (OR = 2.15, CI = 1.43–3.23) or mental health disorder (OR = 3.50, CI = 2.44–5.01) were associated with SUD treatment, whereas past-year medical and drug disorders, and AUDIT-C scores were not.

4. Discussion

4.1. Reprise of findings

To our knowledge, this is the first study to describe the prevalence and correlates of specialty SUD treatment using guidelines for identifying individuals with elevated AUDIT-C scores within a healthcare system. Specifically, the current approach reflected the criterion set forth by VA treatment guidelines which recommend that clinicians offer specialty treatment referral to patients with AUDIT-C scores of ≥ 8 (The Management of Substance Use Disorders Working Group, 2009). Using a large and unique dataset, we found that about 4% of VA patients met this cutoff. Among these individuals with at-risk drinking, approximately 4% received SUD treatment in the year after being surveyed.

These findings are consistent with the alcohol epidemiology literature which describes that a substantial gap exists between individuals who could benefit from treatment and those who actually receive it (Cohen et al., 2007; Mojtabai, 2005; Regier et al., 1993; Wang et al., 2004). Another study (Booth et al., 2000) examined a sample of at-risk drinkers from the general population and found that the rates of one-year SUD treatment were approximately 7%. Although one-year SUD treatment rates in the current study (4%) were slightly lower, this may reflect that we did not measure SUD services received outside of the VA healthcare system.

While the one-year prevalence of SUD treatment in the current study may be considered low, it is important to note that non-specialty alcohol interventions are available in VA general healthcare settings. Prior studies have estimated that 56% of VA patients with AUDIT-C scores of ≥ 8 received some sort of advice about their drinking from a healthcare provider (Bradley et al., 2006). However, brief alcohol advice may be sufficient to reduce drinking-related problems for many individuals, but it is unlikely that it would be the optimal intervention for the majority of those with elevated AUDIT-C scores who did not receive specialty SUD treatment. Another consideration is that at the time of this study, some efforts existed within VA to embed alcohol specialists into general healthcare settings (Oslin et al., 2006).

It is important to recognize that our results do not provide a measure of how often providers offered specialty treatment referrals to patients with high alcohol consumption. Many patients may have been offered a referral but chose not to accept it, or encountered barriers that precluded visits to specialty care. Additionally, treatment providers may not have recognized the majority of at-risk drinkers in the current sample as having high alcohol consumption. Hawkins et al. (2007) estimated that less than one-third of patients endorsing scores of ≥ 8 on SHEP also reported this level of alcohol consumption to their providers. Similarly, we suspect that AUD remained unidentified for many individuals in this sample, as just 15.6% had an identified alcohol diagnosis. Based on diagnostic interviews, Rubinsky et al. (2010) demonstrated that the probability of alcohol dependence was 42–45% for men and women scoring 7–9, and 75–88% for those scoring 10–12 on the AUDIT-C. More work is certainly needed to increase the accuracy of routine alcohol screening and the identification of AUD in clinical practice.

4.2. Barriers to treatment

The current study found that having a higher household income was negatively associated with SUD treatment, which has been found in prior studies (Cohen et al., 2007). In our VA sample, this could reflect that the visit copayment structure in VA is based in part on income eligibility. This warrants further consideration, as even small copayments have been found to deter the initiation of mental health treatment (Simon et al., 1996).

Table 2
Characteristics of ambulatory care patients endorsing AUDIT-C scores of ≥ 8 by SUD treatment status.

