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# Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: Comparison at intake and 6 months later

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## Abstract

**Objectives:** Alcohol screening and brief interventions in medical settings can significantly reduce alcohol use. Corresponding data for illicit drug use is sparse. A Federally funded screening, brief interventions, referral to treatment (SBIRT) service program, the largest of its kind to date, was initiated by the Substance Abuse and Mental Health Services Administration (SAMHSA) in a wide variety of medical settings. We compared illicit drug use at intake and 6 months after drug screening and interventions were administered.

**Design:** SBIRT services were implemented in a range of medical settings across six states. A diverse patient population (Alaska Natives, American Indians, African-Americans, Caucasians, Hispanics), was screened and offered score-based progressive levels of intervention (brief intervention, brief treatment, referral to specialty treatment). In this secondary analysis of the SBIRT service program, drug use data was compared at intake and at a 6-month follow-up, in a sample of a randomly selected population (10%) that screened positive at baseline.

**Results:** Of 459,599 patients screened, 22.7% screened positive for a spectrum of use (risky/problematic, abuse/addiction). The majority were recommended for a brief intervention (15.9%), with a smaller percentage recommended for brief treatment (3.2%) or referral to specialty treatment (3.7%). Among those reporting *baseline illicit drug use*, rates of drug use at 6-month follow-up (4 of 6 sites), were 67.7% lower ( $p < 0.001$ ) and heavy alcohol use was 38.6% lower ( $p < 0.001$ ), with comparable findings across sites, gender, race/ethnic, age subgroups. Among persons recommended for brief treatment or referral to specialty treatment, self-reported improvements in general health ( $p < 0.001$ ), mental health ( $p < 0.001$ ), employment ( $p < 0.001$ ), housing status ( $p < 0.001$ ), and criminal behavior ( $p < 0.001$ ) were found.

**Conclusions:** SBIRT was feasible to implement and the self-reported patient status at 6 months indicated significant improvements over baseline, for illicit drug use and heavy alcohol use, with functional domains improved, across a range of health care settings and a range of patients.

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## 1. Introduction

Substance abuse is a major public health burden worldwide, contributing significantly to morbidity and mortality (World

Health Organization (WHO), 2002, 2008). In the United States, the 2006 National Survey on Drug Use and Health (NSDUH) estimated that 22.6 million people harbor a diagnosable (DSM-IV) alcohol or illicit drug use disorder (15.6 million: alcohol disorder alone; 3.8 million: illicit drug use disorder; 3.2 million: combined alcohol and drug disorder, Substance Abuse and Mental Health Services Administration, 2007a). Yet, it is estimated that the vast majority of this population, 95.5% do not recognize they harbor a problem and do not seek treatment. If

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one factors in risky, problematic use, the public health burden may even exceed that of populations with more severe substance abuse conditions (Institute of Medicine, 1990). Alcohol and illicit drug abusers are also at higher risk for the burgeoning problem of misuse or abuse of prescription medications (Carise et al., 2007; Huang et al., 2006; McCabe et al., 2006; McCabe and Teter, 2007).

To alleviate this public health burden, the World Health Organization and others developed sensitive screening questionnaires capable of identifying a continuum of substance use and brief interventions (e.g. Babor et al., 2001; Gavin et al., 1989; Knight et al., 2002; WHO, 2008). A positive screen with low to moderate risk prompts a protocol-driven brief intervention, which has been repeatedly shown to reduce alcohol intake, and associated injury recidivism, driving under the influence, and other adverse consequences (Babor and Higgins-Biddle, 2001; Babor et al., 2007; Burke et al., 2003; Cuijpers et al., 2004; Fleming et al., 1997, 2002; Gentilello et al., 1999, 2005; Schermer et al., 2006; Whitlock et al., 2004). Based on the preponderance of evidence, the World Health Organization, the United States Preventative Services Task Force, (United States Preventive Services Task Force, 2004) and the Committee on Trauma of the American College of Surgeons have endorsed routine alcohol screening and brief interventions in primary health care settings and Level I Trauma Centers (American College of Surgeons, Committee on Trauma, 2007; Substance Abuse and Mental Health Services Administration, 2007c).

The documented effectiveness of SBI for reducing heavy alcohol use is extensive, but corresponding research for illicit or prescription drug abuse is sparse, even though evidence is mounting that medical conditions are overrepresented in illicit drug abusers (e.g. Mertens et al., 2003, 2005; Swanson et al., 2007). Investigator-initiated research (e.g. Bernstein et al., 2005; Copeland et al., 2001) and a World Health Organization (WHO) sponsored study of screening and brief interventions for illicit drugs (marijuana, cocaine, amphetamine-type stimulants, opioids) are gradually filling this void. In the WHO-sponsored randomized control, multi-national study, SBI yielded significant short-term reductions (~3 months) in illicit drug use in combined data from 731 participants (World Health Organization, 2008).

In 2003, the largest SBIRT service program of its kind was implemented by the Center for Substance Abuse Treatment of the Substance Abuse and Mental Health Administration (SAMHSA). Designated screening, brief intervention, and referral to treatment (SBIRT) service, the program has screened over 690,000 to date. SBIRT programs for states and tribal organizations were implemented in various healthcare sites (inpatient, emergency departments, ambulatory, primary and specialty healthcare settings, and community health clinics). Patients were screened concurrently for illicit drug abuse and alcohol consumption, and those screening positive were determined to be in need of a brief intervention, brief treatment, or referral to specialty care, based on score severity. A random sample of populations screening positive and recommended for brief intervention, brief treatment or referral to treatment were interviewed 6 months after receiving SBIRT services, in accordance

with reporting requirements of the Government Performance and Results Act (GPRA) Client Outcome Measures for Discretionary Programs.

We now describe secondary data analysis of these outcome measures, based on screening results of 459,599 people. The uniqueness of this report resides in the large population sample, the heterogeneity of the population, the varied healthcare settings, the diversity of personnel and SBI procedures, and the service orientation of the program.

Given the copious data in support of SBI procedures for reducing heavy alcohol use and the paucity of published reports on SBI effectiveness for illicit drug abuse, we focused on feasibility and outcome measures of illicit drug screening and interventions. Alcohol screening results were included for several reasons. The new (2008) SBI procedural and reimbursable codes for these services adopted by the AMA CPT®, by Medicare (CMS), and Medicaid (CMS) bundle screening and brief interventions for alcohol and other drugs into a single service. Since there is strong scientific evidence, based on randomized control trials, that SBI is effective for reducing heavy alcohol use, we included alcohol results in the study to serve as a standard for validation and for comparison with randomized control trials. Based on the large, diverse populations provided these services in range of healthcare settings, the information is critical for healthcare professionals motivated to provide SBI services for all intoxicants in various settings. Finally, both data sets provide estimates of the relative incidence of alcohol and drug abuse, in healthcare settings.

