

# UC Davis

## UC Davis Previously Published Works

### Title

Documented brief intervention not associated with resolution of unhealthy alcohol use one year later among VA patients living with HIV.

### Permalink

<https://escholarship.org/uc/item/1f77r1j0>

### Authors

Williams, Emily C  
Lapham, Gwen T  
Bobb, Jennifer F  
et al.

### Publication Date

2017-07-01

### DOI

10.1016/j.jsat.2017.04.006

Peer reviewed



Published in final edited form as:

*J Subst Abuse Treat.* 2017 July ; 78: 8–14. doi:10.1016/j.jsat.2017.04.006.

## Documented Brief Intervention Not Associated with Resolution of Unhealthy Alcohol Use One Year Later among VA Patients Living with HIV

Emily C. Williams, PhD, MPH<sup>1,3,6</sup>, Gwen T. Lapham, PhD, MPH, MSW<sup>1,6</sup>, Jennifer F. Bobb, PhD<sup>6</sup>, Anna D. Rubinsky, PhD, MS<sup>1,8</sup>, Sheryl L. Catz, PhD<sup>5,6</sup>, Susan M. Shortreed, PhD<sup>6,7</sup>, Kara M. Bensley, MSc<sup>1,3</sup>, and Katharine A. Bradley, MD, MPH<sup>1,2,3,4,6</sup>

<sup>1</sup>Health Services Research & Development (HSR&D) Center of Innovation for Veteran-Centered Value-Driven Care (COIN) Veterans Affairs (VA) Puget Sound Health Care System, Seattle, WA

<sup>2</sup>Center of Excellence in Substance Abuse Treatment and Education (CESATE) VA Puget Sound Health Care System – Seattle Division; Seattle, WA

<sup>3</sup>Department of Health Services, University of Washington; Seattle, WA

<sup>4</sup>Department of Medicine, University of Washington, Seattle, WA

<sup>5</sup>Betty Irene Moore School of Nursing, University of California at Davis, Sacramento, CA

<sup>6</sup>Kaiser Permanente Washington Health Research Institute, Seattle, WA

<sup>7</sup>Department of Biostatistics, University of Washington; Seattle, WA

<sup>8</sup>Kidney Health Research Collaborative, University of California, San Francisco and San Francisco VA Medical Center; San Francisco, CA

### Abstract

**Objective**—Unhealthy alcohol use is particularly risky for patients living with HIV (PLWH). Brief interventions reduce drinking among patients with unhealthy alcohol use, but whether its receipt in routine outpatient settings is associated with reduced drinking among PLWH with unhealthy alcohol use is unknown. We assessed whether PLWH who screened positive for unhealthy alcohol use were more likely to resolve unhealthy drinking one year later if they had brief alcohol intervention (BI) documented in their electronic health record in a national sample of PLWH from the Veterans Health Administration.

---

**Correspondence:** Emily C. Williams (corresponding author): Emily.Williams3@va.gov.

#### CONTRIBUTORS

All authors contributed to the article. GTL conducted all data analyses and contributed to study design and interpretation; JFB and SMS served as the study biostatisticians, guiding analytic design and interpretation; ADR contributed to study design, data management, analysis, and drafting of the manuscript; KMB contributed to study design; SLC and KAB served as senior investigators, contributing to study design and interpretation. ECW served as the principal investigator of the study, guiding all aspects of study design, analysis, interpretation, and preparation of the manuscript prior to submission and serving as the lead author of the manuscript. All authors reviewed iterative drafts of the manuscript prior to submission and contributed to its completion.

#### COMPETING INTERESTS

All other authors declare no potential competing interests. This study, including a HIPAA waiver of written consent, was approved by Institutional Review Boards at the Kaiser Permanente Washington Health Research Institute and VA Puget Sound.

**Methods**—Secondary VA clinical and administrative data from the electronic medical record (EMR) were used to identify all positive alcohol screens (AUDIT-C score  $\geq 5$ ) documented among PLWH (10/01/09-5/30/13) followed by another alcohol screen documented 9–15 months later. Unadjusted and adjusted Poisson regression models assessed the association between brief intervention (advice to reduce drinking or abstain documented in EMR) and resolution of unhealthy alcohol use (follow-up AUDIT-C  $<5$  with  $\geq 2$  point reduction).

**Results**—Overall 2,101 PLWH with unhealthy drinking (10/01/09-5/30/13) had repeat alcohol screens 9–15 months later. Of those, 77% had brief intervention documented after their first screen, and 61% resolved unhealthy alcohol use at follow-up. Documented brief intervention was not associated with resolution [Adjusted incidence rate ratio 0.96, (95% CI 0.90–1.02)].

**Conclusions**—Documented brief intervention was not associated with resolving unhealthy alcohol use at follow-up screening among VA PLWH with unhealthy alcohol use. Effective methods of resolving unhealthy alcohol use in this vulnerable population are needed.

### Keywords

Alcohol; HIV; Brief intervention; Unhealthy Alcohol Use

---

## 1. INTRODUCTION

Approximately one-quarter of people living with HIV (PLWH) drink at unhealthy levels (Williams, Joo, Lipira, & Glass, 2016). Unhealthy alcohol use is particularly risky among PLWH because it is associated with increased risk of HIV transmission, diminished engagement at all steps of the HIV treatment cascade (Vagenas et al., 2015) and increased risk of morbidity and mortality (Justice et al., 2016b; E.C. Williams et al., 2016).