	SUD treatment status in the year after being surveyed		F (ndf) ^c	p
	No SUD tx n = 9839 ^a Weighted % (SE) ^b	Received SUD tx n = 320 ^a Weighted % (SE) ^b		
Age (years)			14.5 (1.96)	<0.0001
19–44	6.8 (0.57)	6.9 (2.14)		
45–64	61.9 (1.04)	84.6 (3.39)		
≥ 65	31.3 (0.98)	8.4 (2.71)		
Gender			0.71 (1)	0.40
Male	98.4 (0.30)	97.2 (1.67)		
Female	1.6 (0.30)	2.8 (1.67)		
Race/ethnicity			7.4 (2.9)	<0.001
White, not Hispanic	75.7 (0.98)	53.0 (5.61)		
Black, not Hispanic	12.4 (0.78)	28.05 (5.20)		
Hispanic	8.0 (0.63)	14.2 (4.37)		
Other	3.9 (0.42)	4.8 (2.26)		
Marital status			11.6 (1)	<0.001
Not married	53.5 (1.08)	72.2 (4.85)		
Married	46.5 (1.08)	27.8 (4.85)		
Household income			21.5 (1)	<0.0001
\$30,000 or less	77.3 (0.91)	93.0 (2.03)		
Greater than \$30,000	22.7 (0.91)	7.0 (2.03)		
Education			0.0 (1)	0.94
Less than high school	15.7 (0.79)	16.1 (4.13)		
High school or greater	84.3 (0.79)	84.0 (4.13)		
Employment			17.5 (1)	<0.0001
Unemployed	70.2 (0.98)	87.2 (2.91)		
Employed	29.8 (0.98)	12.8 (2.91)		
Received SUD treatment in the past year			117.9 (1)	<0.0001
None	98.2 (0.29)	79.7 (4.26)		
Received SUD tx	1.8 (0.29)	20.3 (4.26)		
Alcohol use disorder diagnosis in the past year			81.4 (1)	<0.0001
None	85.8 (0.76)	48.8 (5.55)		
Alcohol dx	14.2 (0.76)	51.2 (5.55)		
Drug use disorder diagnosis in the past year			71.7 (1)	<0.0001
None	97.3 (0.35)	78.9 (4.86)		
Drug dx	2.7 (0.35)	21.1 (4.86)		
Mental health diagnosis in the past year			96.3 (1)	<0.0001
None	78.7 (0.88)	34.1 (5.02)		
MHdx	21.3 (0.88)	65.9 (5.02)		
Charlson medical comorbidity index (past year)			4.0 (1)	<0.05
0 medical dx	79.7 (0.90)	71.1 (4.74)		
≥ 1 medical dx	20.3 (0.90)	28.9 (4.74)		

^a All ns in column headers are expressed as unweighted values.^b All table values are weighted column percentages (standard errors).^c Design-based F test statistics are displayed with numerator degrees of freedom (ndf). Pairwise deletion was used for missing cases (n for missing data are noted in Table 1).

SUD services are available to all veterans who enroll in VA, thus one might expect that barriers to access would be experienced similarly by all enrollees regardless of their racial/ethnic group. In the current study, Hispanic and black individuals were significantly more likely than whites to receive treatment in an adjusted analysis. Although a barrier-free system would not necessarily result in a greater use of services by racial/ethnic minorities as compared to whites, additional factors may drive these findings. For example, the cultural reactions to alcohol problems differ across racial/ethnic groups, with prior studies finding greater levels of social support for sobriety among black patients (Brower and Carey, 2003), and greater levels of social disadvantage related to alcohol misuse among African Americans and Hispanics as compared to whites (Mulia et al., 2009).

4.3. Illness and severity factors

The presence of AUD was associated with an increased likelihood of receiving SUD treatment. This finding is consistent with a

prior study (Booth et al., 2000) involving participants who were at or below a threshold for AUD. Meeting criteria for AUD conceptually reflects a higher problem severity, as well as it is perhaps a clear indicator of treatment need that is acknowledged by clinicians and insurers. Also consistent with existing literature (Booth et al., 2000; Grant, 1996), past-year SUD treatment was related to receiving SUD treatment in the year after being surveyed. It is not known whether these associations reflect a patient's greater recognition of treatment need, a preference to seek help externally, a local treatment system better designed to identify and treat at-risk patients, or if it simply reflects a higher problem severity. For providers, it may be safe to assume that AUD and/or past-year SUD treatment would indicate a higher alcohol problem severity for which SUD treatment is indicated (Bradley et al., 2004; U.S. Preventative Services Task Force, 2004).

While a past-year medical disorder and drug use disorder were related to SUD treatment in unadjusted analyses, these associations were attenuated in the adjusted model. These findings were not completely surprising. The current sample was predefined

Table 3
Logistic regression showing the association between patient factors and the receipt of SUD treatment within one year for patients with AUDIT-C scores of ≥ 8 .

