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Comparing Alcohol Screening Measures Among HIV Infected and Uninfected Men

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Abstract

Background—Brief measures of unhealthy alcohol use have not been well-validated among people with HIV. We compared the Alcohol Use Disorders Identification Test (AUDIT) to reference standards for unhealthy alcohol use based on 30 day Timeline Follow Back (TLFB) and Composite International Diagnostic Interview - Substance Abuse Module (CIDI-SAM), among 873 male HIV infected and uninfected patients in the Veterans Aging Cohort Study.

Methods—Three reference standards were: 1)*Risky drinking* - based on TLFB: >14 drinks over 7 consecutive days or >4 drinks on one day; 2)*Alcohol dependence* - based on a CIDI-SAM diagnosis; and 3)*Unhealthy alcohol use* - risky drinking or a CIDI-SAM diagnosis of abuse or dependence. Various cutoffs for the AUDIT, AUDIT-C, and heavy episodic drinking were compared to the reference standards.

Results—Mean age of patients was 52 years, 53% (444) were HIV infected, and 53% (444) were African-American. Among HIV infected and uninfected patients, the prevalence of risky drinking (14% vs. 12% respectively), alcohol dependence (8% vs. 7%), and unhealthy alcohol use (22% vs. 20%) was similar. For risky drinking and alcohol dependence, multiple cutoffs of AUDIT, AUDIT-C, and heavy episodic drinking provided good sensitivity (>80%) and specificity (>90%).

For unhealthy alcohol use, few cutoffs provided sensitivity >80%; however, many cutoffs provided good specificity. For all three alcohol screening measures, sensitivity improved when heavy episodic drinking was included with the cutoff. Sensitivity of measures for risky drinking and unhealthy alcohol use were lower in HIV infected than in uninfected patients.

Conclusions—For identifying risky drinking, alcohol dependence, and unhealthy alcohol use, AUDIT-C performs as well as AUDIT and similarly in HIV infected and uninfected patients. Cutoffs should be based on the importance of specific operating characteristics for the intended research or clinical use. Incorporating heavy episodic drinking increased sensitivity for detecting alcohol dependence and unhealthy alcohol use.

Introduction

“Unhealthy alcohol use” includes any amount of drinking above “low risk” drinking and specifically includes risky drinking, alcohol abuse, and alcohol dependence (Bradley et al., 2009; Saitz, 2005). Unhealthy alcohol use is common in HIV infected individuals and contributes to adverse health consequences (Conigliaro et al., 2003; Saitz, 2005). Alcohol consumption can influence HIV disease progression by impacting patients’ adherence and response to antiretroviral treatment (Baum et al., 2010; Samet et al., 2006). Despite these findings, and the potential that even low levels of alcohol consumption may cause harm among those infected with HIV (Braithwaite and Bryant, 2010; Sullivan et al., 2011), there are no detailed studies comparing the operating characteristics of standard alcohol screening measures between HIV infected and uninfected individuals or validating the use of alcohol screening measures and identifying appropriate cutoffs to use for HIV infected patients. This creates a problem for researchers and clinicians in deciding which measures should be used to identify and characterize unhealthy alcohol use among HIV infected individuals.

To conduct meaningful research on alcohol use and related consequences in those with HIV infection and to identify patients who may benefit from counseling or pharmacologic interventions, researchers and clinicians need valid and feasible measures for identifying unhealthy alcohol use. For instance, certain pharmacotherapies are indicated primarily for those who meet criteria for alcohol dependence. There are many instruments designed to identify those who may be at increased risk for unhealthy alcohol use, including brief screening measures such as the Alcohol Use Disorders Identification Test (AUDIT)(Babor et al., 1989). More time intensive methods such as the 30 day Time Line Follow Back (TLFB)(Sobell et al., 1988a) and the Composite International Diagnostic Interview – Substance Abuse Module (CIDI-SAM)(Compton, 1993) provide more definitive information about unhealthy alcohol use. Many prior studies have evaluated the use of the AUDIT for identifying various types of unhealthy alcohol use and have identified appropriate cutoffs to use in various populations (Babor et al., 1989; Bradley et al., 1998; Gordon et al., 2001; Gual et al., 2002; Reinert and Allen, 2002; Rubinsky et al., 2010; Saunders et al., 1993; Schmidt et al., 1995) but not in an HIV infected population.

The aim of the current research was to determine the performance of various screening instruments and thresholds for three types of alcohol use in a large cohort of HIV infected and uninfected patients receiving primary care. The three drinking categories evaluated are

1) risky drinking, (NIAAA 2003; NIAAA 2010), 2) alcohol dependence (DSM) and, 3) unhealthy alcohol use (Saitz, 2005).

