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Association between Alcohol Screening Scores and Mortality in Black, Hispanic, and White Male Veterans

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Abstract

Background—AUDIT-C alcohol screening scores are associated with mortality, but whether or how associations vary across race/ethnicity is unknown.

Methods—Self-reported black (n=13,068), Hispanic (n=9,466), and white (n=182,688) male VA outpatients completed the AUDIT-C via mailed survey. Logistic regression models evaluated whether race/ethnicity modified the association between AUDIT-C scores (0, 1–4, 5–8, and 9–12) and mortality after 24 months, adjusting for demographics, smoking, and comorbidity.

Results—Adjusted mortality rates were 0.036, 0.033, and 0.054, for black, Hispanic, and white patients with AUDIT-C scores of 1–4, respectively. Race/ethnicity modified the association between AUDIT-C scores and mortality (p=0.0022). Hispanic and white patients with scores of 0, 5–8, and 9–12 had significantly increased risk of death compared to those with scores of 1–4; Hispanic ORs: 1.93, 95% CI 1.50–2.49; 1.57, 1.07–2.30; 1.82, 1.04–3.17, respectively; white ORs: 1.34, 95% CI 1.29–1.40; 1.12, 1.03–1.21; 1.81, 1.59–2.07, respectively. Black patients with scores of 0 and 5–8 had increased risk relative to scores of 1–4 (ORs 1.28, 1.06–1.56 and 1.50, 1.13–1.99), but there was no significant increased risk for scores of 9–12 (ORs 1.27, 0.77–2.09). Post-hoc exploratory analyses suggested an interaction between smoking and AUDIT-C scores might account for some of the observed differences across race/ethnicity.

Conclusions—Among male VA outpatients, associations between alcohol screening scores and mortality varied significantly depending on race/ethnicity. Findings could be integrated into systems with automated risk calculators to provide demographically-tailored feedback regarding medical consequences of drinking.

Keywords

alcohol; race; ethnicity; mortality; AUDIT-C

INTRODUCTION

Alcohol misuse, representing a spectrum from drinking above recommended limits to meeting diagnostic criteria for alcohol dependence (Whitlock et al., 2004), is prevalent and associated with considerable morbidity and mortality (Room et al., 2005). Routine alcohol screening coupled with brief alcohol counseling for patients who screen positive for alcohol misuse is effective for reducing drinking (Kaner et al., 2007), recommended as standard practice (U.S. Preventive Services Task Force, 2004), and has been deemed the 3rd highest prevention priority for U.S. adults (Solberg et al., 2008). However, implementing brief alcohol counseling into routine care is challenging (Johnson et al., 2011; Williams et al., 2011), and a number of barriers to addressing alcohol use in primary care have been identified (Aira et al., 2003; Beich et al., 2002; Thom and Tellez, 1986).

One important barrier is the lack of clinically accessible information on risk. Despite a large body of epidemiologic evidence on associations between alcohol use and adverse medical outcomes (Room et al., 2005) and mortality (Gronbaek et al., 1995; Kerr et al., 2011; Klatsky et al., 2003; Rehm J et al., 2001; Rehm and Sempos, 1995; Theobald et al., 2001; Thun et al., 1997), less is known about the clinical utility of brief alcohol screening questionnaires for assessing alcohol-related risk.. Recent research has demonstrated that scores on a brief 3-item alcohol screening instrument are associated with a number of medical outcomes including medication adherence; fractures; subsequent hospitalizations for trauma, liver disease, upper gastrointestinal bleeding, and pancreatitis; and mortality (Au et al., 2007; Bradley et al., 2001; Bryson et al., 2008; Greene et al., 2008; Harris et al., 2010; Harris et al., 2009; Kinder et al., 2009; Lembke et al., 2011; Williams et al., 2012). This line of research suggests that alcohol screening scores obtained routinely in primary care as opposed to more detailed measures of alcohol consumption may serve as a scaled marker of alcohol-related risk, and thus could be used by clinicians in the course of routine care to help patients recognize their alcohol-related risks. Such feedback on risk is a key component of evidence-based alcohol counseling interventions (Bradley et al., 2009).