	n = 9564		
	OR	SE	95% CI
Age group			
19–44 (reference)	1.00		–
45–64	1.46	0.61	0.65–3.31
≥ 65	0.49	0.26	0.17–1.41
Gender			
Male (reference)	1.00		–
Female	0.76	0.64	0.15–3.92
Race and ethnicity			
White, not Hispanic (reference)	1.00		–
Black, not Hispanic	3.36^{***}	1.08	1.79–6.30
Hispanic	3.35^{**}	1.45	1.43–7.83
Other	1.34	0.79	0.42–4.26
Marital status			
Not married (reference)	1.00		–
Married	0.70	0.19	0.41–1.19
Household income			
$\leq \$30,000$ (reference)	1.00		–
$> \$30,000$	0.26^{**}	0.10	0.12–0.56
Education			
Less than high school (reference)	1.00		–
HS or greater	0.80	0.27	0.41–1.56
Employment			
Unemployed (reference)	1.00		–
Employed	0.42^{**}	0.12	0.24–0.75
Received SUD treatment in the past year			
None (reference)	1.00		–
Received SUD tx	2.92[*]	1.24	1.27–6.72
Alcohol use disorder diagnosis in the past year			
None (reference)	1.00		–
Alcohol dx	2.18[*]	0.66	1.21–3.93
Drug use disorder diagnosis in the past year			
None (reference)	1.00		–
Drug dx	1.78	0.74	0.79–4.00
Mental health diagnosis in the past year			
None (reference)	1.00		–
MH dx	3.82^{***}	1.27	2.00–7.33
Medical diagnosis in the past year			
None (reference)	1.00		–
Medical dx	0.64	0.20	0.35–1.17
AUDIT-C score (8–12)	1.13	0.10	0.96–1.34
Model statistics	$F(16, 242,090) = 13.2; p < 0.0001$		

OR, odds ratio. All values in bold are statistically significant based on a confidence interval (CI) that does not include 1.0. Standard errors (SE) were calculated using a Taylor series linearization.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

specifically by alcohol risk, and the adjusted model included factors that could indicate a higher alcohol severity (i.e. past-year SUD treatment and AUD) which may be more central to decisions to seek treatment. Additionally, AUDIT-C scores were not significant in the adjusted model, which may reflect that the scores were limited to a restricted range of 8–12. Perhaps a more heterogeneous sample would have yielded different findings for these variables.

It should be noted that we conducted subgroup analyses with our sample to determine the rates of SUD treatment for patients with past-year clinical diagnoses. We found that the effects of having past-year comorbid mental health, drug, and alcohol disorders appeared to be additive. Specifically, 12.7% (SE = 1.83) with

AUD; 23.9% (SE = 5.40) with a drug diagnosis; 11.1% (SE = 1.48) with a mental health diagnosis; and 31.1% (SE = 7.50) with all three (drug, AUD, and mental health diagnoses) received treatment. This relatively high rate of SUD treatment may be attributed to VA's systematic screening and performance measurement for alcohol misuse and mental health problems (Bradley et al., 2007; Kerr and Fleming, 2007).

4.4. Limitations

The use of SHEP was a significant advantage because it provided population-representative data on alcohol consumption and sociodemographic characteristics (Dobscha et al., 2009; Wright et al., 2006). Its ability to be linked to administrative data may offer an important contribution given that many population-representative studies rely solely on self-report data to measure the receipt of SUD treatment. Response bias may have affected the results of the study, particularly if non-response was associated with alcohol consumption levels or the receipt of SUD treatment. Perhaps the use of the weighting variable that adjusted for the basic demographic characteristics of non-responders helped address this limitation. It should also be noted that 7.4% of respondents had missing data on AUDIT-C scores. Another limitation of this study is the diagnosis variables were those identified by clinicians and documented in the medical record. Other conditions may have existed but were unidentified or undocumented. Also, general medical comorbidity was used rather than adjusting for alcohol-specific diagnoses such as liver disease. We note that even with a 60-day washout period, almost one fifth of those who received treatment in the year after being surveyed also had treatment in the prior year. For this subset of individuals who were recently engaged at some level in the treatment system, our outcome variable reflects a readmission to treatment rather than new admission. AUD is conceptualized as a chronic disease, thus the concept of discrete treatment episodes may be less useful. Additionally, the AUDIT-C assesses past-year drinking, and it is possible that some patients stopped drinking shortly before or after the survey. SUD treatment may not be indicated for these patients. Of note, the data in the current study were from 2005, and since then VA implemented a national performance measure for brief alcohol counseling. Last, while all patients had at-risk drinking, some may have initiated SUD treatment to address drug problems.