Randomized controlled trials have repeatedly demonstrated the efficacy of brief alcohol counseling interventions (“brief interventions”) for reducing self-reported drinking among primary care patients with unhealthy alcohol use identified by population-based alcohol screening (Jonas et al., 2012). Additionally, three trials conducted among PLWH have identified reductions in drinking associated with brief interventions (Chander, Hutton, Lau, Xu, & McCaul, 2015; Hasin et al., 2013; Papas et al., 2011). Based on the evidence for brief intervention, alcohol screening and brief intervention are now widely recommended (Jonas et al., 2012), covered as a standard preventive benefit under the Affordable Care Act, and increasingly being implemented for receipt by all outpatients.

Though mixed, evidence suggests possible diminished effects of brief alcohol interventions when delivered and documented as part of routine medical care to general outpatients relative to effects observed in trials of brief intervention (Chi & Weisner, 2015; Williams et al., 2014). The effectiveness of brief intervention delivered in routine outpatient care for reducing drinking among PLWH with unhealthy alcohol use is not known. Further, while brief intervention has been demonstrated to be efficacious and effective in medical populations with other chronic conditions, such as hypertension and diabetes (Fleming, Brown, & Brown, 2004; Maheswaran, Beever, & Beever, 1992; Rose et al., 2008), achieving reductions in alcohol use among PLWH has been challenging to date, even with

intensive quality-controlled interventions (Samet & Walley, 2010). Therefore, it is important to assess whether provision of brief intervention in routine care is having its intended effect—resolution of unhealthy drinking—in this vulnerable patient population or whether additional services or interventions might be needed.

We evaluate whether brief interventions documented with clinical decision support in the electronic health records (EHR) of PLWH who screened positive for unhealthy alcohol use as part of routine care are associated with subsequent resolution of unhealthy alcohol use in a large national sample of PLWH.

## 2. MATERIALS AND METHODS

### 2.1. Setting

This study was conducted using data from the Veterans Health Administration (VA), which provides HIV care for more patients than any other healthcare system in the United States and was the first large healthcare system to offer alcohol screening and brief intervention as part of routine care (Williams et al., 2011). VA has national performance measures which are linked to financial incentives for network directors and require that all outpatients are screened for unhealthy alcohol use with the Alcohol Use Disorders Identification Test Consumption (AUDIT-C) annually and that those who screen positive receive brief interventions—including advice to reduce or abstain from drinking and feedback linking drinking to health—within 14 days of the positive screen (Williams et al., 2011).

### 2.2. Data Source and Study Sample

EHR data obtained from VA's Corporate Data Warehouse (CDW) were used to identify all positive alcohol screens (defined below) documented among VA patients who had an outpatient appointment October 1, 2009 through May 30, 2013 and were documented to have HIV at the time of positive alcohol screening (based on either 2 outpatient or 1 inpatient ICD-9-CM code for either AIDS or HIV 0-720 days prior to alcohol screening) (Fultz et al., 2006). Consistent with VA's performance measure for brief intervention (Lapham et al., 2012), patients with AUDIT-C scores  $\geq 5$  were considered positive. All positive screens identified during the study period that had no screen in the prior 9 months (to identify routine annual clinical screens) were followed through September 30, 2014 to identify follow-up alcohol screens (AUDIT-C scores 0–12) documented 9–15 months later. The study sample included initial positive screens that had follow-up alcohol screening documented between 9 and 15 months later; patients could contribute more than one pair of screens.

### 2.3 Measures

Any documented brief intervention—the primary predictor variable—was defined as documentation of advice to reduce and/or abstain from drinking in the 0–14 days following a positive alcohol screen (Lapham et al., 2015). This component of VA's performance measure for brief intervention is routinely documented using electronic clinical reminders, resulting in text data that can be extracted from the CDW to measure its receipt (Lapham et al., 2015; E. C. Williams, C. E. Achtmeyer, et al., 2016; Williams et al., 2014). Because

repeated brief interventions may be more effective than a single brief intervention (Jonas et al., 2012) we used a categorical secondary predictor variable based on the number of brief interventions documented in the 0–365 days after a positive screen. Categories included no brief intervention, single brief intervention, and 2 brief interventions.

Resolution of unhealthy alcohol use was defined as screening negative on the next annual follow-up screening (AUDIT-C < 5) with at least a 2 point reduction from the previous score, consistent with previous studies (Williams et al., 2014). As above, follow-up screens (AUDIT-C 0–12) were identified 9–15 months after each initial positive screen in order to reflect changes over a period approximating a year. When there were multiple follow-up screens documented within 9–15 months after the first, the one recorded closest to 365 days after the initial positive screen was used to measure the outcome.