Methods

Setting and Subjects

Subjects were male participants of the Veterans Aging Cohort Study (VACS), a prospective multisite observational study focused on the role of alcohol use on health in HIV infected and uninfected individuals (Justice et al., 2006a), funded by the National Institute on Alcohol Abuse and Alcoholism. VACS is an ongoing study conducted at eight Veterans Affairs facilities (Atlanta, Georgia; Baltimore, Maryland; Bronx, New York; Houston, Texas; Los Angeles, California; New York City, New York; Pittsburgh, Pennsylvania and Washington, District of Columbia, USA). HIV infected individuals are recruited from Infectious Disease clinics that provide primary medical care at the participating sites. All HIV infected patients presenting to each participating site are eligible. Uninfected controls are recruited from the General Internal Medicine clinics at the same sites, and are matched to the demographics of the HIV infected subjects on 5-year age blocks, race/ethnicity and gender. Subjects in the current analysis are 837 male VACS participants enrolled from June 2002 to February 2004 who were part of a sub-study designed to assess alcohol use and the validity of alcohol screening measures. VACS participants were asked to participate in the sub-study if they had reported having at least one alcoholic drink in the past year. The study was approved by the Institutional Review Board of each site.

Measures of Alcohol Use Collected in VACS

The AUDIT was collected via self-administered paper survey at the 1 year follow-up (Babor TF 1989). The CIDI-SAM and 30 day TLFB were administered via telephone interview shortly after the 1 year follow-up paper survey.

The CIDI-SAM operationalizes the diagnostic criteria of Diagnostic and Statistical Manuals (DSM-III, DSM-III-R, DSM-IV and International Classification of Diseases-10th Revision (ICD-10) psychoactive substance use disorders.(Compton, 1993; Kessler et al., 1998). CIDI-SAM data were used to identify both lifetime and current (past 12 month) alcohol abuse and dependence disorders. The alcohol 30 day TLFB, a validated calendar-based method whereby subjects provide retrospective estimates of their daily drinking was used to collect information on alcohol consumption over the 30 days prior to the telephone interview. The TLFB has been evaluated in clinical and nonclinical populations, and is validated when administered in person and by telephone (Maisto et al., 2009; Sobell et al., 1988a; Sobell et al., 1988b; Sobell and Sobell, 1992). The 10-item AUDIT (Babor, 1989; Gordon et al., 2001; Reinert and Allen, 2002; Saunders et al., 1993; Schmidt et al., 1995) was administered during the year 1 follow-up survey and includes the 3 item AUDIT-C, an instrument that consists of the three consumption items of the AUDIT (Bush et al., 1998; Dawson et al., 2005; Gual et al., 2002). The AUDIT-C has similar sensitivities and specificities for identifying unhealthy alcohol use to the AUDIT (Bradley et al., 1998a; Bradley et al., 1998b; Gual et al., 2002) yet is shorter.

We used the 3rd item of the AUDIT, which asks: “How often do you have six or more drinks on one occasion?” with response options “never,” “less than monthly,” “monthly,” “weekly,” and “daily or almost daily” to identify patients with heavy episodic drinking. Those who indicated that they consumed 6 or more drinks (chose response option of “less than monthly” or more frequently) were classified as ‘ever’ heavy episodic drinkers. Heavy episodic drinking has been associated with many adverse health effects including unintentional injuries, acute myocardial infarction, ischemic stroke, sexually transmitted diseases (Hansagi et al, 1995; Naimi et al., 2003; Raj et al., 2009) and among those with HIV it has been associated with decreased adherence (Braithwaite et al., 2008). To determine if we could improve the performance of the AUDIT and AUDIT-C measures with reference standard measures by incorporating the single heavy episodic drinking item from the AUDIT, we also created composite measures that were positive if the AUDIT measure was greater than a specified cutoff *or* if the person reported any heavy episodic drinking in the past year. These measures represent a broader spectrum of unhealthy alcohol use than do an AUDIT cutoff or heavy episodic drinking alone.

We used ICD-9 codes to identify subjects diagnosed with alcohol dependence. We also used ICD-9 codes to identify subjects with an alcohol-related diagnosis which included ICD-9 codes reflecting alcohol abuse, alcohol dependence, or problems stemming from excessive alcohol consumption (e.g. alcoholic cirrhosis). The alcohol-related diagnosis ICD-9 codes used were based on the work of Piette and are listed on the VACS website (www.vacohort.org) (Justice et al., 2006b; Piette et al., 1998). Patients were considered to have a diagnosis of alcohol dependence or an alcohol-related diagnosis if they had at least one inpatient or two outpatient alcohol-related ICD-9 codes ever and within the 12 months prior to and including the date of the follow-up telephone interview. Requiring at least one inpatient or two outpatient ICD-9 codes has been shown to improve the accuracy of these codes (Justice et al., 2006b).