In this secondary analysis, we addressed the following: (1) Was screening for any illicit drug use feasible in the context of simultaneous screening for heavy alcohol use, in general healthcare settings? (2) Was drug use altered 6 months later in persons screening positive for illicit drug? (3) Were there significant variations in 6-month outcomes as a function of age, gender, and race/ethnicity? (4) For patients that screened positive and designated in need of brief treatment or referred to specialty care, did health and social outcomes change?

## 2. Methods

### 2.1. Sites and clinical procedures

All sites used “universal screening”, that is, screening everyone who came through the door of the site (ED or clinic), unless the patient was too ill, very old, or already had been screened. Although there was not a standard protocol across all sites for approaching patients, each site typically had a “script” to follow. The number of screen positive clients was comparable to what is reported in the literature.

Table 1 summarizes the clinical procedures used by SBIRT programs (sites located in each of the six states are coded Sites 1–6, respectively). Screening was conducted by a wide range of health care personnel with varied backgrounds, all of whom were hired specifically for these projects. The majority of patients presented in healthcare settings for other purposes, and were approached to answer questions related to substance abuse. From site to site, screening questionnaires varied. Thresholds for interventions varied from site to site. Overall, a positive screen for heavy alcohol use was defined as reporting over the past 30 days more than five drinks in one sitting or within a brief period of approximately 1–2 h. Illicit drug use within the past 30 days constituted a positive screen, regardless of the amount used. Generally, patients with low risk use patterns for alcohol and no drug use, received screening only; those with moderate risk alcohol use pat-

Table 1  
Feasibility of screening across all sites

Site	Healthcare settings	Screening tools	Number screened	Screen positive% (n)	BI tools	BI% (n)	BT tools	BT% (n)	RT% (n)
1	Trauma centers; emergency rooms; primary health care centers; hospitals (inpatient/outpatient)	DAST; AUDIT	191,037	18.7 (35,816)	Custom protocols based on FRAMES	14.6 (27,967)	Six sessions based on FRAMES and cognitive behavior therapy	2.4 (4,519)	1.7 (3,330)
2	Trauma centers' emergency room; hospitals (inpatient/outpatient)	DAST; AUDIT	69,112	39.9 (27,551)	Feedback on DAST and AUDIT; motivational interviewing to explore patient views of use and develop change strategies	24.9 (17,198)	Provider choice (without a structured curriculum)	5.9 (4,078)	9.1 (6,275)
3	Emergency rooms; inpatient and outpatient services; primary care health centers; hospitals (inpatient/outpatient); other	Quantity and frequency of alcohol consumption; CAGE (modified for drugs); DAST; AUDIT	68,185	20.9 (14,239)	Custom protocols based on FRAMES	12.9 (8,773)	Motivational interviewing intervention	3.5 (2,368)	4.5 (3,098)
4	Emergency rooms; primary care health centers; hospitals (inpatient/outpatient)	CAGE; drug abuse items; quantity and frequency of alcohol consumption	60,111	22.8 (13,702)	Custom protocols based on FRAMES	16.1 (9,704)	Motivational enhancement therapy	2.1 (1,292)	4.5 (2,706)
5	Rural primary health care clinics; public health offices; school health clinics; one rural hospital	AUDIT (adapted for drugs); CRAFFT (for adolescents)	51,078	16.6 (8,490)	Clinical motivational intervention and telephone follow up (telehealth) counseling	12.5 (6,404)	Cognitive behavioral therapy, assertive community reinforcement approach (for adolescents)	3.4 (1,725)	0.7 (361)
6	Primary health care centers	AUDIT plus drug abuse item	20,076	23.4 (4,707)	Custom protocols based on FRAMES	14.5 (2,908)	Six to eight sessions focused on patient education and motivation	2.6 (516)	6.4 (1,283)
Total	–	–	459,599	22.7 (104,505)	–	15.9 (72,954)	–	3.2 (14,498)	3.7 (17,053)
Total among screen positives	–	–	–	–	–	69.8 (72,954)	–	13.9 (14,498)	16.3 (17,053)

Settings, screening tools, number of patients screened, intervention tools and proportion receiving brief intervention (BI), brief treatment (BT) or referral to specialty treatment (RT) at each site. AUDIT: Alcohol Use Disorders Identification Test; DAST: Drug Abuse Screening Test; CAGE: Cut Down, Annoyed, Guilt, Eye-opener Questionnaire; FRAMES: Feedback, Responsibility, Advice, Menu of options, Empathy, and Self-Efficacy.

terms and/or illicit drug use received brief interventions, those with heavy alcohol use patterns and/or heavy illicit drug use received brief treatment, and patients that fulfilled criteria for addictive patterns of behavior (compulsive drug-seeking behavior, loss of control over use, adverse consequences) were referred to specialty care. Brief interventions generally followed a scripted program, which varied by site. Currently, SBIRT sites use the ASSIST screening tool (WHO, 2008) which provides clear guidance on the relationship between scores and levels of severity of substance use.

Personnel were trained at each site in SAMHSA-sponsored training sessions, prior to initiation of the SBIRT program. We report the number of persons who were screened and the proportions recommended for brief intervention (BI), brief treatment (BT) and referral to specialty treatment (RT).

Site 1 integrated substance abuse screening services into emergency rooms in hospitals and medical centers, Federally-qualified health centers (FQHCs), and community health clinics in a single large urban county. Peer health educators conducted screening using the Drug Abuse Screening Test (DAST) and the Alcohol Use Disorders Identification Test (AUDIT) (Babor et al., 2001; Gavin et al., 1989). Brief interventions were also conducted by peer health educators using the Feedback, Responsibility, Advice, Menu of options, Empathy, and Self-Efficacy (FRAMES) model with motivational interviewing to raise awareness of the risks of substance use, to assess motivation for change, and to helping persons commit to utilizing self-management skills for changing their substance abuse behaviors. Brief treatment involved one session of enhanced brief intervention and motivational interviewing, one assessment session, and four additional sessions based on the cognitive behavioral treatment (CBT) model (Carroll, 1998). Referrals to specialty care were based on collaborative relationships with 19 specialized treatment agencies. Service features included bilingual staff; English/Spanish interpretation for medical staff as well as patients; on-site referral services, including referrals/transportation of intoxicated patients to sobering services; and continued management support through phone calls, e-mails, letters, or in-person contacts during medical visits. Of the 191,037 patients screened, 27,967 (14.6%) were recommended for a brief intervention, 4519 (2.4%) were recommended for a brief treatment, and 3330 (1.7%) were recommended for a referral to specialty treatment.