Covariates expected to confound the association between documented brief intervention and resolution of unhealthy alcohol use were selected based on prior literature demonstrating associations with both brief intervention and unhealthy alcohol use (Burman et al., 2004; E. F. Kaner, Heather, Brodie, Lock, & McAvoy, 2001; Volk, Steinbauer, & Cantor, 1996; Williams et al., 2014). Socio-demographic characteristics including gender (male, female), age (18–29, 30–44, 45–64, 65), marital status (divorced/separated, married, never married/single, widowed), and race/ethnicity (non-Hispanic black, Hispanic, or non-Hispanic white) were identified based on documentation in the EHR. Eligibility for VA care (full VA coverage, partial VA coverage, or no VA coverage) was used as a possible indicator of socio-economic status, with full VA coverage representing the most disadvantaged (E. C. Williams, S. Gupta, et al., 2016). Because rates of brief intervention changed over time in VA (Bradley, Johnson, & Williams, 2011; Chavez et al., 2016; Lapham et al., 2012), each positive AUDIT-C screen was categorized into the fiscal year of the screen (based on the year it was documented). Diagnoses of mental health and drug use disorders were measured based on ICD-9-CM diagnostic codes in the 0–365 days prior to each initial positive alcohol screen. Five categories of mental health disorders were identified: depressive disorders, posttraumatic stress disorder (PTSD), other anxiety disorders, other mood disorders (e.g., episodic mood disorders), and serious mental illness (e.g., schizophrenia, bipolar, and psychosis). Three categories of active drug use disorders were identified: stimulant use disorders (amphetamine and/or cocaine), opioid use disorders; and other drug use disorders (cannabis, hallucinogens and/or sedatives). Tobacco use was measured based either on documentation of an ICD-9-CM code for tobacco use disorder or EHR documentation indicating current smoker status (McGinnis et al., 2011). Three measures of severity of unhealthy alcohol use were included: 1) AUDIT-C risk groups indicating increasing severity (scores of 5–8 and 9–12) (Rubinsky, Dawson, Williams, Kivlahan, & Bradley, 2013), 2) alcohol use disorders (ICD-9-CM diagnoses for abuse or dependence) and 3) alcohol-attributable medical conditions (e.g. alcoholic cirrhosis) documented in the 0–365 days prior to each initial positive alcohol screen. The Deyo Comorbidity Index, a validated measure of comorbidity that is derived using ICD-9-CM codes and predictive of subsequent utilization and mortality, was used to measure comorbidity with scores of 3 points indicating high levels of comorbidity (Deyo, Cherkin, & Ciol, 1992). Consistent with previous studies in PLWH, we excluded AIDS diagnoses from the comorbidity index. Outpatient utilization (0,

1–4, 5–10, 11–24, and ≥ 25 visits) and inpatient utilization (0, 1, 2–3, and ≥ 4 days) were measured in the 0–365 days prior to each initial positive alcohol screen.

## 2.4 Analyses

Patient-level analyses using each patient's first positive AUDIT-C screen were conducted to describe patient characteristics, both overall and across groups based on receipt of brief intervention. Chi square tests of independence tested differences in the distribution of characteristics across receipt of brief intervention. The number of brief interventions received in the year following a positive screen was summarized.

The distribution of resolution of unhealthy alcohol use across receipt of brief intervention was compared using Chi square tests. Poisson regression, with positive screens as the unit of analysis (to make use of all available data), was used to estimate the association between documented brief intervention (binary primary independent variable) and resolution of unhealthy alcohol use at follow-up screening (dependent variable). Poisson models estimated the incidence rate of resolution for patients with documented brief intervention relative to those without. The model was first unadjusted and then adjusted for all covariates. Robust standard errors were calculated using the sandwich estimator to account for repeated measures within patients and misspecification of the variance structure of the Poisson model (Zou, 2004). Because our analytic sample was restricted to positive screens that had a follow-up screen in the specified time window of 9–15 months, we applied inverse probability weighting to weight the positive screens in our sample back to the population of all initial positive screens (including ones without follow-up screens within the time window). Inverse probability weights were estimated by fitting a logistic regression model of an indicator for whether a follow-up screen was observed regressed on all covariates. All models were replicated to estimate the association between our secondary categorical measure of number of brief interventions (independent variable) and resolution of unhealthy alcohol use at follow-up screening (dependent variable).

To assess whether conducting analyses at the screen-level as opposed to the patient-level altered results, we conducted two sets of sensitivity analyses at the patient-level. Specifically, the primary unadjusted and adjusted models were re-fit at the patient level first by selecting only the first initial positive screen for each patient and then by selecting a random initial positive screen for each patient.

All analyses were conducted in Stata Version 13.

## 3. RESULTS

During the study period, 3,514 PLWH (4,634 records) had at least one positive alcohol screen, and among those with an initial positive screen, 2,101 (60%) (2,803 records) had follow-up screening 1 year later. Among the 2,101 patients with follow-up screening, 77% had brief intervention documented within two weeks following the first screen, and 61% resolved unhealthy alcohol use at annual follow-up screening. The number of brief interventions received range from 0–6 with a mean of 0.84 and a median of 1: 24% of the sample had no brief interventions, 69% had 1, and 7% had 2 or more.

Characteristics of the sample are presented in Table 1. The sample was largely male and age 45 years or older. Approximately half were black race/ethnicity; about 10% were Hispanic and 36% were white. Most were never married, single, or divorced, and 15% had full VA coverage indicating disability and/or low income. Mental health and drug use disorders were common: the prevalence of each disorder was at least 10% except opioid use disorder, for which the prevalence was 8%. Tobacco use was very common with 67% having documentation of a tobacco use disorder or current smoking. Approximately 50% of the population had a clinically recognized alcohol use disorder, and 2% had a diagnosis for an alcohol-attributable medical condition. While the majority of patients did not have inpatient visits, outpatient visits were common. Patients with documented brief intervention were more likely than those without to have diagnosed alcohol use disorders and mental health disorders, with the exception of anxiety for which no differences were observed across groups (Table 1). No other differences were observed between groups.

We did not find evidence of an association between documented brief intervention and resolution of unhealthy alcohol use. The prevalence of resolution of unhealthy alcohol use was 61% for those with and 63% for those without documented brief intervention (p-value 0.259). Any documented brief intervention in the 0–14 days following a positive screen was not found to be associated with resolution of unhealthy alcohol use at follow-up screening in unadjusted or adjusted models (Table 2), nor was receipt of one or two or more brief interventions relative to none received in the 0–365 days following a positive screen (Table 2). Results of primary analyses were unchanged in sensitivity analyses at the patient level.

Because approximately half of our sample had documented alcohol use disorders and patients with the most severe unhealthy alcohol use may not benefit from brief intervention (Jonas et al., 2012; McKay, 2005), we conducted post-hoc secondary analyses stratified by alcohol use disorder status. We specifically repeated primary regression analyses among observations with and without documented alcohol use disorders and found no evidence of an association between documented brief intervention and resolution of unhealthy alcohol use for those with or without documented alcohol use disorders (see: Appendix).