Alcohol Reference Measures for Risky Drinking, Dependence, and Unhealthy Use

We used established reference standards (“gold standards”) for risky drinking, alcohol dependence, and unhealthy alcohol use. The reference standard for *risky drinking* was based on the 30-day TLFB assessment of amounts that increase the risk for health consequences. We defined risky drinking as consuming greater than 14 drinks over any consecutive 7 day period or >4 drinks in one day based on guidelines recommended by the National Institute on Alcohol Abuse and Alcoholism to identify those at risk for alcohol related problems (Fleming, 2009). The reference standard for past year alcohol *dependence* was based on the CIDI-SAM diagnosis of dependence. We chose to use a dependence-only reference measure instead of dependence/abuse because certain treatments and pharmacotherapies are indicated primarily for those who meet criteria for alcohol dependence. *Unhealthy alcohol use in the past year* was defined as having a CIDI-SAM diagnosis of alcohol abuse or dependence in the past year or meeting criteria for risky drinking based on TLFB interview.

Analysis

We describe demographic characteristics for the VACS participants who completed the CIDI-SAM. Using the three reference measures, we calculated sensitivity, specificity,

positive predictive value (PPV), negative predictive value (NPV), percent agreement, and kappa statistics for measures of alcohol use for both HIV infected and uninfected participants. We compared the following alcohol measures to the reference standard for risky drinking and unhealthy alcohol use: AUDIT, AUDIT-C, heavy episodic drinking, AUDIT or heavy episodic drinking, and AUDIT-C or heavy episodic drinking. For the unhealthy alcohol use reference standard we also compared ICD-9 diagnosis of alcohol abuse or dependence in the past year. We compared those measures as well as the following measures to the reference standard for dependence: ICD-9 codes for alcohol diagnoses, and an AUDIT dependence score (from items 4-6 of the AUDIT). The AUDIT and AUDIT-C cutoffs tested are based on prior research (Babor et al., 1989; Bradley, 1998b). Analyses were run using Stata 10.0.

Results

Subject Characteristics

All subjects were male. Age and percent with HIV were similar between the sub-study sample (n=837) and the entire VACS cohort (n=6,467), although those in the analytic sample were more likely to be white than overall VACS participants (33% vs. 22%). Of the 837 in the analytic sample, half were HIV infected which is consistent with the study design target to recruit a similar number of HIV infected and uninfected patients. Race/ethnicity was similar between the HIV infected and uninfected participants with 53% African-American, 8% Hispanic, 33% White, and 5% other. However, compared to uninfected subjects, HIV infected were younger (average age 50 years vs. 54 year).

Based on the TLFB, 13% reported risky drinking amounts in the past 30 days. Seven percent of subjects met criteria for past year alcohol dependence based on the CIDI-SAM. Based on a combination of TLFB-determined risky amounts and CIDI-SAM-determined alcohol use disorders, 21% had unhealthy alcohol use. The prevalence of various levels of unhealthy use and alcohol measures is shown in Table 1, and there are no statistically significant differences in these alcohol measures between HIV infected and uninfected subjects.

Alcohol Screening Measures and Risky Drinking

For HIV infected and uninfected subjects, sensitivity was 80% or greater between the TLFB reference standard for risky drinking and the following measures and cutoffs: AUDIT 4+ (80% vs. 86%), AUDIT 5+ or heavy episodic drinking (83% vs. 84%), AUDIT 4+ or heavy episodic drinking (83% vs. 90%), AUDIT-C 3+ (83 vs. 90%), AUDIT-C 4+ or heavy episodic drinking (83% vs. 88%), AUDIT-C 3+ or heavy episodic drinking (85% vs. 94%). Specificity was 90% or greater for AUDIT 8+ (92% vs. 94%), AUDIT 7+ (90% vs. 92%), AUDIT-C 6+ (96% vs. 95%), AUDIT-C 5+ (92% vs. 94%), heavy episodic drinking less than monthly (94% vs. 94%), and at least monthly heavy episodic drinking (98% vs. 97%) (Table 2). The kappa statistics for these comparisons ranged from 0.28 to 0.61, indicating fair to moderate agreement (Landis and Koch, 1977).