However, previous epidemiologic studies have found variation in associations between alcohol use and medical outcomes across racial/ethnic groups (Caetano, 2003), as well as variation in alcohol-related mortality across race/ethnicity (Gilliland et al., 1995; Kerr et al., 2011; Stahre and Simon, 2010). Further, one previous study found that, among patients with the same alcohol screening scores, black patients reported poorer health status than white or other race patients (Williams et al., 2010). Therefore, it is possible that associations between alcohol screening scores and medical outcomes vary based on race/ethnicity and that a population-based approach to providing personalized alcohol-related feedback may not work equitably across sub-populations of primary care patients. Previous studies of associations between alcohol screening scores and medical outcomes were conducted in samples where the majority of patients reported white race/ethnicity, and the sample sizes of patients reporting other race/ethnicities were too low for adequately powered stratified analyses (Au et al., 2007; Bradley et al., 2001; Bryson et al., 2008; Greene et al., 2008; Harris et al., 2010; Harris et al., 2009; Kinder et al., 2009; Lembke et al., 2011; Williams et al., 2012). Therefore, it is unknown whether risks associated with alcohol screening scores vary by race/ethnicity. In this study, we sought to evaluate whether the clinical utility of scores on a brief alcohol screening questionnaire for predicting mortality varies based on race/ethnicity, and to describe racial/ethnic-specific associations between alcohol screening scores and mortality, among a large sample of Veterans Affairs (VA) outpatients who responded to mailed patient satisfaction surveys and self-reported Hispanic ethnicity or black or white race.

METHODS

Study Sample and Data Sources

This study makes use of data collected by the VA Office of Quality and Performance (OQP) for quality improvement purposes. The study sample is comprised of VA outpatients who responded to OQP's mailed patient satisfaction survey, the Survey of Health Experiences of Patients (SHEP), in 2004 and 2005. Each month during 2004 and 2005, the VA OQP mailed SHEP to a random sample of approximately 29,000 patients who had a VA clinic visit in the previous month. All patients who received ambulatory care in 2004 and 2005 and who had not been selected for participation in a SHEP survey in the past 12 months were eligible for SHEP. During 2004 and 2005, the total number of distinct patients seen in the VA was 5,717,528, of whom 5,707,639 received ambulatory care, including visits to outpatient mental health clinics. Among those receiving outpatient care, 696,384 were randomly sampled by SHEP and 452,244 (64.9%) responded.

For this study, SHEP data were merged with diagnostic data from the VA's National Patient Care Databases (NPCD) and the VA's Vital Status File. Patients included in this study were male SHEP respondents who completed alcohol screening questions and were followed via clinical and administrative data for at least 24 months. Women were not included in the present study because of small proportions of black and Hispanic women in the VA. This study was approved by the Institutional Review Boards of VA Puget Sound and Stanford University.

Measures

Alcohol Screening Scores—The 2004 and 2005 SHEP surveys included the 3-item Alcohol Use Disorders Identification Test Consumption (AUDIT-C) questionnaire, which assesses quantity and frequency of average drinking and the frequency of heavy episodic drinking and has been validated as a brief alcohol screening questionnaire for the spectrum of alcohol misuse in male Veteran outpatients (Bush et al., 1998). AUDIT-C scores range from 0–12 with higher scores representing greater severity of alcohol misuse (Bradley et al., 2004; Rubinsky et al., 2010). For the present study, AUDIT-C scores were categorized into 0, 1–4, 5–8, and 9–12, corresponding to non-drinkers, low-level drinkers, and patients with mild-moderate, and severe alcohol misuse, respectively. Although a cut-point of 4 best balances sensitivity and specificity in male Veteran outpatients (Bush et al., 1998), categories were derived to be consistent with the VA performance measure for brief alcohol counseling, which expects that patients who screen positive with scores of 5 or more are offered advice and feedback linking alcohol use to health (Lapham et al., 2010).