## 4. DISCUSSION

This is the first study to our knowledge to assess whether brief intervention documented in routine health care among PLWH with unhealthy alcohol use is associated with subsequent changes in drinking. In this national sample of PLWH who screened positive for unhealthy alcohol use, we found no differences in resolution of unhealthy alcohol use associated with EHR documentation of brief intervention.

Our findings are largely consistent with the literature regarding the effectiveness of brief interventions among patients with unhealthy alcohol use when translated into real-world settings. Specifically, though two studies in medical populations with other chronic conditions have found promising effects (Chi & Weisner, 2015; Rose et al., 2008), studies that have evaluated drinking outcomes associated with brief intervention delivered in routine care to general outpatients have largely found diminished or no effects of brief intervention on alcohol use at follow-up (E. Kaner et al., 2013; Williams et al., 2010; Williams et al.,

2014), and one study suggested the possibility that brief intervention may even have a negative effect when delivered in routine care to general outpatients (Hilbink, Voerman, van Beurden, Penninx, & Laurant, 2012). The present study builds on prior work by evaluating this question in a medical population particularly vulnerable to the effects of alcohol use. Similar to the previous studies (E. Kaner et al., 2013; Williams et al., 2010; Williams et al., 2014), our findings demonstrate that in a non-research setting, EHR documentation of either a single brief alcohol intervention, or documentation of two or more brief interventions relative to none, was not associated with resolution of unhealthy alcohol use.

Findings from this study suggest there may be a need for improvement in the effectiveness of brief interventions delivered in routine outpatient care and documented in EHRs for PLWH and/or that brief alcohol interventions may not be effective in PLWH. This study cannot address whether longer, more frequent, or higher quality interventions are needed, or whether different types of alcohol interventions may be needed for PLWH who drink at unhealthy levels. Given that half of patients in the present study had a clinically recognized alcohol use disorder and that brief interventions alone are unlikely to be effective among patients with alcohol use disorders (Jonas et al., 2012; McKay, 2005) it is possible that more is needed in this population due to clinical characteristics. However, findings from our post-hoc secondary analyses identified no effect of brief intervention regardless of alcohol use disorder diagnoses. In addition, the consistency of findings regarding the efficacy of alcohol-related interventions tested among PLWH is substantially less robust than that for brief interventions tested among primary care patients with unhealthy alcohol use. Specifically, while the number of trials testing interventions aimed at reducing alcohol use among PLWH is still small (Samet & Walley, 2010), only three to date have had positive findings (Chander et al., 2015; Hasin et al., 2013; Papas et al., 2011). All three of these interventions offered more than a single brief intervention. One tested 6 sessions of cognitive-behavioral therapy interventions relative to usual care (Papas et al., 2011), another tested a 2-session brief intervention supplemented by 2 booster calls relative to a control (Chander et al., 2015), and the third tested two 25–30 minute motivational-interviewing (MI)-based interventions relative to a control, with the second MI intervention supplemented with daily calls with interactive voice response for 60 days (Hasin et al., 2013). While all interventions were associated with decreased drinking at either 60 or 90 day follow-ups, it is unclear if these intensive interventions had longer-term effects on drinking. Therefore, in terms of the findings of the present study, it may be unsurprising that a single brief intervention consisting of advice to reduce or abstain from drinking documented using clinical decisions support in an EHR, but of unclear duration or salience to the patient or provider, was not associated with resolution of unhealthy alcohol use a year later. Finally, there was a very high rate of resolved unhealthy alcohol use observed in the present study, independent of receipt of brief intervention. This finding may reflect regression to the mean, and/or low quality repeat screening (Bradley, Lapham, et al., 2011; Williams et al., 2015). However, it is also possible that alcohol screening alone served as an intervention (“an assessment effect”) (McCambridge & Day, 2008) thus decreasing the relevance of brief intervention.

It is important to acknowledge the limitations of the present study. First, this study was observational, and, while we adjusted for multiple measured factors expected to confound the association of interest, residual confounding may be present. In particular, though we

adjusted for frequent utilization associated with HIV treatment, other aspects of HIV care were not measured (e.g., pharmacy contacts) but may have influenced both receipt of brief intervention and resolution of unhealthy alcohol use. Second, only 60% of PLWH with an initial positive alcohol screen had follow-up alcohol screening 9–15 months later. While we used inverse probability weighting to account for missing data bias by measured covariates, it is possible bias persisted due to unmeasured (or imperfectly measured) factors. Third, while reliance on EHR data enabled a very large study of PLWH with unhealthy alcohol use, this also limited the quality of measurement of exposure and outcome data. Specifically, brief intervention, which was measured based on documentation of advice in the EHR, does not capture brief interventions documented outside electronic clinical reminders. Moreover, clinical documentation of brief intervention is easily enabled by clinical reminder use. While no studies to our knowledge have described the content and quality of brief interventions documented in the VA, and it is unknown what occurs between patients and providers in the encounters that are documented as brief intervention, a qualitative study conducted after announcement of the performance measure for brief intervention found that, at least at a single VA medical center, little was done to educate frontline staff and providers regarding provision of brief intervention (E. C. Williams, C. E. Achtmeyer, et al., 2016). Therefore, it is likely that there are gaps in the quality of brief intervention provision in VA. Because the intensity and quality of the brief intervention documented and captured in our EHR-based measure cannot be assessed in this study, our ability to reach conclusions regarding the utility of brief interventions in this population is limited. Further, the secondary EHR data used to measure brief intervention in this study does not allow determination of which provider documented the brief intervention, thus limiting investigation of provider-specific effects. Similarly, resolution of unhealthy alcohol use was measured based on clinically documented AUDIT-C scores one year later. Though the AUDIT-C has been validated as a screen for unhealthy use across multiple samples, its results correspond well to biomarkers of alcohol use (e.g., phosphatidylethanol) (Hahn et al., 2012), and changes in AUDIT-C scores over time appear to have predictive validity for several alcohol-associated medical outcomes., (Bradley et al., 2016) it is possible that repeat screening may not have been a valid reflection of alcohol use at follow-up. There are known quality issues with clinical alcohol screening in the VA (e.g., a high rate of false-negative alcohol screening) (Bradley, Lapham, et al., 2011; Williams et al., 2015) which may have resulted in misclassification in this study's outcome measure. Finally, resolution of unhealthy alcohol use was measured one year after a positive screen because the AUDIT-C is only administered annually in VA. However, use of a more proximal measure of alcohol use may have been more sensitive to change in response to brief intervention.