Alcohol Screening Measures and Alcohol Dependence

For HIV infected and uninfected subjects, sensitivity was 80% or greater between the CIDI-SAM reference standard, for alcohol dependence in past year and the following measures and cutoffs: AUDIT 4+ (83% vs. 81%), AUDIT 8+ or heavy episodic drinking (83% vs. 78%), AUDIT 7+ or heavy episodic drinking (83% vs. 81%), AUDIT 6+ or heavy episodic drinking (86% vs. 81%), AUDIT 5+ or heavy episodic drinking (86% vs. 81%) and AUDIT-C 3+ or heavy episodic drinking (77% vs. 81%). Specificity was 90% or greater for the following measures: ICD-9 diagnosis for abuse or dependence in past year (93% vs. 92%), ICD-9 diagnosis code for dependence in the past year (97% vs. 94%), AUDIT 20+ (99% vs. 98%), AUDIT 16+ (98% vs. 98%), AUDIT 8+ (92% vs. 91%), AUDIT-C 10+ (100% vs. 99%), AUDIT-C 8+ (98% vs. 95%), AUDIT-C 6+ (94% vs. 86%), heavy episodic drinking less than monthly (92% vs. 90%) heavy episodic drinking at least monthly (98% vs. 94%), and AUDIT Dependence Score 4+ (99% vs. 98%) (Table 3). Among HIV uninfected, the kappa statistics are 0.06 and 0.10 for the ICD-9 diagnosis of alcohol abuse or dependence and dependence alone, respectively. Otherwise, kappa statistics ranged from 0.17 to 0.43 indicating slight to moderate agreement (Landis and Koch, 1977).

Alcohol Screening Measures and Unhealthy Alcohol Use

For HIV infected and uninfected subjects, sensitivity was 80% or greater between the reference standard for unhealthy alcohol use and the following measures and cutoffs: AUDIT-C 2+ (88% vs. 96%) AUDIT-C 3+ or heavy episodic drinking (71% vs. 83%). Specificity was 90% or greater for AUDIT 8+ (95% vs. 96%), AUDIT 7+ (93% vs. 95%), AUDIT 6+ (91% vs. 93%), AUDIT-C 6+ (97% vs. 97%), AUDIT-C 5+ (94% vs. 96%), heavy episodic drinking less than monthly (96% vs. 95%), at least monthly heavy episodic drinking (99% vs. 98%), and ICD-9 diagnosis for alcohol abuse or dependence (94% vs. 92%) (Table 4). For the ICD-9 diagnosis of alcohol abuse or dependence, kappa statistics are 0.16 and 0.02 for HIV infected and uninfected respectively. Otherwise, kappa-statistics range from 0.27 to 0.57 indicating fair to moderate agreement (Landis and Koch, 1977).

Discussion

In this sample, the prevalence of various types of unhealthy alcohol use were similar among HIV infected and uninfected adults. Compared to the reference standards, the AUDIT-C can identify risky drinking and unhealthy alcohol use with over 80% sensitivity at the best performing cutoffs among both HIV infected and uninfected patients. Using the AUDIT-C combined with any heavy episodic drinking in the past year (item 3 of the AUDIT-C) improves sensitivity for detecting both risky and unhealthy alcohol use compared to using the AUDIT-C alone. High specificity for risky drinking and unhealthy alcohol use can be obtained using various AUDIT-C cutoffs and even by using the heavy episodic drinking single item question alone. We note that sensitivity is higher for most cutoffs for risky drinking than for unhealthy alcohol use. We believe this is because alcohol abuse and dependence are included in the definition for unhealthy alcohol use and they may be more difficult to detect with AUDIT based measures than risky drinking alone. For both risky drinking and unhealthy alcohol use, many cutoffs provide moderate agreement or better based on the kappa statistics.

For identifying those with alcohol dependence, the AUDIT performs better than the AUDIT-C and combining heavy episodic drinking with the AUDIT cutoffs results in higher sensitivity. Using a cutoff of AUDIT 6+ or heavy episodic drinking resulted in sensitivity of 86% for HIV infected and 81% for HIV uninfected. High specificity for alcohol dependence can be obtained by using high cutoffs for the AUDIT (20+ and 16+), the AUDIT-C (10+ and 8+), the AUDIT dependence score of 4+, and the ICD-9 code for dependence in the past year, however sensitivity is low (14-31%). Many cutoffs provide fair agreement or better based on the kappa statistics.

Our findings are consistent with other studies that have reported on recommendations for AUDIT and AUDIT-C cutoffs for unhealthy alcohol use. The standard cutoffs recommended for AUDIT range from 5 or more to 8 or more, and those recommended for the AUDIT-C range from 3 or more to 6 or more for various types of unhealthy alcohol use (Bradley et al., 1998b; Bush et al., 1998; Gordon et al., 2001; Gual et al., 2002). Additionally, our finding that the AUDIT-C performs as well as the longer AUDIT for identifying those with risky drinking and unhealthy alcohol use is consistent with findings of other researchers (Bradley et al., 2009; Gordon et al., 2001; Bradley et al., 1998b; Gordon and Saitz, 2004). We demonstrate that adding a heavy episodic drinking component improves sensitivity compared to AUDIT cutoffs alone without adding additional burden to the patients or survey respondents as this question is already included as part of the AUDIT.