Site 2 provided SBIRT services for adults in emergency room departments and trauma centers and is affiliated with nine urban hospitals. The site also had established relationships with 12 specialized treatment agencies. Screenings were performed by substance abuse professionals using the AUDIT and a brief version of the DAST (Babor et al., 2001; Gavin et al., 1989). Brief interventions were conducted immediately following the screening for those patients who scored in moderate or high-risk range. Addicted patients were referred to a certified treatment provider for care. Linkages between screening sites and community provider agencies allowed for seamless transition of patients from screening, to brief intervention, to brief treatment, and/or to traditional addiction services. Of the 69,112 patients screened at Site 2, 17,198 (24.9%) were recommended for a brief intervention, 4078 (5.9%) were recommended for a brief treatment and 6275 (9.1%) were determined to need referral to secondary treatment.

Site 3 provided services in community clinics, school clinics, and hospitals within a single large urban county health district. Services were provided at over 15 sites, and at these sites, healthcare professionals performed screenings using the National Institute on Alcohol Abuse and Alcoholism (NIAAA) quantity and frequency question, a single substance use question (SSUQ) related to drug abuse, and the CAGE-AID (Cut down, Annoyed, Guilty, Eye-opener-Adapted to Include Drugs), (Ewing, 1984; Brown and Rounds, 1995). Staff specialists completed a brief assessment using the AUDIT and the DAST, and conducted brief interventions using the FRAMES model (Babor et al., 2001; Gavin et al., 1989). Patients addicted to alcohol or drugs were referred to the local treatment council for further assessment, referral, and placement. Of the 68,185 patients screened in Site 3, 8773 (12.9%) were recommended for a brief intervention, 2368 (3.5%) were recommended for a brief treatment, and 3098 (4.5%) were recommended for a referral to specialty treatment.

Site 4 services were provided in three hospitals, six health centers, and one outpatient clinic, operated by a large urban bureau of health services in conjunction with a group of local substance abuse treatment programs. General health care staff conducted screening, using an instrument that incorporated three quantity-frequency and four CAGE questions for alcohol and a two-item screen for drugs (Ewing, 1984). Brief interventions, which were conducted

using the FRAMES model, consist of two sessions for hospital patients, two to six sessions for community health center patients, and one session for emergency department patients. Licensed behavioral health counselors, primary care providers, and community health workers/case managers conducted the brief interventions in community health centers, and SBIRT counselors conducted brief interventions in hospital and emergency department settings. Brief treatments were conducted using motivational enhancement therapy strategies at participating treatment centers and community clinics. Of the 60,111 patients screened in Site 4, 9704 (16.1%) were recommended for a brief intervention, 1292 (2.1%) were recommended for a brief treatment, and 2706 (4.5%) were recommended for a referral to secondary treatment.

Site 5 provided services across a broad rural area through over 30 primary health clinics, public health offices, and school-based clinics and had established relationships with six specialized treatment agencies. Health care providers conducted screenings using a Personal Health Profile, the Substance Abuse Subtle Screening Inventory, the AUDIT-AID, and the Mental Health Screening Form III (Babor et al., 2001; Lazowski et al., 1998). Screening of adolescents was conducted using the Health Lifestyles Questionnaire, the Car, Relax, Alone, Forget, Family, Friends or Trouble (CRAFT) instrument, and the Depression Identification and Treatment Protocol (Knight et al., 2002). Licensed behavioral health counselors and primary care providers made referrals for brief interventions and to Community Health Workers/Case Managers. Telehealth technology was used to conduct patient clinical interviews and counseling at over 20 telehealth sites. Licensed behavioral health counselors conducted brief treatment, using protocols and modalities based primarily on brief cognitive behavioral therapy. Adolescent brief treatment was conducted using the Adolescent Community Reinforcement Approach (ACRA) and the Alcohol Treatment Targeting Adolescents in Need (ATTAIN) model (Gil et al., 2004; Godley et al., 2007). Referrals to community mental health centers or other substance abuse treatment providers were made only for those who failed to respond to brief intervention/treatment or those whose life situations were unstable. Of the 51,078 patients screened at Site 5, 6404 (12.5%) were recommended for brief intervention, 1725 (3.4%) were recommended for brief treatment, and 361 (0.7%) were recommended for a referral to secondary treatment.

Site 6 served a modest sized metropolitan area along with a large, widely distributed rural population through a primary care center that routinely conducted screenings on all applicants for services. Announcements for the project were frequently presented in the community through press releases, newspaper ads, and radio broadcasts. Specialists conducted screening using the AUDIT plus one drug use question (Babor et al., 2001). Brief interventions consisted of up to five, 15-min sessions using motivational interviewing and the FRAMES, which were incorporated into basic substance abuse education and goal setting, to lower or eliminate high-risk behaviors. Brief treatment consisted of six to eight weekly sessions (30–60 min each) focused on educating the patient about substance abuse, building motivation to quit, analyzing the patient's drinking/drugging pattern and identifying situations that precipitate relapse. Patients were assessed and referred to traditional treatment and continuing care provided by several local treatment agencies. Importantly, if a person was waitlisted, the SBIRT program offered pre-treatment group counseling and case management for up to 6 months. Of the 20,076 patients screened in Site 6, 2908 (14.5%) were recommended for a brief intervention, 516 (2.6%) were recommended for a brief treatment, and 1283 (6.4%) were recommended for referral to specialty treatment.

## 2.2. Data collection

Data elements are from the administratively required data for the CSAT SBIRT grant program through August 1, 2007, based on the CSAT Government Performance and Results Act (GPRA) Client Outcome Measures for Discretionary Programs (Substance Abuse and Mental Health Services Administration, 2007b). No patient identifiers are included in submitted data. Grantees are not required to seek IRB approval since data collected is for administrative, not research, purposes. That being said, 5 of the 6 sites did seek and received IRB approval.

At intake, age, gender, and race/ethnicity were recorded on all patients screened at each site. Race/ethnicity were determined using the GPRA tool. Participants are asked to respond to questions at intake (baseline) and can respond

“yes”, “no” or “refused” to the following self-identifiers: Hispanic or Latino (and further refined into country of origin), Black or African American, Asian, Native Hawaiian or other Pacific Islander, Alaska Native, White, American Indian.

For those with negative screens, demographic data alone were collected. Based on the degree of problems identified, positive screens were referred to one of three different levels of intervention: brief intervention (BI), brief treatment (BT), or referral to specialized treatment (RT). Patients who screened negative were not offered any intervention, but it has been noted that the process of screening alone has been shown to be effective (Saitz et al., 2007).