Despite these limitations, the present study has many strengths including that it was conducted in a national sample of PLWH with unhealthy alcohol use who are receiving healthcare using a large, robust dataset with multiple years of available data on brief intervention from the largest provider of HIV care in the United States. Findings from the present study suggest that brief interventions documented among PLWH who screen positive for unhealthy alcohol use as a result of widespread implementation efforts in the VA's national health care system are not having their intended effect of resolving unhealthy alcohol use. Given the perils of unhealthy alcohol use for patients with HIV (Justice et al.,

2016a; Vagenas et al., 2015), improvements in the intensity or quality of brief intervention offered may be needed. However, findings from previous intervention studies suggest it may require intensive interventions to influence drinking among patients with HIV. Substantial research is still needed to understand how to effectively help PLWH resolve unhealthy alcohol use. As new interventions are tested, it will be important to simultaneously identify factors that may facilitate or impede their implementation in real-world clinical settings in order to optimize population benefit and ultimately mitigate the adverse effects of alcohol use in this vulnerable population of patients.

## Acknowledgments

The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of Group Health Research Institute, the University of Washington, the University of California or the Department of Veterans Affairs. Dr. Shortreed worked on a grant awarded to Group Health Research Institute (GHRI) by Pfizer to evaluate a risk reduction initiative for long-term opioid therapy patients. She is also a co-Investigator on a grant awarded to GHRI from the Campbell Alliance, a consortium of pharmaceutical companies carrying out FDA-mandated studies regarding the safety of extended release opioids. Dr. Bradley owns stock in Pfizer Pharmaceuticals.

### SOURCES OF SUPPORT

This study was funded by a grant from the National Institute on Alcohol Abuse and Alcoholism (R21AA022866-01; Williams/Bradley PIs). Dr. Williams is supported by a Career Development Award from VA Health Services Research & Development (CDA 12-276); Dr. Bradley is supported by a mid-career mentoring award from the National Institute on Alcohol Abuse and Alcoholism (K24-AA022128). Views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs, the University of Washington, the University of California, or the Kaiser Permanente Washington Health Research Institute.

## Appendix. Association between receipt of brief intervention and resolution of unhealthy alcohol use at follow-up screening a year later among VA patients living with HIV who had an initial positive screen for unhealthy alcohol use and a follow-up alcohol screen 9–15 months later: Stratified by AUD status

	Incidence Rate Ratio (IRR)	95% Confidence Interval (CI)	p-value
<b>No Diagnosis for AUD (n=1,298)</b>			
Unadjusted	0.94	0.86 – 1.03	0.197
Adjusted *	0.98	0.89 – 1.08	0.740
<b>Diagnosis for AUD (n=1,498)</b>			
Unadjusted	0.94	0.86 – 1.02	0.147
Adjusted *	0.99	0.90 – 1.09	0.789

\* adjusted for sociodemographic and clinical characteristics, and utilization patterns