We found that the prevalence of risky drinking is slightly higher in the HIV infected subjects based on the TLFB, but the percent of patients identified with risky drinking is slightly lower among the HIV infected subjects based on the various cutoffs of AUDIT, AUDIT-C, and heavy episodic drinking. For risky drinking and unhealthy alcohol use, we are uncertain as to why sensitivity is lower among the HIV infected compared to uninfected. One study reported that those with HIV used alcohol at lower usual levels but with greater variability compared to those who were HIV uninfected (Braithwaite et al., 2008). Perhaps this difference in drinking patterns between HIV infected and uninfected provides some insight into the differences in sensitivity. More likely, however, there may be a social desirability bias causing the HIV infected patients to under report their alcohol consumption.

For alcohol dependence, agreement is particularly low for the ICD-9 codes for the HIV uninfected ($\kappa < .10$) compared to the HIV infected subjects ($\kappa = 0.23-.26$). Although we realize that alcohol related diagnoses often are underreported, we are surprised to see a lower level of agreement among the HIV uninfected subjects given that the prevalence of all alcohol measures including the ICD-9 measures are similar between the HIV infected and uninfected groups. Perhaps HIV infected patients are screened more frequently or aggressively due to increased surveillance for the potential negative interactions of alcohol use with medications and/or other comorbidities, such as Hepatitis C.

This study has several strengths. It uses a large United States multisite cohort of racially/ethnically diverse HIV infected and uninfected patients with multiple measures of alcohol use. Many studies have evaluated and identified the optimal cutoffs to use for the AUDIT and the AUDIT-C to identify risky drinking amounts, alcohol dependence and the spectrum of unhealthy alcohol use. However, no other studies that we are aware of have evaluated

these measures in an HIV infected population. This study provides new information regarding the performance of commonly used screening and diagnostic instruments among HIV infected subjects, an important population that is at higher risk for adverse outcomes from alcohol use. For many studies and clinical settings it is important to have brief tools for evaluating alcohol use to help minimize participant burden and maximize time and resources, especially when one is attempting to collect information on a variety of behaviors. In clinical settings especially, patient assessments need to be brief due to patient and provider time constraints.

This study has several limitations. First, our study sample was restricted to Veterans receiving medical care and, because the majority of our cohort is male, we limited the analysis to men. Similar studies should be conducted on cohorts of HIV infected and uninfected women. The mean age of our study population is 52 years and this should be considered when applying these findings to older or younger populations. For risky drinking, we compare the AUDIT, which captures data for the previous year, to the TLFB which captures drinking information over the previous 30 days. Based on these differing timeframes, we might expect to see lower prevalence of risky drinking identified by the TLFB, especially if we are incorporating heavy episodic drinking, which we expect to have reported more frequently over the past year in the AUDIT than in the past 30 days on the TLFB. How much prevalence differs would depend on how consistent drinking behavior was over time; furthermore the AUDIT asks about typical drinking which is likely affected by recent (e.g. past-month) behavior. In any case, sensitivity should not be impacted by the timeframe discrepancy between measures because the screening test covers a longer time than the reference standard. However, specificity could be lower due to some individuals not meeting criteria for risky drinking over the past 30 days on the TLFB, but meeting risky drinking criteria based on AUDIT or AUDIT-C during the previous year.

Although our results demonstrate that agreement is similar between HIV infected and uninfected subjects for identifying participants on the spectrum of alcohol use, we cannot be sure that screening tests administered in person as one to three items as part of clinical care will perform the same as the screening tests asked as part of a research survey that is self-administered.

Despite these limitations, our findings have implications for the use of these screening measures in clinical practice and research. We do not recommend a standard instrument or cutoff to use for all purposes, as the decision will depend on the purpose (e.g. screening) for each situation. However, based on the current findings, the optimal balance between sensitivity, specificity, and agreement, is provided by the following instruments using the specified cutoffs for both general medical and HIV care settings: AUDIT-C 4+ or heavy episodic drinking for risky drinking; AUDIT 6+ or heavy episodic drinking for alcohol dependence, and AUDIT-C 3+ or heavy episodic for unhealthy alcohol use. Of note, for unhealthy alcohol use, few cutoffs provide sensitivity >80%; however, many cutoffs provide good specificity. For identifying alcohol dependence, the highly specific AUDIT dependence score and the ICD-9 diagnosis codes are not recommended when sensitivity is important, such as for screening measures by physicians. However, in the absence of other

sources of alcohol data, ICD-9 codes can be useful where specificity is important and sensitivity is not (for example, when evaluating costly and/or time intensive interventions).