Baseline information on all patients requiring any level of intervention included demographic data and information about past 30 day use of alcohol and illicit drugs, and for some locations, prescription drug abuse, as documented in the “other drug” category. For this report, rates were calculated for any past 30-day use of an illicit substance and any past 30-day use of alcohol to intoxication (“heavy alcohol use”). For patients determined to need either a BT or RT (i.e. the more intense levels of intervention), additional baseline measures of past 30 day income, education, employment, family and living conditions, mental illness, general physical health, sexual behavior, housing, social connectedness, and criminal behavior were also documented.

Outcomes were evaluated at 6-month post intake. Across the six sites, only those who screened positive and recommended for interventions were in the follow-up pool, and of this population, the majority (more than 63%) received an intervention (BI, BT, or RT). To be conservative, all analysis was conducted using an “intent to treat” approach so that patients requiring an intervention were assessed regardless of whether or not they actually received the intervention. Patients were selected for follow-up by the following method: each grantee was given a randomly selected 10-digit range by SAMHSA (e.g. 20–29). If the last two digits of the SSN fell into the randomly selected range, the patient became part of the follow-up sample. Outcomes assessed at this follow-up depended on the level of intervention. For patients recommended for a BI, substance abuse measures were repeated at follow-up. For those who were determined to need a BT or RT, follow-up also included repeat assessment of the additional baseline measures of general health status, mental health, social functioning, sexual risk taking, and criminal behavior. Six-month follow-up was conducted either by phone or in person within a range of 30 days prior to or 60 days after the anniversary date. Follow-up rates varied considerably.

Grantees were required to sample 10% of those that were classified as BI, BT or RT. Each grantee was given a range of digits and those social security numbers that fell within those digits were used for follow-up samples. The follow-up rate is derived by the number of patients within the fixed sample size due that were contacted. In four of six sites the rate exceeded 70% and outcome measures are compared for all sites and for sites with high follow-up levels.

Site 1 had a follow-up rate of 25.3%; Site 2: 74.2%; Site 3: 38.8%; Site 4: 95.9%; Site 5: 72.3%; and Site 6: 81.6%, of the follow-up rate required by GPRA. The lower rate of follow-up at Site 1 (which used the standard randomly selected sample) was due to program interruption, and consequent reduced follow-up rate. Nevertheless, results from Site 1 were comparable to the other sites. At Site 3, the reduced rate was due to the initial protocol, which attempted to conduct follow-up of patients via an office visit at 6 months. The low response to a request for an office visit led Site 3 to follow-up via phone interviews. The initial follow-up method could have resulted in bias in self-reports. Among persons queried at baseline and follow-up, average missing data rates were as follows: Site 1: 0.9% missing; Site 2: 1.2% missing; Site 3: 1.1% missing; Site 4: 0.1% missing; Site 5: 0.1% missing; and Site 6: 10.3% missing. Across all the baseline and follow-up interviews, 2.4% of responses were missing. No imputation was done. Only cases with valid responses were included in each analysis.

### 2.3. Data analysis

Output and data analyses for this report were generated using SAS software, Version 9.3.1 (SAS Institute, Cary, NC, 2000). Cross tabs function was used to determine rates according to site and demographic subgroup. Comparisons of baseline to follow-up rates of all outcome variables were tested for statistical significance (two-tailed  $p < 0.05$ ) using the paired  $t$ -test. Comparisons were not tested when there were fewer than 10 subjects reporting use of a particular substance at baseline. Analyses were conducted on each site separately because of considerable variation of sites in patient characteristics, clinical interventions, and follow-up rates. Summary statistics are provided for the combined sites. We recognize that conducting multiple  $t$ -tests can generate false positives, but the robust statistical significance in the majority of data sets (see Tables 3–8) is consistent with the overall direction of the results across sites.

Table 2  
Mean age, gender and racial/ethnic composition of patients screened at each site

State	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Total
Overall <i>N</i>	191,037	69,112	68,185	60,111	51,078	20,076	459,599
<b>Race/ethnicity</b>							
% African American	9.2	9.7	28.4	68.7	0.5	0.4	18.5
% Asian	5.9	1.6	1.9	3.7	0.2	0.1	3.3
% Native Hawaiian/Pacific Islander	1.0	0.8	0.01	0.2	0.1	0.04	0.5
% Alaska Native	0.03	0.3	0	0.01	0.03	87.8	4.3
% Caucasian	57.8	78.5	18.1	11.5	84.0	2.8	49.6
% American Indian	1.4	7.0	0.5	0.2	13.9	5.9	3.7
% Other	24.1	1.2	16.6	0.9	0.4	0.4	12.1
% Multi-racial	0.3	0.9	3.7	0.01	0.03	2.1	0.9
% Hispanic	36.5	9.8	49.8	20.8	63.8	0.7	33.9
Mean age (S.D.)	48.7	37.4	44.1	47.4	39.2	37.7	44.6
% Female	57.5	48.5	54.2	50.5	57.6	60.2	54.9
Screen positive ( <i>n</i> )	35,816	27,551	14,239	13,702	8,490	4,707	104,505
<b>Substance endorsed among those screening positive<sup>a</sup></b>							
Heavy alcohol% ( <i>n</i> )	55.3	55.0	55.6	43.6	49.0	42.1	52.6
Marijuana% ( <i>n</i> )	20.8	31.3	21.3	27.8	28.7	15.5	24.9
Cocaine% ( <i>n</i> )	3.4	14.2	24.6	30.3	6.9	4.9	13.0
Methamphetamines% ( <i>n</i> )	7.2	9.9	1.8	0.10	2.2	0.6	5.5
Heroin% ( <i>n</i> )	1.6	6.0	1.4	18.8	2.3	0.3	5.0
Other drugs% ( <i>n</i> )	4.6	9.7	10.0	3.4	6.6	2.0	6.6

<sup>a</sup> May add to greater than 100% if patients endorsed multiple substances and may add to less than 100% if patients screen positive for problematic alcohol consumption in the absence of heavy alcohol use or changed their responses between the screening protocol and when they were queried about substance consumption.