Mortality—Vital status and date of death, but not cause of death, were available from the VA's Vital Status File, which includes data from multiple sources (the Beneficiary Identification Records Locator Subsystem Death File, the Social Security Administration Death Master File, the Medicare Vital Status File, and the VA Medical SAS Inpatient Datasets) and has high correspondence to death ascertainment with the National Death File ($\kappa=98.1$) (Arnold et al., 2006).

Race/ethnicity—Both ethnicity and race were self-reported via survey and categorized into black, Hispanic, and white race/ethnicity such that those with Hispanic ethnicity were categorized as Hispanic irrespective of whether they also reported black or white race.

Other measures included age at the time of survey, as well as self-reported: education (less than high school, high school graduate, college graduate), income (< \$15,000/year vs. ≥ \$15,000/year), occupational status (employed vs. other), marital status (married or not), past

year depression, and smoking status (never, over 5 years ago, 1–5 years ago, and current past-year smoker). Finally, the Deyo Score (Deyo et al., 1992) was used as a measure of physical illness and was constructed from the VA's NPCD by counting the number of past-year inpatient and outpatient International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnostic codes for myocardial infarction, congestive heart failure, cerebrovascular disease, dementia, chronic pulmonary diseases, rheumatologic diseases, peptic ulcer disease, liver diseases, diabetes, hemiplegia, paraplegia, renal disease, malignancies, and HIV/AIDS. These covariates are consistent with previous studies (Harris et al., 2010) and were selected based on the potential for these factors to confound the association between alcohol screening scores and mortality.

Analyses

The study sample was described, and chi square tests were used to identify whether there were differences across racial/ethnic groups in patients' demographic or clinical characteristics. Remaining analyses were completed using logistic regression. Although survival analysis methodology is often used to assess risk of death over time, this methodology was not used in the present study because preliminary analyses for the parent study (Harris et al., 2010), which assessed the proportional hazards assumption both graphically and via testing Schoenfeld residuals, found the assumption not to be satisfied. Patients with AUDIT-C scores of 1–4 comprised the reference group in all models because previous studies have shown that low-level drinkers have lower risk of mortality than non-drinkers (Bradley et al., 2001; Harris et al., 2010; Kinder et al., 2009).

A logistic regression model adjusted for age, education, marital status, smoking status, physical illness and depression was fit to assess the association between AUDIT-C scores and all-cause mortality. Covariates were chosen for consistency with previous analyses of associations between AUDIT-C scores and medical outcomes and mortality (Harris et al., 2010; Lembke et al., 2011) and in order to limit response bias due to missing data. Post-estimation predicted probabilities of death were obtained from results of this model and used to calculate the mean probability of death (i.e., the adjusted mortality rate) for patients with AUDIT-C scores of 1–4, overall and within each racial/ethnic group.

Subsequently, a multiplicative interaction term between race/ethnicity and AUDIT-C categories was included in the model to assess whether the association between AUDIT-C scores and all-cause mortality varied by race/ethnicity. Upon finding a significant interaction, stratified logistic regression models were fit to identify associations between AUDIT-C categories and all-cause mortality for black, Hispanic, and white VA outpatients separately. Whereas race-specific odds ratios could have been obtained from the integrated model containing the interaction term for race by AUDIT-C score, stratified models were fit because they accounted for any race specificity in the associations between the model covariates and mortality, because they facilitated interpretable estimation of the confidence intervals, and because the sample size was large enough that separate models did not lead to significant loss of power. A final adjusted logistic regression model, including the interaction term, was fit to compare risk of death between each racial/ethnic group *within* each AUDIT-C category.

Finally, secondary sensitivity analyses were also completed, which repeated main analyses but also included adjustment for other measures of socio-economic status (SES), including income and occupational status because SES often accounts in part for racial/ethnic differences in health (Dressler et al., 2005). Although income and occupational status were omitted from main models for the reasons described above, they were available for a majority of the sample (n=192,567; 94%). All analyses were conducted using SAS statistical software.

RESULTS

A total of 205,222 male VA outpatients responded to alcohol screening questions on mailed surveys (SHEP), reported white or black race and/or Hispanic ethnicity, and had administrative data 24 months later. The majority of patients were 60 years or older, white, married, and high school graduates, though patient characteristics varied significantly across race/ethnicity (Table 1).