4.5. Conclusions and implications

While brief interventions offer a cost-effective way to manage alcohol problems (Fleming et al., 2000), specialty SUD treatment should be considered for those with elevated alcohol consumption levels considering the high prevalence of mental health and medical problems among these patients. As well, most patients were not employed, had a household income of \$30,000 or less, and were unmarried. In combination, these sociodemographic and clinical factors could reflect a substantial degree of psychosocial and clinical vulnerability for a given patient, which may be better addressed in specialty settings of care where comprehensive psychosocial treatments are available to address life-context issues that complicate the recovery from alcohol problems (Department of Veterans Affairs, 2008; Finney et al., 2007).

VA's system of care has changed to a great extent in the past decade, which includes initiatives to provide screening, brief alcohol counseling, and integrated SUD specialists in primary healthcare settings at all major VA hospitals and larger community clinics (Department of Veterans Affairs, 2008). Future research is needed to determine the extent to which alcohol treatment services are received across all available settings of care in VA.

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Contributors

Mr. Glass conceptualized the study's design, conducted statistical analyses, and prepared drafts of the manuscript. Drs. Perron and Ilgen helped conceptualize the study's design, interpreted results, and provided feedback on drafts of the manuscript. Dr. Chermack provided consultation and feedback on drafts of the manuscript. Mr. Ratliff prepared all data and gave feedback on drafts of the manuscript. Dr. Zivin provided consultation on the data source, study design, and edited drafts on the manuscript.

Conflicts of interest

All authors declare that they have no conflicts of interest.

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References

Booth, B.M., Kirchner, J., Fortney, J., Ross, R., Rost, K., 2000. Rural at-risk drinkers: correlates and one-year use of alcoholism treatment services. *J. Stud. Alcohol* 61, 267–277.

Bradley, K.A., Kivlahan, D.R., Zhou, X.H., Sporleder, J.L., Epler, A.J., McCormick, K.A., Merrill, J.O., McDonell, M.B., Fihn, S.D., 2004. Using alcohol screening results and treatment history to assess the severity of at-risk drinking in Veterans Affairs primary care patients. *Alcohol. Clin. Exp. Res.* 28, 448–455.

Bradley, K.A., Williams, E.C., Achtmeyer, C.E., Hawkins, E.J., Harris, A.H., Frey, M.S., Craig, T., Kivlahan, D.R., 2007. Measuring performance of brief alcohol counseling in medical settings: a review of the options and lessons from the Veterans Affairs (VA) health care system. *Subst. Abuse* 28, 133–149.

Bradley, K.A., Williams, E.C., Achtmeyer, C.E., Volpp, B., Collins, B.J., Kivlahan, D.R., 2006. Implementation of evidence-based alcohol screening in the Veterans Health Administration. *Am. J. Manag. Care* 12, 597–606.

Brower, K.J., Carey, T.L., 2003. Racially related health disparities and alcoholism treatment outcomes. *Alcohol. Clin. Exp. Res.* 27, 1365–1367.

Bush, K., Kivlahan, D.R., McDonell, M.B., Fihn, S.D., Bradley, K.A., 1998. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch. Intern. Med.* 158, 1789–1795.

Charlson, M.E., Pompei, P., Ales, K.L., MacKenzie, C.R., 1987. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J. Chron. Dis.* 40, 373–383.

Cohen, E., Feinn, R., Arias, A., Kranzler, H.R., 2007. Alcohol treatment utilization: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Drug Alcohol Depend.* 86, 214–221.

Dalton, A., McKellar, J.D., 2007. Health Services for VA Substance Use Disorder Patients: Comparison of Utilization in Fiscal Years 2006, 2005 and 2002. Program Evaluation and Resource Center, Palo Alto, CA.

Department of Veterans Affairs, 2008. Uniform Mental Health Services in VA Medical Centers and Clinics. Veterans Health Administration, Washington, DC.

Dobscha, S.K., Dickinson, K.C., Lasarev, M.R., Lee, E.S., 2009. Associations between race and ethnicity and receipt of advice about alcohol use in the Department of Veterans Affairs. *Psychiatr. Serv.* 60, 663–670.

Finney, J.W., Wilbourne, P.L., Moos, R.H., 2007. Psychosocial treatments for substance use disorders. In: Nathan, P.E., Gorman, J.M. (Eds.), *A Guide to Treatments that Work*. Oxford University Press, New York, pp. 179–202.