Table 3  
Use of substances at baseline and follow-up among those reporting heavy alcohol and/or illicit drug use at baseline

Substance	Site	N <sup>a</sup>	Heavy alcohol (n) %		Marijuana (n) %		Cocaine (n) %		Methamphetamine (n) %		Heroin (n) %		Other drugs (n) %	
			Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U
Any heavy alcohol or illicit drug reported at baseline	1	2996	(2511) 83.8	(1191) 39.8***	(756) 25.2	(377) 12.6***	(98) 3.3	(40) 1.3***	(175) 5.8	(57) 1.9***	(31) 1.0	(10) 0.3***	(169) 5.6	(56) 1.9***
	2	3258	(2363) 72.5	(1132) 34.7***	(1360) 41.7	(572) 17.6***	(648) 19.9	(174) 5.3***	(455) 14.0	(111) 3.4***	(266) 8.2	(78) 2.4***	(414) 12.7	(223) 6.8***
	3	3212	(2549) 79.4	(441) 13.7***	(829) 25.8	(86) 2.7***	(981) 30.5	(63) 2.0***	(83) 2.6	(3) 0.1***	(60) 1.9	(4) 0.1***	(351) 10.9	(23) 0.7***
	4	811	(281) 34.6	(251) 30.9	(300) 37.0	(145) 17.9***	(367) 45.3	(109) 13.4***	–	–	(242) 29.8	(86) 10.6***	(35) 4.3	(9) 1.1***
	5	887	(706) 79.6	(370) 41.7***	(412) 46.4	(215) 24.2***	(101) 11.4	(34) 3.8***	(24) 2.7	(4) 0.5***	(28) 3.2	(9) 1.0***	(91) 10.3	(28) 3.2***
	6	1120	(1027) 91.7	(349) 31.2***	(389) 34.7	(86) 7.7***	(108) 9.6	(26) 2.3***	(15) 1.3	(0) 0.0***	–	–	(49) 4.4	(8) 0.7***
	Total (Sites: 1–6)	12284	(9437) 76.8	(3734) 30.4***	(4046) 32.9	(1481) 12.1***	(2303) 18.7	(446) 3.6***	(753) 6.1	(175) 1.4***	(634) 5.2	(189) 1.5***	(1109) 9.0	(347) 2.8***
Total (Sites: 2, 4, 5, 6)	6076	(4337) 72.0	(2102) 34.6***	(2461) 40.5	(1018) 16.8***	(1224) 20.1	(343) 5.6***	(495) 8.1	(115) 1.9***	(543) 8.9	(175) 2.9***	(589) 9.7	(268) 4.4***	
Heavy alcohol reported at baseline	1	2511	100.0	(1095) 43.6***	(420) 16.7	(252) 10.0***	(61) 2.4	(27) 1.1***	(76) 3.0	(26) 1.0***	(12) 0.5	(5) 0.2	(85) 3.4	(38) 1.5***
	2	2363	100.0	(955) 40.4***	(812) 34.4	(352) 14.9***	(373) 15.8	(94) 4.0***	(211) 8.9	(58) 2.5***	(102) 4.3	(29) 1.2***	(257) 10.9	(134) 5.7***
	3	2549	100.0	(406) 15.9***	(503) 19.7	(59) 2.3***	(648) 25.4	(35) 1.4***	(53) 2.1	(3) 0.1***	(32) 1.3	(1) 0.0***	(201) 7.9	(12) 0.5***
	4	281	100.0	(109) 38.8***	(75) 26.7	(30) 10.7***	(104) 37.0	(35) 12.5***	–	–	(39) 13.9	(17) 6.0***	(15) 5.3	(1) 0.4***
	5	706	100.0	(333) 47.2***	(278) 39.4	(161) 22.8***	(73) 10.3	(24) 3.4***	(14) 2.0	(4) .6**	(12) 1.7	(7) 1.0	(55) 7.8	(19) 2.7***
	6	1027	100.0	(325) 32.6***	(316) 30.8	(78) 7.6***	(86) 8.4	(23) 2.2***	–	–	–	–	(35) 3.4	(6) 0.6***
	Total (Sites: 1–6)	9437	100.0	(3233) 34.3***	(2404) 25.5	(932) 9.9***	(1345) 14.3	(238) 2.5***	(364) 3.9	(91) 1.0***	(201) 2.1	(60) 0.6***	(648) 6.9	(210) 2.2***
Total (Sites: 2, 4, 5, 6)	4377	(4337) 100	(1732) 39.6***	(1481) 33.8	(621) 14.2***	(636) 14.5	(176) 4.0***	(235) 5.4	(62) 1.4***	(157) 3.6	(54) 1.2%***	(362) 8.3	(160) 3.7***	
Any illicit drug reported at baseline	1	1022	(537) 52.5	(385) 37.7***	(756) 74.0	(313) 30.6***	(98) 9.6	(33) 3.2***	(175) 17.1	(46) 4.5***	(31) 3.0	(8) 0.8***	(169) 16.5	(41) 4.0***
	2	1978	(1083) 54.8	(623) 31.5***	(1360) 68.8	(502) 25.4***	(648) 32.8	(155) 7.8***	(455) 23.0	(105) 5.3***	(266) 13.4	(76) 3.8***	(414) 20.9	(186) 9.4***
	3	1618	(955) 59.0	(176) 10.9***	(829) 51.2	(81) 5.0***	(981) 60.6	(59) 3.6***	(83) 5.1	(3) 0.2***	(60) 3.7	(4) 0.2***	(351) 21.7	(19) 1.2***
	4	696	(166) 23.9	(212) 30.5**	(300) 43.1	(144) 20.7***	(367) 52.7	(104) 14.9***	–	–	(242) 34.8	(83) 11.9***	(35) 5.0	(9) 1.3***
	5	495	(314) 63.4	(208) 42.0***	(412) 83.2	(178) 36.0***	(101) 20.4	(29) 5.9***	(24) 4.8	(4) 0.8***	(28) 5.7	(8) 1.6***	(91) 18.4	(27) 5.5***
	6	453	(360) 79.5	(139) 30.7***	(389) 85.9	(72) 15.9***	(108) 23.8	(22) 4.9***	(15) 3.3	(0) 0.0***	–	–	(49) 10.8	(5) 1.1***
	Total (Sites: 1–6)	6262	(3415) 54.5	(1743) 27.8***	(4046) 64.6	(1290) 20.6***	(2303) 36.8	(402) 6.4***	(753) 12.0	(158) 2.5***	(634) 10.1	(181) 2.9***	(1109) 17.7	(287) 4.6***
Total (Sites: 2, 4, 5, 6)	3622	(1923) 53.1	(1182) 32.6***	(2461) 67.9	(896) 24.7***	(1224) 33.8	(310) 8.6***	(495) 13.7	(109) 3.0***	(543) 15.0	(169) 4.7***	(589) 16.3	(227) 6.3***	

Two sets of data analyses are shown based on total results from 6 sites and from 4 sites with high follow-up rates. (–) Results suppressed because fewer than 10 subjects reported use of that substance at baseline. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>a</sup> Among subjects qualifying for any level of intervention, the number with data at baseline and follow-up who report the substance listed on the left (i.e. heavy alcohol or illicit drugs, heavy alcohol irrespective of drugs, any illicit drug irrespective of alcohol).