In main analyses, 13,099 patients died during the follow-up period, including 681 black, 420 Hispanic, and 11,998 white patients. The overall adjusted mortality rate for patients with AUDIT-C scores of 1–4 (reference group) was 0.052, with adjusted mortality rates of 0.036, 0.033, and 0.054, for black, Hispanic, and white patients, respectively (Table 2). Among all patients, risk of death was increased for patients with AUDIT-C scores of 0, 5–8, and 9–12 compared to patients with scores of 1–4 (Table 2).

The association between AUDIT-C categories and mortality varied significantly based on race/ethnicity ($p = 0.0022$). In stratified analyses, Hispanic and white patients with scores of 0, 5–8, and 9–12 were at significantly increased risk compared to those with scores of 1–4 (Table 2). For black patients, risk of death was increased for patients with scores of 0 and 5–8 compared with patients with scores of 1–4, but there was no significant increase in risk for black patients with scores of 9–12 (Table 2).

Among all patients with AUDIT-C scores of 0, risk of death was significantly higher for Hispanic than black or white patients (Table 2). Within AUDIT-C scores of 5–8, risk of death was significantly higher for black than white patients, and trended toward higher for Hispanic than white patients (Table 2). No other significant differences across race/ethnicity were observed within AUDIT-C categories (Table 2).

Secondary sensitivity analyses, including adjustment for income and occupational status, resulted in similar but slightly attenuated estimates relative to main analyses (Appendix 1). Finally, based on the high prevalence of current smoking among black patients (Tables 1 and 3a) and the unexpected finding that black patients with AUDIT-C scores of 9–12 were not at increased risk of death compared to those with scores 1–4, main analyses were repeated stratified by smoking status. Among Hispanic and white patients, both never/former and current smokers with AUDIT-C scores of 0, 5–8, and 9–12 were at significantly increased risk of death compared to those with scores of 1–4, though the association was weaker among current smokers (Table 3b). For black patients who were never/former smokers, those with AUDIT-C scores of 0, 5–8, and 9–12 had significantly increased risk of death compared to those with scores of 1–4 (Table 3b). However, among black current smokers, risk of death was increased for those with AUDIT-C scores of 5–8, but not 0 or 9–12, compared with those with scores of 1–4 (Table 3b).

DISCUSSION

In this study of over 200,000 male VA outpatients who self-reported black, Hispanic, or white race/ethnicity, associations between alcohol screening scores and all-cause mortality varied significantly depending on race/ethnicity. In stratified analyses, non-drinkers and patients with mild-moderate alcohol misuse were at increased risk of death for all racial/ethnic groups. However, black patients with severe alcohol misuse (AUDIT-C 9–12) were not at elevated risk of death compared with black patients with low-level drinking (AUDIT-C scores 1–4), whereas white and Hispanic patients were. Exploratory secondary analyses suggested that differences in the prevalence of current smoking across racial/ethnic groups, combined with an interaction between smoking and alcohol screening scores, might account for this unexpected finding.

It is recommended that all patients who screen positive for alcohol misuse receive feedback relating their alcohol use to their health (National Institute on Alcohol Abuse and Alcoholism, 2007; Whitlock et al., 2004). Therefore, the risks of mortality associated with increasing alcohol screening scores should be conveyed to patients of all races/ethnicities who screen positive for alcohol misuse during brief alcohol counseling interventions. However, in healthcare systems that have automated feedback tools or risk calculators, data from studies such as this could be integrated to provide feedback regarding the health risks associated with drinking tailored by race/ethnicity. Furthermore, results from secondary exploratory analyses in the present study suggest that mortality risk associated with alcohol screening scores varies based on smoking status. Although this finding merits exploration that was beyond the scope of the present study, risk calculators may also be useful for synthesizing risk information for patients with competing risk behaviors.