Fleming, M.F., Mundt, M.P., French, M.T., Manwell, L.B., Stauffacher, E.A., Barry, K.L., 2000. Benefit–cost analysis of brief physician advice with problem drinkers in primary care settings. *Med. Care* 38, 7–18.

Garnick, D.W., Horgan, C.M., Chalk, M., 2006. Performance measures for alcohol and other drug services. *Alcohol Res. Health* 29, 19–26.

Grant, B.F., 1996. Toward an alcohol treatment model: a comparison of treated and untreated respondents with DSM-IV alcohol use disorders in the general population. *Alcohol. Clin. Exp. Res.* 20, 372–378.

Hawkins, E.J., Kivlahan, D.R., Williams, E.C., Wright, S.M., Craig, T., Bradley, K.A., 2007. Examining quality issues in alcohol misuse screening. *Subst. Abuse* 28, 53–65.

Kahwati, L.C., Elter, J.R., Straits-Troster, K.A., Kinsinger, L.S., Davey, V.J., 2007. The impact of the 2004–2005 influenza vaccine shortage in the Veterans Health Administration. *J. Gen. Intern. Med.* 22, 1132–1138.

Kerr, E.A., Fleming, B., 2007. Making performance indicators work: experiences of US Veterans Health Administration. *Br. Med. J.* 335, 971–973.

Mojtabai, R., 2005. Use of specialty substance abuse and mental health services in adults with substance use disorders in the community. *Drug Alcohol Depend.* 78, 345–354.

Mulia, N., Ye, Y., Greenfield, T.K., Zemore, S.E., 2009. Disparities in alcohol-related problems among White, Black, and Hispanic Americans. *Alcohol. Clin. Exp. Res.*

Oslin, D.W., Ross, J., Sayers, S., Murphy, J., Kane, V., Katz, I.R., 2006. Screening, assessment, and management of depression in VA primary care clinics. The Behavioral Health Laboratory. *J. Gen. Intern. Med.* 21, 46–50.

Regier, D.A., Narrow, W.E., Rae, D.S., Manderscheid, R.W., Locke, B.Z., Goodwin, F.K., 1993. The de facto US mental and addictive disorders service system. Epidemiologic catchment area prospective 1-year prevalence rates of disorders and services. *Arch. Gen. Psychiatry* 50, 85–94.

Rubinsky, A.D., Kivlahan, D.R., Volk, R.J., Maynard, C., Bradley, K.A., 2010. Estimating risk of alcohol dependence using alcohol screening scores. *Drug Alcohol Depend.* 108, 29–36.

Simon, G.E., Grothaus, L., Durham, M.L., VonKorff, M., Pabiniak, C., 1996. Impact of visit copayments on outpatient mental health utilization by members of a health maintenance organization. *Am. J. Psychiatry* 153, 331–338.

StataCorp LP, 2007. Stata Statistical Software: Release 10, College Station, TX.

Substance Abuse and Mental Health Services Administration, 2008. Results from the 2007 National Survey on Drug Use and Health (NSDUH): National Findings. NSDUH Series H-34, Department of Health and Human Services Publication No. SMA 08-4343, Office of Applied Studies, Rockville, MD.

The Management of Substance Use Disorders Working Group, 2009. VA/DoD Clinical Practice Guideline for the Management of Substance Use Disorders. Department of Veterans Affairs/The Department of Defense, Washington, DC.

U.S. Preventative Services Task Force, 2004. Screening and behavioral counseling interventions in primary care to reduce alcohol misuse: recommendation statement. *Ann. Intern. Med.* 140, 554–556.

Valenstein, M., McCarthy, J.F., Ignacio, R.V., Dalack, G.W., Stavenger, T., Blow, F.C., 2006. Patient- and facility-level factors associated with diffusion of a new antipsychotic in the VA health system. *Psychiatr. Serv.* 57, 70–76.

Wang, P.S., Berglund, P.A., Olfson, M., Kessler, R.C., 2004. Delays in initial treatment contact after first onset of a mental disorder. *Health Serv. Res.* 39, 393–415.

Wright, S.M., Craig, T., Campbell, S., Schaefer, J., Humble, C., 2006. Patient satisfaction of female and male users of Veterans Health Administration services. *J. Gen. Intern. Med.* 21 (Suppl. 3), S26–S32.