In summary, for both HIV infected and uninfected patients, briefer measures of alcohol use provide reasonable sensitivity and specificity for risky and unhealthy use compared to the longer more resource intensive measures. The incorporation of heavy episodic drinking from question 3 of the AUDIT with AUDIT and AUDIT-C cutoffs improves sensitivity for identifying risky drinking, alcohol dependence and unhealthy alcohol use compared to using AUDIT and AUDIT-C cutoffs alone. For many research and clinical purposes, the briefer measures should be sufficient, at least for screening purposes, and then more time intensive measures could be utilized to follow-up on positive screens. Cutoffs can be chosen to maximize sensitivity or specificity as appropriate to the clinical or research application. For alcohol dependence, the briefer measures may not be adequate for more than broad screening; a more intensive measure, such as the CIDI-SAM, may still be necessary when sensitivity is important. However, when specificity is important and sensitivity is not, brief tools can be used when identifying people with alcohol dependence.

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Table 1

Subject Characteristics

	Total (n=837)	HIV+ (n=444)	HIV- (n=393)	P-value
Race/ethnicity (%)				
African-American	53	56	51	0.5
Hispanic	8	7	8	
White	33	32	36	
Other	5	5	5	
Mean Age, in years	52 (9.3)	50 (8.4)	54 (9.8)	<.001
Alcohol Use (%)				
Unhealthy use in past year (SAM and TLFB)	21	22	20	0.5
Alcohol dependence in past year	7	8	7	0.6
Alcohol abuse/dependence in past year	16	16	16	0.9
Risky consumption (TLFB)	13	14	12	0.8
AUDIT 8+	12	12	11	0.7
AUDIT 8+ or HED	26	25	27	0.7
AUDIT-C 6+	10	9	11	0.3
AUDIT-C 5+	15	15	15	0.8
AUDIT-C 4+	22	21	22	0.8
AUDIT-C 3+	31	30	31	0.8
AUDIT-C 6+ or HED	24	23	26	0.4
AUDIT-C 5+ or HED	25	24	26	0.4
AUDIT-C 4+ or HED	28	27	29	0.4
AUDIT-C 3+ or HED	33	32	34	0.5
HED ever	24	23	26	0.4
HED less than monthly	12	11	13	0.4
HED at least monthly	6	5	8	0.1
Alcohol-related ICD-9 diagnosis in past year	9	9	9	0.9
ICD-9 alcohol dependence diagnosis in past year	6	5	6	0.7
AUDIT 20+	3	2	3	0.6
AUDIT 16+	4	4	4	0.9
AUDIT Dependence Score 4+ (items4-6)	4	3	4	0.7

HED, heavy episodic drinking

ICD-9; International Classification of Diseases, 9th revision

Table 2
Agreement of “Gold Standard” for **Risky Drinking** based on TLFB with Various Measures and Cutoffs

<i>Comparison Measure</i>	<i>Sens (%)</i>	<i>Spec (%)</i>	<i>PPV (%)</i>	<i>NPV (%)</i>	<i>Agree (%)</i>	<i>Kappa</i>
HIV Infected						
AUDIT 8+	38	92	42	90	84	0.31
AUDIT 7+	52	90	44	92	85	0.39
AUDIT 6+	60	88	43	93	84	0.41
AUDIT 5+	73	84	42	95	82	0.43
AUDIT 4+	80	79	37	37	79	0.39
AUDIT 8+ or HED	75	82	40	95	81	0.42
AUDIT 7+ or HED	75	82	39	95	81	0.41
AUDIT 6+ or HED	78	81	39	96	81	0.42
AUDIT 5+ or HED	83	79	39	97	80	0.42
AUDIT 4+ or HED	83	75	34	97	76	0.37
AUDIT-C 6+	38	96	59	91	88	0.40
AUDIT-C 5+	60	92	54	94	88	0.49
AUDIT-C 5+	49	94	70	87	84	0.48
AUDIT-C 4+	75	87	47	96	85	0.50
AUDIT-C 3+	83	78	37	97	79	0.40
AUDIT-C 2+	88	65	28	97	68	0.28
AUDIT-C 6+ or HED	72	84	41	95	83	0.43
AUDIT-C 5+ or HED	77	84	42	96	83	0.45
AUDIT-C 4+ or HED	80	82	41	96	82	0.44
AUDIT-C 3+ or HED	85	77	36	97	78	0.39
HED ever	72	85	42	95	83	0.43
HED less than monthly	42	94	52	91	87	0.39
HED at least monthly	23	98	61	89	88	0.28
HIV Uninfected						
AUDIT 8+	47	94	53	92	88	0.43