AUD = alcohol use disorder

## REFERENCES CITED

- Bradley KA, Johnson ML, Williams EC. Commentary on Nilsen et al.: The importance of asking patients—the potential value of patient report of brief interventions. *Addiction*. 2011; 106(10): 1757–1759. [PubMed: 21917038]
- Bradley KA, Lapham GT, Hawkins EJ, Achtmeyer CE, Williams EC, Thomas RM, Kivlahan DR. Quality concerns with routine alcohol screening in VA clinical settings. *Journal of General Internal Medicine*. 2011; 26(3):299–306. DOI: 10.1007/s11606-010-1509-4 [PubMed: 20859699]
- Bradley KA, Rubinsky AD, Lapham GT, Berger D, Bryson C, Achtmeyer C, Kivlahan DR. Predictive Validity of Clinical AUDIT-C Alcohol Screening Scores and Changes in Scores for Three Objective Alcohol-related Outcomes in a Veterans Affairs (VA) Population. *Addiction*. 2016; doi: 10.1111/add.13505
- Burman ML, Kivlahan DR, Buchbinder MB, Broglio K, Zhou XH, Merrill JO, Bradley KA. Alcohol-related advice for VA primary care patients: who gets it, who gives it? *Journal of Studies on Alcohol*. 2004; 65(5):621–630. [PubMed: 15536772]
- Chander G, Hutton HE, Lau B, Xu X, McCaul ME. Brief intervention decreases drinking frequency in HIV-infected, heavy drinking women: results of a Randomized Controlled Trial. *Journal of Acquired Immune Deficiency Syndromes*. 2015; 70(2):137–145. DOI: 10.1097/QAI.0000000000000679 [PubMed: 25967270]
- Chavez LJ, Williams EC, Lapham GT, Rubinsky AD, Kivlahan DR, Bradley KA. Changes in Patient-Reported Alcohol-Related Advice Following Veterans Health Administration Implementation of Brief Alcohol Interventions. *Journal of Studies on Alcohol and Drugs*. 2016; 77(3):500–508. [PubMed: 27172583]
- Chi, FW., Weisner, C. Alcohol Screening and Brief Intervention and Improved Health Outcomes in Hypertensive Patients: Results from an Implementation Study in Primary Care Setting. Paper presented at the International Network on Evidence Based Brief Interventions for Alcohol and Drugs; Atlanta, GA. 2015.
- Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *Journal of Clinical Epidemiology*. 1992; 45(6):613–619. Retrieved from [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list\\_uids=1607900](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=1607900). [PubMed: 1607900]
- Fleming M, Brown R, Brown D. The efficacy of a brief alcohol intervention combined with %CDT feedback in patients being treated for type 2 diabetes and/or hypertension. *J Stud Alcohol*. 2004; 65(5):631–637. Retrieved from [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list\\_uids=15536773](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=15536773). [PubMed: 15536773]
- Fultz SL, Skanderson M, Mole LA, Gandhi N, Bryant K, Crystal S, Justice AC. Development and verification of a “virtual” cohort using the National VA Health Information System. *Medical Care*. 2006; 44(8 Suppl 2):S25–30. DOI: 10.1097/01.mlr.0000223670.00890.74 [PubMed: 16849965]
- Hahn JA, Dobkin LM, Mayanja B, Emenyonu NI, Kigozi IM, Shiboski S, Wurst FM. Phosphatidylethanol (PEth) as a biomarker of alcohol consumption in HIV-positive patients in sub-Saharan Africa. *Alcoholism, Clinical and Experimental Research*. 2012; 36(5):854–862. DOI: 10.1111/j.1530-0277.2011.01669.x
- Hasin DS, Aharonovich E, O’Leary A, Greenstein E, Pavlicova M, Arunajadai S, Johnston B. Reducing heavy drinking in HIV primary care: a randomized trial of brief intervention, with and without technological enhancement. *Addiction*. 2013; 108(7):1230–1240. DOI: 10.1111/add.12127 [PubMed: 23432593]
- Hilbink M, Voerman G, van Beurden I, Penninx B, Laurant M. A randomized controlled trial of a tailored primary care program to reverse excessive alcohol consumption. *The Journal of the American Board of Family Medicine*. 2012; 25(5):712–722. DOI: 10.3122/jabfm.2012.05.120070 [PubMed: 22956707]
- Jonas DE, Garbutt JC, Amick HR, Brown JM, Brownley KA, Council CL, Harris RP. Behavioral counseling after screening for alcohol misuse in primary care: a systematic review and meta-analysis for the U.S. Preventive Services Task Force. *Annals of Internal Medicine*. 2012; 157(9): 645–654. DOI: 10.7326/0003-4819-157-9-201211060-00544 [PubMed: 23007881]

- Justice AC, McGinnis KA, Tate JP, Braithwaite RS, Bryant KJ, Cook RL, Fiellin DA. Risk of mortality and physiologic injury evident with lower alcohol exposure among HIV infected compared with uninfected men. *Drug and Alcohol Dependence*. 2016a; 161:95–103. DOI: 10.1016/j.drugalcdep.2016.01.017 [PubMed: 26861883]
- Justice AC, McGinnis KA, Tate JP, Braithwaite RS, Bryant KJ, Cook RL, Fiellin DA. Risk of mortality and physiologic injury evident with lower alcohol exposure among HIV infected compared with uninfected men. *Drug and Alcohol Dependence*. 2016b; 161:95–103. doi:<http://dx.doi.org/10.1016/j.drugalcdep.2016.01.017>. [PubMed: 26861883]
- Kaner E, Bland M, Cassidy P, Coulton S, Dale V, Deluca P, Drummond C. Effectiveness of screening and brief alcohol intervention in primary care (SIPS trial): pragmatic cluster randomised controlled trial. *British Medical Journal*. 2013; 346:e8501.doi: 10.1136/bmj.e8501 [PubMed: 23303891]
- Kaner EF, Heather N, Brodie J, Lock CA, McAvoy BR. Patient and practitioner characteristics predict brief alcohol intervention in primary care. *British Journal of General Practice*. 2001; 51(471):822–827. Retrieved from [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list\\_uids=11677706](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=11677706). [PubMed: 11677706]
- Lapham GT, Achtmeyer CE, Williams EC, Hawkins EJ, Kivlahan DR, Bradley KA. Increased documented brief alcohol interventions with a performance measure and electronic decision support. *Medical Care*. 2012; 50(2):179–187. DOI: 10.1097/MLR.0b013e3181e35743 [PubMed: 20881876]
- Lapham GT, Rubinsky AD, Shortreed SM, Hawkins EJ, Richards J, Williams EC, Bradley KA. Comparison of provider-documented and patient-reported brief intervention for unhealthy alcohol use in VA outpatients. *Drug and Alcohol Dependence*. 2015; 153:159–166. DOI: 10.1016/j.drugalcdep.2015.05.027 [PubMed: 26072218]
- Maheswaran R, Beevers M, Beevers DG. Effectiveness of advice to reduce alcohol consumption in hypertensive patients. *Hypertension*. 1992; 19:79–84. [PubMed: 1346121]
- McCambridge J, Day M. Randomized controlled trial of the effects of completing the Alcohol Use Disorders Identification Test questionnaire on self-reported hazardous drinking. *Addiction*. 2008; 103(2):241–248. doi:ADD2080 [pii]. DOI: 10.1111/j.1360-0443.2007.02080.x [PubMed: 18199302]
- McGinnis KA, Brandt CA, Skanderson M, Justice AC, Shahrir S, Butt AA, Crothers K. Validating smoking data from the Veteran's Affairs Health Factors dataset, an electronic data source. *Nicotine & tobacco research: official journal of the Society for Research on Nicotine and Tobacco*. 2011; 13(12):1233–1239. DOI: 10.1093/ntr/ntr206 [PubMed: 21911825]
- McKay JR. Is there a case for extended interventions for alcohol and drug use disorders? *Addiction*. 2005; 100(11):1594–1610. doi:ADD1208 [pii]. DOI: 10.1111/j.1360-0443.2005.01208.x. [PubMed: 16277622]
- Papas RK, Sidle JE, Gakinya BN, Baliddawa JB, Martino S, Mwaniki MM, Maisto SA. Treatment outcomes of a stage 1 cognitive-behavioral trial to reduce alcohol use among human immunodeficiency virus-infected out-patients in western Kenya. *Addiction*. 2011; 106(12):2156–2166. DOI: 10.1111/j.1360-0443.2011.03518.x [PubMed: 21631622]
- Rose HL, Miller PM, Nemeth LS, Jenkins RG, Nietert PJ, Wessell AM, Ornstein S. Alcohol screening and brief counseling in a primary care hypertensive population: a quality improvement intervention. *Addiction*. 2008; 103(8):1271–1280. doi:ADD2199 [pii]. DOI: 10.1111/j.1360-0443.2008.02199.x [PubMed: 18422825]
- Rubinsky AD, Dawson DA, Williams EC, Kivlahan DR, Bradley KA. AUDIT-C scores as a scaled marker of mean daily drinking, alcohol use disorder severity, and probability of alcohol dependence in a U.S. general population sample of drinkers. *Alcoholism, Clinical and Experimental Research*. 2013; 37(8):1380–1390. DOI: 10.1111/acer.12092
- Samet JH, Walley AY. Interventions targeting HIV-infected risky drinkers: drops in the bottle. *Alcohol Res Health*. 2010; 33(3):267–279. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/23584068>. [PubMed: 23584068]
- Vagenas P, Azar MM, Copenhaver MM, Springer SA, Molina PE, Altice FL. The impact of alcohol use and related disorders on the HIV continuum of care: a systematic review: alcohol and the HIV continuum of care. *Current HIV/AIDS reports*. 2015; 12(4):421–436. DOI: 10.1007/s11904-015-0285-5 [PubMed: 26412084]