**3. Results**

**3.1. Gender, age, race and ethnicity of patients screened**

Combined screening and brief interventions for illicit drug and heavy alcohol use was feasible across all sites, with personnel hired specifically for this purpose (Table 1). The total number of patients screened across the six sites was 459,599. As seen in Table 2, the demographic characteristics of patients varied considerably across the six sites. All sites had more female than male patients except Site 2 which had a slight excess of males. Alaska Native and American Indians were the two predominant groups in Site 6. Sites 1, 2, and 5 had greater than 50% Caucasian patients. Site 4 had a predominantly African American population. Site 3 had nearly 50% and Site 5 had greater than 50% Hispanic patients.

Of the 459,599 persons screened, 104,505 (22.7%) screened positive for heavy alcohol use (defined as reporting over the past 30 days more than five drinks in one sitting or within a brief period of approximately 1–2 h) and/or illicit drug use. Illicit drug use within the past 30 days constituted a positive screen, regardless of the amount used. More specifically, 72,954 (15.9%) were at a low clinical level and were recommended for a brief intervention, 14,498 (3.2%) were at a moderate level and were determined to need a brief treatment; while, 17,053 (3.7%) were recommended for referral to specialty treatment. Of positive screens, 70% were recommended for a brief intervention, 14% for a brief treatment and 16% were referred to specialty treatment.

**3.2. Baseline and follow-up alcohol and drug use**

GPRA required grantees to report alcohol and illicit drug use at intake and 6 months later. Among the full population screened, heavy alcohol use was reported by 12.0%, marijuana use was reported by 5.7%, cocaine by 3.0%, methamphetamine by 1.3%, heroin by 1.1%, and other drugs by 1.5%. Exam-

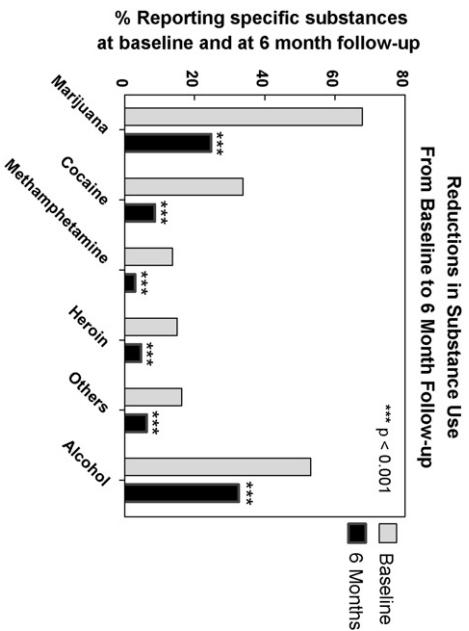


Fig. 1. Among persons reporting illicit drug use at baseline, percent people reporting specific drugs and heavy alcohol at baseline and 6 months after intervention (all  $p < 0.001$ ). Data are based on the sites with higher follow-up rates (Table 3, bottom row).

Table 4  
Use of substances at baseline and follow-up among male and female subgroups of those reporting any illicit drug at baseline

Site	N <sup>a</sup>	Heavy alcohol (n) %		Marijuana (n) %		Cocaine (n) %		Methamphetamine (n) %		Heroin (n) %		Other drugs (n) %		
		Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	
Men	1	673	(386) 57.4	(276) 41.0***	(512) 76.1	(225) 33.4***	(76) 11.3	(20) 3.0***	(120) 17.8	(27) 4.0***	(18) 2.7	(4) 0.6***	(97) 14.4	(21) 3.1***
	2	1292	(753) 58.3	(402) 31.1***	(908) 70.3	(312) 24.1***	(423) 32.7	(90) 7.0***	(294) 22.8	(65) 5.0***	(178) 13.8	(45) 3.5***	(252) 19.5	(94) 7.3***
	3	1077	(693) 64.3	(138) 12.8***	(565) 52.5	(62) 5.8***	(666) 61.8	(38) 3.5***	(56) 5.2	(3) 0.3***	(38) 3.5	(2) 0.2***	(214) 19.9	(11) 1.0***
	4	472	(115) 24.4	(158) 33.5***	(213) 45.1	(101) 21.4***	(238) 50.4	(70) 14.8***	-	-	(162) 34.3	(59) 12.5***	(19) 4.0	(7) 1.5**
	5	275	(172) 62.5	(114) 41.5***	(233) 84.7	(101) 36.7***	(54) 19.6	(14) 5.1***	(13) 4.7	(0) 0.0***	(18) 6.5	(5) 1.8***	(50) 18.2	(2) 7.3***
	6	214	(177) 82.7	(66) 30.8***	(189) 88.3	(38) 17.8***	(40) 18.7	(9) 4.2***	-	-	-	-	(23) 10.7	(3) 1.4***
	Total (Sites: 1–6)	4003	(2296) 57.4	(1154) 28.8***	(2620) 65.5	(839) 21.0***	(1497) 37.4	(241) 6.0***	(490) 12.2	(95) 2.4***	(418) 10.4	(116) 2.9***	(655) 16.4	(156) 3.9***
Total (Sites: 2, 4, 5, 6)	2253	(1217) 54	(740) 32.8***	(1543) 68.5	(552) 24.5***	(775) 33.5	(183) 8.1***	(314) 13.9	(65) 2.9***	(362) 16.1	(110) 4.9***	(344) 15.3	(124) 5.5***	
Women	1	348	(150) 43.1	(109) 31.3***	(244) 70.1	(88) 25.3***	(22) 6.3	(13) 3.7	(55) 15.8	(19) 5.5***	(12) 3.4	(4) 1.1*	(72) 20.7	(20) 5.7***
	2	685	(329) 48.0	(221) 32.3***	(451) 65.8	(190) 27.7***	(224) 32.7	(65) 9.5***	(161) 23.5	(40) 5.8***	(88) 12.8	(31) 4.5***	(161) 23.5	(92) 13.4***
	3	532	(255) 47.9	(36) 6.8***	(259) 48.7	(19) 3.6***	(308) 57.9	(21) 3.9***	(26) 4.9	(0) 0.0***	(21) 3.9	(2) 0.4***	(137) 25.8	(8) 1.5***
	4	224	(51) 22.8	(54) 24.1	(87) 38.8	(43) 19.2***	(129) 57.6	(34) 15.2***	-	-	(80) 35.7	(24) 10.7***	(116) 7.1	(2) 0.9***
	5	219	(141) 64.4	(94) 42.9***	(178) 81.3	(76) 34.7***	(47) 21.5	(15) 6.8***	(11) 5.0	(4) 1.8*	(10) 4.6	(3) 1.4*	(41) 18.7	(7) 3.2***
	6	237	(181) 76.4	(72) 30.4***	(198) 83.5	(34) 14.3***	(68) 28.7	(13) 5.5***	-	-	-	-	(26) 11.0	(2) 0.8***
	Total (Sites: 1–6)	2245	(1107) 49.3	(586) 26.1***	(1417) 63.1	(450) 20.0***	(798) 35.5	(161) 7.2***	(262) 11.7	(63) 2.8***	(214) 9.5	(65) 2.9***	(453) 20.2	(131) 5.8***
Total (Sites: 2, 4, 5, 6)	1365	(702) 51.4	(441) 32.3***	(914) 67.0	(343) 25.1***	(468) 34.3	(127) 9.3***	(181) 13.3	(44) 3.2***	(181) 13.3	(59) 4.3***	(244) 17.9	(103) 7.5***	