Associations between alcohol screening scores and mortality observed in the present study were largely consistent with results of previous studies, including large scale epidemiological studies that used non-clinical measures of alcohol consumption (Gronbaek et al., 1995; Kerr et al., 2011; Klatsky et al., 2003; Rehm J et al., 2001; Rehm and Semplos, 1995; Theobald et al., 2001; Thun et al., 1997), and health services studies using alcohol screening scores (Bradley et al., 2001; Bridevaux et al., 2004; Conigrave et al., 1995; Harris et al., 2010; Kinder et al., 2009; Williams et al., 1988). Specifically, in all three racial/ethnic groups there was a U-shaped association between alcohol screening scores and risk of death.

However, only Hispanic and white patients with severe alcohol misuse were at significantly increased risk of death compared to low-level drinkers in main analyses. This finding is surprising and should be interpreted cautiously. Secondary exploratory analyses identified weaker associations between alcohol screening scores and mortality among current smokers than among never/former smokers of all racial/ethnic groups. These results suggest that the high prevalence of current smoking among black patients, and a different association between alcohol screening results and mortality in smokers and non-smokers in this study, may have accounted for the non-significant association between AUDIT-C scores 9–12 and mortality among black patients. However, there are several other possible explanations for these surprising findings. First, black patients with severe alcohol misuse may under-report their drinking, which would misclassify patients with severe misuse into less severe categories. One previous study of individuals with alcohol use disorders found that black respondents had significantly higher perceived stigma of alcoholism than non-Hispanic white respondents (Keyes et al., 2010). Therefore, it is possible that black patients would be more likely than white to under-report their drinking. Because a previous study found that alcohol content per standard drink reported varies based on race/ethnicity, such that black men had the largest overall mean drink alcohol content, it is similarly possible that larger drink sizes per drink reported could contribute to misclassification of black patients in the mild-moderate, as opposed to severe, alcohol misuse group (Kerr et al., 2009). Although, in the present study, black patients did not have a disproportionately high proportion of mild-moderate alcohol misuse, nor a disproportionately low proportion of severe alcohol misuse relative to the other two racial/ethnic groups, we did identify a stronger association with mortality among black than white men in the mild-moderate alcohol misuse group. However, after more comprehensive adjustment for SES, the associations between mild-moderate alcohol misuse and mortality did not differ between black and white patients. Second, there may have been inadequate power to detect an association given the relatively small number of black patients with very severe alcohol misuse (AUDIT-C scores 9–12). Although the number of patients in this group was similar to the number of Hispanic patients with very severe alcohol misuse, the association between AUDIT-C scores of 9–12 and mortality may be stronger among Hispanic than black patients. Finally, important unmeasured confounders could vary across racial/ethnic groups and obscure an association

between severe alcohol misuse and mortality in black patients. Specifically, SES and health risk behaviors often account at least in part for racial/ethnic differences in health (Dressler et al., 2005), and those available in the secondary dataset used for this study may not have fully captured these constructs. Future research is needed to understand why black patients who report drinking at levels known to be associated with a high probability of alcohol dependence (Rubinsky et al., 2010) were not at increased risk of death compared to low-level drinkers in this study.

Consistent with the present study, previous research has identified variation in associations between alcohol use and medical outcomes based on race/ethnicity (Caetano, 2003), as well as variation in alcohol-related mortality across race/ethnicity (Gilliland et al., 1995; Kerr et al., 2011; Stahre and Simon, 2010). However, in contrast to previous investigations of racial/ethnic differences in associations between alcohol use and mortality, the present study was focused on the utility of AUDIT-C scores for predicting subsequent mortality. The AUDIT-C is an easily-administrable 3-item instrument that is increasingly being used in clinical care. The AUDIT-C assesses several dimensions of alcohol misuse, including heavy episodic drinking, which is a strong predictor of alcohol-related harm (Dawson et al., 2011; Greenfield and Kerr, 2008). Although substantial literature suggests that AUDIT-C scores have utility as a scaled marker of medical and surgical risk and mortality (Au et al., 2007; Bradley et al., 2001; Bryson et al., 2008; Greene et al., 2008; Harris et al., 2010; Harris et al., 2009; Kinder et al., 2009; Lembke et al., 2011; Williams et al., 2012), previous investigations of the clinical utility of the AUDIT-C score have not provided adequate numbers of black and Hispanic men to evaluate whether associations between alcohol screening scores and outcomes vary across race/ethnicity. This study is the first to our knowledge to explicitly investigate whether associations between AUDIT-C scores and risk of death vary based on race/ethnicity.