- Volk RJ, Steinbauer JR, Cantor SB. Patient factors influencing variation in the use of preventive interventions for alcohol abuse by primary care physicians. *Journal of Studies on Alcohol*. 1996; 57(2):203–209. Retrieved from [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list\\_uids=8683970](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=8683970). [PubMed: 8683970]
- Williams EC, Achtmeyer CE, Kivlahan DR, Greenberg D, Merrill JO, Wickizer TM, Bradley KA. Evaluation of an electronic clinical reminder to facilitate brief alcohol-counseling interventions in primary care. *Journal of Studies on Alcohol and Drugs*. 2010; 71(5):720–725. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/20731977>. [PubMed: 20731977]
- Williams EC, Achtmeyer CE, Thomas RM, Grossbard JR, Lapham GT, Chavez LJ, Bradley KA. Factors Underlying Quality Problems with Alcohol Screening Prompted by a Clinical Reminder in Primary Care: A Multi-site Qualitative Study. *Journal of General Internal Medicine*. 2015; doi: 10.1007/s11606-015-3248-z
- Williams EC, Achtmeyer CE, Young JP, Rittmueller SE, Ludman EJ, Lapham GT, Bradley KA. Local implementation of alcohol screening and brief intervention at five Veterans Health Administration primary care clinics: perspectives of clinical and administrative staff. *Journal of Substance Abuse Treatment*. 2016; 60:27–35. DOI: 10.1016/j.jsat.2015.07.011 [PubMed: 26297322]
- Williams EC, Gupta S, Rubinsky AD, Jones-Webb R, Bensley KM, Young JP, Harris AH. Racial/Ethnic Differences in the Prevalence of Clinically Recognized Alcohol Use Disorders Among Patients from the U.S. Veterans Health Administration. *Alcoholism, Clinical and Experimental Research*. 2016; 40(2):359–366. DOI: 10.1111/acer.12950
- Williams EC, Hahn JA, Saitz R, Bryant K, Lira MC, Samet JH. Alcohol use and Human Immunodeficiency Virus (HIV) Infection: current knowledge, implications, and future directions. *Alcoholism Clinical and Experimental Research*. 2016; 40(10):2056–2072. DOI: 10.1111/acer.13204
- Williams EC, Johnson ML, Lapham GT, Caldeiro RM, Chew L, Fletcher GS, Bradley KA. Strategies to implement alcohol screening and brief intervention in primary care settings: a structured literature review. *Psychology of Addictive Behaviors*. 2011; 25(2):206–214. DOI: 10.1037/a0022102 [PubMed: 21517141]
- Williams EC, Joo YS, Lipira L, Glass JE. Psychosocial stressors and alcohol use, severity, and treatment receipt across human immunodeficiency virus (HIV) status in a nationally representative sample of US residents. *Substance Abuse*. 2016; :1–9. DOI: 10.1080/08897077.2016.1268238
- Williams EC, Rubinsky AD, Chavez LJ, Lapham GT, Rittmueller SE, Achtmeyer CE, Bradley KA. An early evaluation of implementation of brief intervention for unhealthy alcohol use in the US Veterans Health Administration. *Addiction*. 2014; 109(9):1472–1481. DOI: 10.1111/add.12600 [PubMed: 24773590]
- Zou G. A modified poisson regression approach to prospective studies with binary data. *American Journal of Epidemiology*. 2004; 159(7):702–706. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/15033648>. [PubMed: 15033648]