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<i>Comparison Measure</i>	<i>Sens</i> (%)	<i>Spec</i> (%)	<i>PPV</i> (%)	<i>NPV</i> (%)	<i>Agree</i> (%)	<i>Kappa</i>
AUDIT 7+	55	92	51	93	87	0.45
AUDIT 6+	65	90	49	94	87	0.48
AUDIT 5+	75	88	48	96	86	0.50
AUDIT 4+	86	81	40	98	82	0.45
AUDIT 8+ or HED	82	82	40	97	82	0.44
AUDIT 7+ or HED	84	82	41	97	82	0.45
AUDIT 6+ or HED	84	82	41	97	82	0.45
AUDIT 5+ or HED	84	81	40	97	81	0.44
AUDIT 4+ or HED	90	77	37	98	79	0.42
AUDIT-C 6+	51	95	60	93	89	0.49
AUDIT-C 5+	71	94	63	96	91	0.61
AUDIT-C 4+	80	87	47	97	86	0.51
AUDIT-C 3+	90	77	37	98	79	0.42
AUDIT-C 2+	96	67	30	99	70	0.32
AUDIT-C 6+ or HED	82	82	41	97	82	0.45
AUDIT-C 5+ or HED	86	82	42	98	83	0.48
AUDIT-C 4+ or HED	88	80	39	98	81	0.45
AUDIT-C 3+ or HED	94	75	36	99	78	0.41
HED ever	81	83	40	97	83	0.45
HED less than monthly	56	94	56	94	89	0.50
HED at least monthly	37	97	61	92	89	0.40

HED, heavy episodic drinking; Sens, sensitivity; Spec, specificity; PPV, positive predictive value; NPV, negative predictive value; Agree, agreement

Table 3
Agreement of “Gold Standard” for *Alcohol Dependence* based on CIDI-SAM with Various Measures and Cutoffs

<i>Comparison Measure</i>	Sens (%)	Spec (%)	PPV (%)	NPV (%)	Agree (%)	Kappa (%)
HIV Infected						
Alcohol-related ICD-9 diagnosis in past year	31	93	28	94	88	0.23
ICD-9 diagnosis of alcohol dependence in past year	26	97	39	94	91	0.26
AUDIT 20+	23	99	73	94	93	0.32
AUDIT 16+	31	98	58	94	93	0.37
AUDIT 8+	63	92	40	97	90	0.43
AUDIT 7+	69	89	34	97	87	0.39
AUDIT 6+	74	86	31	98	85	0.37
AUDIT 5+	74	80	25	97	80	0.28
AUDIT 4+	83	75	22	98	76	0.26
AUDIT 8+ or HED	83	79	26	98	80	0.31
AUDIT 7+ or HED	83	79	25	98	80	0.31
AUDIT 6+ or HED	86	78	25	98	79	0.30
AUDIT 5+ or HED	86	76	23	98	77	0.28
AUDIT 4+ or HED	86	72	21	98	73	0.24
AUDIT-C 10+	14	100	83	93	93	0.23
AUDIT-C 8+	29	98	56	94	93	0.34
AUDIT-C 6+	37	94	29	92	89	0.29
AUDIT-C 5+	57	88	30	96	86	0.32
AUDIT-C 4+	71	83	26	97	82	0.30
AUDIT-C 3+	74	74	19	97	74	0.21
AUDIT-C 2+	82	69	43	93	72	0.38
AUDIT-C 6+ or HED	74	81	25	97	81	0.29
AUDIT-C 5+ or HED	74	80	24	97	80	0.28

<i>Comparison Measure</i>	Sens (%)	Spec (%)	PPV (%)	NPV (%)	Agree (%)	Kappa
AUDIT-C 4+ or HED	77	78	23	97	78	0.26
AUDIT-C 3+ or HED	77	72	19	97	73	0.21
HED ever	74	81	25	97	81	0.30
HED less than monthly	46	92	33	95	89	0.32
HED at least monthly	37	98	57	95	93	0.41
AUDIT Dependence Score 4+ (items 4-6)	26	99	60	94	93	0.33
HIV Uninfected						
Alcohol-related ICD-9 diagnosis in past year	15	92	12	94	87	0.06
ICD-9 diagnosis of alcohol dependence in past year	15	94	17	94	89	0.10
AUDIT 20+	22	98	50	94	93	0.28
AUDIT 16+	33	98	56	95	94	0.39
AUDIT 8+	48	91	29	96	88	0.30
AUDIT 7+	52	89	25	96	86	0.27
AUDIT 6+	59	86	24	97	84	0.26
AUDIT 5+	74	84	25	98	83	0.30
AUDIT 4+	81	76	20	98	77	0.24
AUDIT 8+ or HED	78	77	20	98	77	0.23
AUDIT 7+ or HED	81	77	21	98	77	0.25
AUDIT 6+ or HED	81	77	21	98	77	0.25
AUDIT 5+ or HED	81	77	20	98	77	0.24
AUDIT 4+ or HED	81	72	18	98	73	0.20
AUDIT-C 10+	14	99	44	94	93	0.19
AUDIT-C 8+	26	95	29	95	91	0.22
AUDIT-C 6+	41	91	26	95	88	0.25
AUDIT-C 5+	59	89	28	97	87	0.32
AUDIT-C 4+	67	81	21	97	80	0.24
AUDIT-C 3+	74	72	16	97	72	0.17