Two sets of data analyses are shown based on total results from 6 sites and from 4 sites with high follow-up rates. (–) Results suppressed because fewer than 10 subjects reported use of that substance at baseline. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>a</sup> Among subjects qualifying for any level of intervention, the number with data from baseline and follow-up who reported use of one or more illicit drugs at baseline.

Table 5  
Use of substances at baseline and follow-up among age subgroups of those reporting any illicit drug at baseline

Substance	Site	N <sup>a</sup>	Heavy alcohol (n) %		Marijuana (n) %		Cocaine (n) %		Methamphetamine (n) %		Heroin (n) %		Other Drugs (n) %	
			Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U
Younger than 25	1	337	(209) 62.0	(164) 48.7***	(285) 84.6	(122) 36.2***	(31) 9.2	(12) 3.6***	(42) 12.5	(5) 1.5***	–	–	(41) 12.2	(18) 5.3**
	2	526	(333) 63.3	(213) 40.5***	(453) 86.1	(177) 33.7***	(84) 16.0	(21) 4.0***	(100) 19.0	(34) 6.5***	(32) 6.1	(7) 1.3***	(129) 24.5	(59) 11.2***
	3	256	(150) 58.6	(33) 12.9***	(190) 74.2	(17) 6.6***	(117) 45.7	(3) 1.2***	(31) 12.1	(1) 0.4***	–	–	(79) 30.9	(4) 1.6***
	4	49	(13) 26.5	(27) 55.1**	(47) 95.9	(25) 51.0***	–	–	–	–	–	–	–	–
	5	292	(186) 63.7	(128) 44.8***	(259) 88.7	(120) 41.1***	(42) 14.4	(12) 4.1***	(10) 3.4	(2) 0.7*	–	–	(56) 19.2	(19) 6.5***
	6	135	(104) 77.0	(41) 30.4***	(124) 91.9	(27) 20.0***	(25) 18.5	(5) 3.7***	–	–	–	–	(23) 17.0	(1) 0.7***
	Total (Sites: 1–6)	1595	(995) 62.4	(606) 38.0***	(1358) 85.1	(488) 30.6***	(304) 19.1	(53) 3.3***	(191) 12.0	(42) 2.6***	(57) 3.6	(9) 0.6***	(328) 20.6	(101) 6.3***
Total (Sites: 2, 4, 5, 6)	1002	(636) 63.5	(409) 40.8***	(883) 88.1	(349) 34.8***	(156) 15.6	(38) 3.8***	(118) 11.8	(36) 3.6***	(47) 4.7	(9) 0.9***	(208) 20.8	(79) 7.9***	
Age 25–34	1	249	(153) 61.4	(106) 42.6***	(186) 74.7	(82) 32.9***	(22) 8.8	(8) 3.2**	(52) 20.9	(13) 5.2***	–	–	(37) 14.9	(10) 4.0***
	2	556	(296) 53.2	(167) 30.0***	(420) 75.5	(147) 26.4***	(158) 28.4	(24) 4.3***	(165) 29.7	(31) 5.6***	(78) 14.0	(23) 4.1***	(112) 20.1	(56) 10.1***
	3	386	(219) 56.7	(47) 12.2***	(228) 59.1	(26) 6.7***	(213) 55.2	(15) 3.9***	(27) 7.0	(1) 0.3***	(15) 3.9	(2) 0.5***	(116) 30.1	(3) 0.8***
	4	103	(21) 20.4	(40) 38.8**	(70) 68.0	(34) 33.0***	(37) 35.9	(14) 13.6***	–	–	(19) 18.4	(10) 9.7*	–	–
	5	68	(50) 73.5	(32) 47.1***	(47) 69.1	(15) 22.1***	(28) 41.2	(8) 11.8***	–	–	–	–	(12) 17.6	(2) 2.9**
	6	130	(101) 77.7	(41) 31.5***	(108) 83.1	(21) 16.2***	(36) 27.7	(6) 4.6***	–	–	–	–	(14) 10.8	(4) 3.1**
	Total (Sites: 1–6)	1492	(840) 56.3	(433) 29.0***	(1059) 71.0	(325) 21.8***	(494) 33.1	(75) 5.0***	(255) 17.1	(46) 3.1***	(127) 8.5	(43) 2.9***	(295) 19.8	(76) 5.1***
Total (Sites: 2, 4, 5, 6)	857	(468) 54.6	(280) 32.7***	(645) 75.3	(217) 25.3***	(259) 30.2	(52) 6.1***	(176) 20.5	(32) 3.7***	(106) 12.4	(38) 4.4***	(142) 16.6	(63) 7.4***	
Age 35–44	1	189	(81) 42.9	(56) 29.6**	(122) 64.6	(50) 26.5***	(22) 11.6	(4) 2.1***	(35) 18.5	(13) 6.9***	(9) 4.8	(2) 1.1*	(40) 21.2	(7) 3.7***
	2	502	(256) 51.0	(135) 26.9***	(295) 58.8	(103) 20.5***	(212) 42.2	(57) 11.4***	(152) 30.3	(31) 6.2***	(85) 16.9	(25) 5.0***	(99) 19.7	(48) 9.6***
	3	475	(300) 63.2	(41) 8.6***	(208) 43.8	(19) 4.0***	(330) 69.5	(17) 3.6***	(19) 4.0	(1) 0.2***	(14) 2.9	(2) 0.4***	(65) 13.7	(6) 1.3***
	4	218	(55) 25.2	(59) 27.1	(86) 39.4	(32) 14.7***	(136) 62.4	(34) 15.6***	–	–	(92) 42.2	(24) 11.0***	(12) 5.5	(3) 1.4**
	5	69	(44) 63.8	(26) 37.7***	(59) 85.5	(22) 31.9***	(19) 27.5	(4) 5.8***	–	–	–	–	(10) 14.5	(3) 4.3*
	6	101	(82) 81.2	(29) 28.7***	(84) 83.2	(10) 9.9***	(26) 25.7	(7) 6.9***	–	–	–	–	–	–
	Total (Sites: 1–6)	1554	(818) 52.6	(346) 22.3***	(854) 55.0	(236) 15.2***	(745) 47.9	(123) 7.9***	(215) 13.8	(46) 3.0***	(205) 13.2	(55) 3.5***	(234) 15.1	(67) 4.3***
Total (Sites: 2, 4, 5, 6)	890	(437) 49.1	(249) 28.0***	(524) 58.9	(167) 18.8***	(393) 44.2	(102) 11.5***	(161) 18.1	(32) 3.6***	(182) 20.4	(51) 5.7***	(129) 14.5	(54) 6.1***	
Age 45–54	1	182	(76) 41.8	(48) 26.4***	(122) 67.0	(45) 24.7***	(18) 9.9	(7) 3.8**	(38) 20.9	(13) 7.1***	(11) 6.0	(2) 1.1**	(33) 18.1	(4) 2.2***
	2	328	(170) 51.8	(88) 26.8***	(161) 49.1	(62) 18.9***	(160) 48.8	(47) 14.3***	(33) 10.1	(8) 2.4***	(60) 18.3	(19) 5.8***	(66) 20.1	(21) 6.4***
	3	391	(226) 57.8	(45) 11.5***	(162) 41.4	(15) 3.8***	(257) 65.7	(24) 6.1***	–	–	(11) 2.8	(0) 0.0***	(73) 18.7	(5) 13***
	4	254	(65) 25.6	(71) 28.0	(70) 27.6	(40) 15.7***	(157) 61.8	(44) 17.3***	–	–	(104) 40.9	(41) 16.1***	(17) 6.7	(5) 2.0**
	5	43	(25) 58.1	(19) 44.2	(30) 69.8	(14) 32.6***	(11) 25.6	(5) 11.6*	–	–	–	–	–	–
	6	73	(61) 83.6	(22) 30.1***	(60) 82.2	(13) 17.8***	(19) 26.0	(3) 4.1***	–	–	–	–	–	–
	Total (Sites: 1–6)	1271	(623) 49.0	(293) 23.1***	(605) 47.6	(189) 14.9***	(622) 48.9	(130) 10.2***	(76) 6.0	(21) 1.7***	(192) 15.1	(63) 5.0***	(202) 15.9	(38) 3.0***
Total (Sites: 2, 4, 5, 6)	698	(321) 46.0	(200) 28.7***	(321) 46.0	(129) 18.5***	(347) 49.7	(99) 14.2***	(34) 4.9	(8) 1.1***	(170) 24.4	(61) 8.7***	(96) 13.8	(29) 4.2***	