However, this study also has important limitations. First, results may be limited by response bias. Because administrative data on race and ethnicity is limited in the VA (Kressin et al., 2003), the extent to which there is response bias to the VA's patient satisfaction survey based on race/ethnicity is unknown and could not be evaluated in this study of completed surveys. However, an analysis of response rates to the Consumer Assessment of Health Plans Study survey found lower response rates among non-white beneficiaries (Zaslavsky et al., 2002), which could also be true in the VA. Further, previous research has found that VA outpatients who respond to surveys are older, have a higher prevalence of chronic conditions, and are less likely to drink heavily than non-respondents, whereby the latter two differences are likely accounted for by the first (Au et al., 2001; Bradley et al., 1998; Williams et al., 2006). This response bias would decrease likelihood of observing preventable mortality (e.g., mortality that occurred as a result of trauma or injury, which is more common among younger men) (Coronado et al., 2011; Karch et al., 2008; Sauaia et al., 1995). Because rates of traumatic injury have been found to be more common among black and Hispanic than white men (Cubbin et al., 2000; Karch et al., 2010; Karch et al., 2008), trauma could account for differences in mortality across racial/ethnic groups. Unfortunately, cause-specific data on mortality were unavailable in the present study. Response bias could also account for the lower adjusted mortality rate among black patients with low-level drinking compared with Hispanic and white patients with low-level drinking. Two previous studies among Veterans have identified lower rates of mortality among black than white patients (Polsky et al., 2007; Sarrazin et al., 2009), one of which found specifically that, while mortality rates were similar across race for patients under 65, black patients 65 and older had significantly decreased odds of 30-day mortality compared with white patients in the same age category (Polsky et al., 2007). However, this atypical finding is not consistent across condition-specific cohorts (Choi et al., 2009; Ellis et al., 2009). Results of this study also may have limited generalizability to other outpatient populations or to female Veterans.

In particular, risk of mortality associated with the highest AUDIT-C scores appears greater for women than for men (Harris et al., 2010), and this association may also vary by race/ethnicity. Use of alcohol screening data collected via survey may also limit the extent to which the associations obtained in the study generalize to screening scores obtained during a medical visit, in which the quality of screening may be compromised (Bradley et al., 2011). The focus on investigating the AUDIT-C, a practical clinical screen, across race/ethnicity also limits the epidemiologic scope of the study in several ways. Specifically, because the AUDIT-C score was the independent variable of interest, investigation into patterns of drinking was beyond the scope of the study. Further, because the AUDIT-C is a clinical measure with a past-year focus, it has no ability to separate former drinkers from lifetime abstainers among patients with scores of 0, thereby limiting interpretability of both the effects of non-drinking on mortality, as well as racial/ethnic differences in the adjusted odds of mortality within this group.

Despite these limitations, this study found that, among male VA outpatients, risk of death associated with alcohol screening scores differed depending on race/ethnicity. While the U-shaped pattern observed for Hispanic and white male outpatients matched patterns observed in previous population-based epidemiologic and health services studies, the increased risk of mortality among black male outpatients with severe alcohol misuse did not reach statistical significance. This finding may be due to the high prevalence of smoking among black patients or to under-reporting and warrants further investigation. It is recommended that all patients who screen positive for alcohol misuse be offered feedback relating their drinking and health (National Institute on Alcohol Abuse and Alcoholism, 2007; Whitlock et al., 2004), and results of this study should not sway clinicians from doing this equitably across racial/ethnic groups. Data from this and future research regarding differential associations between alcohol screening scores and medical outcomes across racial/ethnic groups could be integrated into systems with automated feedback tools or risk calculators in order to provide more demographically-tailored data regarding the medical consequences of drinking.