Baseline characteristics overall and across receipt of brief intervention among VA patients living with HIV who had an initial positive screen for unhealthy alcohol use and a follow-up alcohol screen 9–15 months later

Table 1

	Total Sample		Documented Brief Intervention		p-value
	n (%)	n (%)	No n (%)	Yes n (%)	
Gender					0.188
Female	39 (1.9)	13 (2.5)	26 (1.6)		
Age					0.534
18–29	65 (3.1)	18 (3.5)	47 (3.0)		
30–44	323 (15.4)	76 (14.8)	247 (15.5)		
45–64	1,552 (73.9)	372 (72.7)	1,180 (74.3)		
65+	161 (7.7)	46 (9.0)	115 (7.2)		
Race/ethnicity <sup>‡</sup>					0.475
Asian American/Pacific Islander	23 (1.1)	9 (1.8)	14 (0.9)		
Black	1,147 (55.7)	286 (56.7)	861 (55.4)		
Hispanic/Latino	194 (9.4)	43 (8.5)	151 (9.7)		
Native American	27 (1.3)	6 (1.2)	21 (1.4)		
White	667 (32.4)	160 (31.7)	507 (32.6)		
Marital status <sup>‡</sup>					0.221
Divorced/Separated	681 (32.7)	170 (33.6)	511 (32.5)		
Married	243 (11.7)	49 (9.7)	194 (12.3)		
Never Married/Single	1,080 (51.9)	273 (54.0)	807 (51.3)		
Widowed	76 (3.7)	14 (2.8)	62 (3.9)		
VA eligibility status <sup>‡</sup>					0.103
Full VA Coverage	369 (17.6)	74 (14.5)	295 (18.6)		
Service connection <50%	447 (21.3)	112 (21.9)	335 (21.1)		
Non-service connected	1,285 (61.2)	326 (63.7)	959 (60.4)		
Fiscal year of first AUDIT-C					0.932
2010	857 (40.8)	211 (41.2)	646 (40.7)		

	Total Sample		Documented Brief Intervention				p-value
	(2,101)		No		Yes		
	n	(%)	n	(%)	n	(%)	
2011	595	(28.3)	147	(28.7)	448	(28.2)	
2012	436	(20.8)	101	(19.7)	335	(21.1)	
2013	213	(10.1)	53	(10.4)	160	(10.1)	
Major depression	329	(15.7)	66	(12.9)	263	(16.6)	0.047
Other mood disorder	840	(40.0)	167	(32.6)	673	(42.4)	0.000
PTSD	312	(14.9)	49	(9.6)	263	(16.6)	0.000
Anxiety	275	(13.1)	65	(12.7)	210	(13.2)	0.761
Serious mental illness	317	(15.1)	58	(11.3)	259	(16.3)	0.006
Stimulant use disorder	596	(28.4)	139	(27.1)	457	(28.8)	0.482
Opioid use disorder	177	(8.4)	36	(7.0)	141	(8.9)	0.192
Other drug use disorder	290	(13.8)	62	(12.1)	228	(14.3)	0.201
Tobacco	1,381	(65.7)	330	(64.5)	1,051	(66.1)	0.484
AUDIT-C categories (first)							0.312
5-8	1,548	(73.7)	386	(75.4)	1,162	(73.1)	
9-12	553	(26.3)	126	(24.6)	427	(26.9)	
Alcohol use disorder excluding remission	1,038	(49.4)	217	(42.4)	821	(51.7)	0.000
Alcohol specific condition	42	(2.0)	9	(1.8)	33	(2.1)	0.654
Deyo Comorbidity Index* 3	168	(8.0)	43	(8.4)	125	(7.9)	0.700
Inpatient visits in past year							0.980
0	1,605	(76.4)	394	(77.0)	1,211	(76.2)	
1	282	(13.4)	66	(12.9)	216	(13.6)	
2-3	155	(7.4)	38	(7.4)	117	(7.4)	
4	59	(2.8)	14	(2.7)	45	(2.8)	
Outpatient visits in past year							0.247
0-4	226	(10.8)	65	(12.7)	161	(10.1)	
5-10	481	(22.9)	124	(24.2)	357	(22.5)	
11-24	696	(33.1)	158	(30.9)	538	(33.9)	
25	698	(33.2)	165	(32.2)	533	(33.5)	

Total N varies for characteristic due to missing values: race/ethnicity (n 2,058); marital status (n 2,080)

\* AIDS diagnoses were excluded from this measure

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

**Table 2**

Association between receipt of brief intervention and resolution of unhealthy alcohol use at follow-up screening a year later among VA patients living with HIV who had an initial positive screen for unhealthy alcohol use and a follow-up alcohol screen 9–15 months later (n=2,101)

	Incidence Rate Ratio (IRR)	95% Confidence Interval (CI)	p-value
<b>Primary Predictor: Documented Brief Intervention 0–14 days after a positive screen</b>			
Unadjusted	0.96	0.90 – 1.03	0.230
Adjusted *	0.96	0.90 – 1.02	0.208
<b>Secondary Predictor: Number of Brief Interventions received 0–365 days after a positive screen</b>			
Unadjusted			
None	Referent	Referent	
Single Brief Intervention	0.96	0.90 – 1.03	0.248
2 Brief Interventions	0.95	0.83 – 1.08	0.411
Adjusted *			
None	Referent	Referent	
Single Brief Intervention	0.96	0.90 – 1.03	0.264
2 Brief Interventions	0.91	0.80 – 1.03	0.146

\* adjusted for sociodemographic and clinical characteristics, and utilization patterns