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<i>Comparison Measure</i>	Sens (%)	Spec (%)	PPV (%)	NPV (%)	Agree (%)	Kappa
AUDIT-C 2+	88	70	43	96	74	0.42
AUDIT-C 6+ or HED	74	78	20	98	77	0.23
AUDIT-C 5+ or HED	78	77	20	98	77	0.24
AUDIT-C 4+ or HED	78	75	18	98	75	0.21
AUDIT-C 3+ or HED	81	70	17	98	70	0.18
HED ever	74	78	20	98	78	0.23
HED less than monthly	52	90	28	96	88	0.30
HED at least monthly	26	94	23	94	89	0.19
AUDIT Dependence Score 4+ (items4-6)	26	98	47	95	93	0.29

HED, heavy episodic drinking; Sens, sensitivity; Spec, specificity; PPV, positive predictive value; NPV, negative predictive value; Agree, agreement

Table 4
Agreement of “Gold Standard” for *Unhealthy Alcohol Use* based on CIDI-SAM and TLFB with Various Measures and Cutoffs

<i>Comparison Measure</i>	Sens (%)	Spec (%)	ppv (%)	NPV (%)	Agree (%)	Kappa
HIV Infected						
AUDIT 8+	38	95	67	84	82	0.38
AUDIT 7+	47	93	66	86	83	0.45
AUDIT 6+	54	91	64	88	83	0.48
AUDIT 5+	63	87	58	89	82	0.49
AUDIT 4+	69	82	52	90	79	0.46
AUDIT 8+ or HED	66	86	58	90	82	0.50
AUDIT 7+ or HED	66	86	57	90	82	0.49
AUDIT 6+ or HED	69	85	57	91	82	0.50
AUDIT 5+ or HED	72	83	55	91	81	0.50
AUDIT 4+ or HED	73	79	50	91	78	0.45
AUDIT-C 6+	30	97	74	83	82	0.34
AUDIT-C 5+	49	94	71	87	84	0.49
AUDIT-C 4+	61	90	63	89	84	0.52
AUDIT-C 3+	70	81	51	91	79	0.45
AUDIT-C 2+	86	65	28	97	68	0.28
AUDIT-C 6+ or HED	61	88	58	89	82	0.48
AUDIT-C 5+ or HED	64	87	59	90	82	0.50
AUDIT-C 4+ or HED	66	85	55	90	81	0.48
AUDIT-C 3+ or HED	71	79	50	91	78	0.44
HED Ever	61	88	59	89	82	0.48
HED less than monthly	36	96	73	84	83	0.39
HED at least monthly	20	99	87	81	82	0.27
Alcohol-related ICD-9 diagnosis in past year	18	94	46	80	77	0.16
HIV Uninfected						
AUDIT 8+	43	96	76	87	86	0.47
AUDIT 7+	48	95	69	88	85	0.48

<i>Comparison Measure</i>	Sens (%)	Spec (%)	PPV (%)	NPV (%)	Agree (%)	Kappa
AUDIT 6+	56	93	66	89	85	0.52
AUDIT 5+	65	91	65	91	86	0.56
AUDIT 4+	74	84	54	93	82	0.51
AUDIT 8+ or HED	74	85	56	93	83	0.53
AUDIT 7+ or HED	75	85	57	93	83	0.54
AUDIT 6+ or HED	75	85	57	93	83	0.54
AUDIT 5+ or HED	75	85	56	93	83	0.53
AUDIT 4+ or HED	79	81	51	94	80	0.49
AUDIT-C 6+	41	97	77	87	86	0.46
AUDIT-C 5+	55	96	77	89	88	0.57
AUDIT-C 4+	65	89	60	91	84	0.52
AUDIT-C 3+	76	80	50	93	79	0.47
AUDIT-C 2+	96	67	30	99	70	0.32
AUDIT-C 6+ or HED	71	86	56	92	83	0.52
AUDIT-C 5+ or HED	74	86	57	93	83	0.54
AUDIT-C 4+ or HED	76	83	54	93	82	0.51
AUDIT-C 3+ or HED	83	79	50	95	79	0.49
HED Ever	70	86	55	92	82	0.51
HED less than monthly	44	95	70	87	85	0.45
HED at least monthly	29	98	77	84	84	0.35
Alcohol-related ICD-9 diagnosis in past year	10	92	24	80	75	0.02

HED, heavy episodic drinking; Sens, sensitivity; Spec, specificity; PPV, positive predictive value; NPV, negative predictive value; Agree, agreement