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Table 1
 Characteristics of Male VA Outpatients: Total and Compared Across Race/Ethnicity

Demographics	Total n=205,222 N (%)	Black n=13,068 N (%)	Hispanic n=9,466 N (%)	White n=182,688 N (%)	p-value
Age					
< 30	810(0.39)	96 (0.7)	121 (1.3)	593 (0.3)	
30–39	2,144(1.04)	344 (2.6)	217 (2.3)	1,583 (.9)	
40–49	8,980(4.38)	1,793 (13.7)	772 (8.2)	6,415 (3.5)	
50–59	41,658(20.30)	4,412 (33.8)	2,842 (30.0)	34,404 (18.8)	
60–69	49,127(23.94)	2,828 (21.6)	2,189 (23.1)	44,110 (24.1)	
70–79	69,243(33.74)	2,585 (19.8)	2,439 (25.8)	64,219 (35.2)	
> 80	33,260(16.21)	1,010 (7.7)	8,86 (9.4)	31,364 (17.2)	<.0001
Education					
Less than 12 th	38,694(18.98)	2,440 (18.7)	2,030 (21.4)	34,224 (18.7)	
High Schoolgraduate	129,528(63.54)	8,797 (67.3)	6,028 (63.7)	114,703(62.8)	
College Graduate	35,623(17.48)	1,728 (13.2)	1,310 (13.8)	32,585 (17.8)	<.0001
Income					
\$15,000/year	60,227 (29.4)	5,720 (43.8)	3,976 (42.0)	50,531 (27.7)	<.0001
Occupation					
Employed	38,999 (19.1)	2,872 (22.1)	2,026 (21.5)	34,101 (18.7)	<.0001
Married	140,216(68.32)	6,392 (48.9)	6,126 (64.7)	127,698(69.9)	<.0001
Health behaviors					
AUDIT-C Score Category					
0	91,342(44.51)	6,423(49.2)	4,201(44.4)	80,718(44.2)	
1–4	86,750(42.27)	4,483(34.3)	3,428(36.2)	78,839(43.2)	
5–8	21,535(10.49)	1,675(12.8)	1,354(14.3)	18,506(10.1)	
9–12	5,595(2.73)	487(3.73)	483(5.10)	4,625(2.53)	<.0001
Smoking Status					
CurrentSmoking	34,840 (16.98)	3,824 (29.3)	1,707 (18.0)	29,309 (16.0)	<.0001

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	Total n=205,222 N (%)	Black n=13,068 N (%)	Hispanic n=9,466 N (%)	White n=182,688 N (%)	p-value
Medical conditions					
Past year Depression	66,212(32.26)	5,989 (45.8)	4,591 (48.5)	55,632 (30.5)	<.0001
Mean Deyo Score(SD)	1.02(1.34)	1.19(1.59)	1.03(1.38)	1.01 (1.32)	

VA = Veterans Affairs

AUDIT-C = Alcohol Use Disorders Identification Test Consumption questionnaire SD = standard deviation

Table 2

Adjusted^a Association between AUDIT-C scores and mortality: Overall and among Black, Hispanic, and White Male VA Outpatients

	AUDIT-C 0 OR (95% CI)	AUDIT-C 1–4 2-Year Adjusted Death Rate ^b	AUDIT-C 5–8 OR (95% CI)	AUDIT-C 9–12 OR (95% CI)
Number of Deaths	7,371	4,480	936	312
Male Total Sample	1.35 (1.30, 1.41) ^b	0.052	1.15 (1.07, 1.24) ^b	1.75 (1.54, 1.98) ^b
Black	1.28 (1.06, 1.56) ^c	0.036	1.50 (1.13, 1.99) ^c	1.27 (0.77, 2.09) ^c
Hispanic	1.93 (1.50, 2.49) ^c	0.033	1.57 (1.07, 2.30) ^c	1.82 (1.04, 3.17) ^c
White	1.34 (1.29, 1.40) ^c	0.054	1.12 (1.03, 1.21) ^c	1.81 (1.59, 2.07) ^c
Tests of Racial/Ethnic Differences in Mortality Within AUDIT-C Categories (p-value from Wald test)^b				
Black/White	0.23		0.03	0.25
Hispanic/White	<0.01		0.06	0.87
Black/Hispanic	<0.01		0.89	0.36

^a Adjusted for age, education, marital status, smoking status, physical illness, and previous year depression.

^b Estimated based on adjusted logistic regression model in full population.

^c Estimated based on adjusted logistic regression models stratified by racial/ethnic subgroup.

AUDIT-C = Alcohol Use Disorders Identification Test Consumption questionnaire

Table 3a

Prevalence of Current Smoking For Each Racial/Ethnic Group Across AUDIT-C Categories

	AUDIT-C 0 N (%)	AUDIT-C 1–4 N (%)	AUDIT-C 5–8 N (%)	AUDIT-C 9–12 N (%)
Black (n=13,068)				
Current Smoker (n=3,824)	1,400 (22%)	1,422 (32%)	740 (44%)	262 (54%)
Hispanic (n=9,466)				
Current Smoker (n=1,707)	594 (14%)	583 (17%)	373 (28%)	157 (33%)
White (n=182,688)				
Current Smoker (n=29,309)	11,849 (15%)	10,562 (13%)	4,965 (27%)	1,933 (42%)

Table 3b

Adjusted^a Association between AUDIT-C scores and mortality among patients stratified by race/ethnicity and smoking status

	AUDIT-C 0 OR (95% CI) ^e	AUDIT-C 1–4 Mortality Rate ^d	AUDIT-C 5–8 OR (95% CI) ^e	AUDIT-C 9–12 OR (95% CI) ^e
Black				
Current Smoker	0.95(0.67–1.35)	0.043	1.43(0.95–2.17)	0.78(0.37–1.68)
Former/Never Smoker	1.46(1.15–1.85)	0.035	1.46(0.98–2.18)	1.95(1.01–3.74)
Hispanic				
Current Smoker	1.99(1.06–3.72)	0.032	1.66(0.78–3.53)	1.57(0.55–4.48)
Former/Never Smoker	1.89(1.43–2.49)	0.025	1.56(1.00–2.43)	1.95 (1.00–3.79)
White				
Current Smoker	1.16 (1.03 – 1.29)	0.056	1.09 (0.93 – 1.27)	1.49 (1.20 – 1.85)
Former/Never Smoker	1.37 (1.31 – 1.43)	0.054	1.11 (1.02 – 1.22)	1.98 (1.68 – 2.35)

^aAdjusted for age, education, marital status, physical illness, and previous year depression

^dEstimated based on adjusted logistic regression model in full population stratified by smoking status.

^eEstimated based on adjusted logistic regression models stratified by racial/ethnic subgroup.

Appendix 1

Adjusted^a Association between AUDIT-C scores and mortality with Fuller SES Adjustment: Overall and among Black, Hispanic, and White Male VA Outpatients (N=192,567)

	AUDIT-C 0 OR (95% CI)	AUDIT-C 1–4 2-Year Adjusted Death Rate ^b	AUDIT-C 5–8 OR (95% CI)	AUDIT-C 9–12 OR (95% CI)
Number of Deaths	6,877	4,229	900	303
Male Total Sample	1.31(1.25, 1.36) ^b	0.052	1.17(1.08,1.26) ^b	1.74(1.53,1.97) ^b
Black (N = 12,145)	1.24(1.02,1.51) ^c	0.036	1.37(1.02,1.85) ^c	1.21(0.72,2.01) ^c
Hispanic (N =8,919)	1.90(1.47,2.46) ^c	0.034	1.61(1.09,2.37) ^c	1.88(1.07,3.30) ^c
White (N=171,503)	1.30(1.24,1.35) ^c	0.054	1.14(1.05,1.24) ^c	1.80(1.58,2.06) ^c
Tests of Racial/Ethnic Differences in Mortality Within AUDIT-C Categories (p-value from Wald test) ^b				
Black/White	0.26		0.18	0.17
Hispanic/White	<0.01		0.05	0.71
Black/Hispanic	<0.01		0.49	0.22

^a Adjusted for age, education, employment status, income, marital status, smoking status, physical illness, and previous year depression.

^b Estimated based on adjusted logistic regression model in full population.

^c Estimated based on adjusted logistic regression models stratified by racial/ethnic subgroup.