Two sets of data analyses are shown based on total results from 6 sites and from 4 sites with high follow-up rates. (–) Results suppressed because fewer than 10 subjects reported use of that substance at baseline. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>a</sup> Among subjects qualifying for any level of intervention, the number with data from baseline and follow-up who reported use of one or more illicit drugs at baseline.

Table 6  
Use of substances at baseline and follow-up among race/ethnic subgroups of those reporting any illicit drug at baseline

Race/ethnic group	Site	N <sup>a</sup>	Heavy alcohol (n) %		Marijuana (n) %		Cocaine (n) %		Methamphetamine (n) %		Heroin (n) %		Other drugs (n) %	
			Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U
African American	1	118	(50) 42.4	(35) 29.7*	(101) 85.6	(39) 33.1***	(12) 10.2	(4) 3.4*	(11) 9.3	(1) 8**	–	–	–	–
	2	263	(132) 50.2	(82) 31.2***	(157) 59.7	(61) 23.2***	(149) 56.7	(47) 17.9***	(15) 5.7	(3) 1.1**	(22) 8.4	(9) 3.4**	(28) 10.6	(15) 5.7*
	3	710	(417) 58.7	(57) 8.0***	(382) 53.8	(40) 5.6***	(468) 65.9	(25) 3.5***	(11) 1.5	(0) 0.0***	(14) 2.0	(1) 0.1***	(96) 13.5	(6) 0.8***
	4	598	(136) 22.7	(174) 29.1**	(249) 41.6	(114) 19.1***	(326) 54.5	(90) 15.1***	–	–	(212) 35.5	(73) 12.2***	(28) 4.7	(7) 1.2***
	Total (Sites: 1–4)	1698	(742) 43.7	(350) 20.6***	(895) 52.7	(256) 15.1***	(959) 56.5	(166) 9.8***	(37) 2.2	(4) 0.2***	(250) 14.7	(83) 4.9***	(161) 9.5	(33) 1.9***
	Total (Sites: 2, 4)	870	(275) 31.6	(258) 29.7	(412) 47.4	(177) 20.3***	(479) 55.1	(137) 15.7***	(15) 1.7	(3) 0.3**	(234) 26.9	(82) 9.4***	(56) 6.4	(22) 2.5***
Alaska Native or American Indian	1	21	–	–	(15) 71.4	(6) 28.6***	–	–	–	–	–	–	–	–
	2	147	(91) 61.9	(47) 32.0***	(102) 69.4	(34) 23.1***	(61) 41.5	(13) 8.8***	(27) 18.4	(7) 4.8***	(14) 9.5	(3) 2.0***	(29) 19.7	(14) 9.5*
	3	27	(19) 70.4	(4) 14.8***	(18) 66.7	(3) 11.1***	(12) 44.4	(0) 0.0***	–	–	–	–	–	–
	5	82	(59) 72.0	(47) 57.3*	(73) 89.0	(32) 39.0***	(17) 20.7	(2) 2.4***	–	–	–	–	–	–
	6	415	(329) 79.3	(131) 31.6***	(361) 87.0	(70) 16.9***	(97) 23.4	(20) 4.8***	(15) 3.6	(0) 0.0***	–	–	(45) 10.8	(5) 1.2***
	Total (Sites: 2, 3, 5, 6)	693	(506) 73.0	(236) 34.1***	(569) 82.1	(145) 20.9***	(191) 27.6	(35) 5.1***	(50) 7.2	(8) 1.2***	(23) 3.3	(5) 0.7***	(93) 13.4	(25) 3.6***
Total (Sites: 2, 5, 6)	645	(479) 74.3	(225) 34.9***	(536) 83.1	(136) 21.1***	(176) 27.3	(35) 5.4***	(46) 7.1	(7) 1.1***	(20) 3.1	(5) 0.8***	(83) 12.9	(24) 3.7***	
White	1	541	(303) 56.0	(220) 40.7***	(423) 78.2	(179) 33.1***	(45) 8.3	(24) 4.4**	(74) 13.7	(30) 5.5***	(13) 2.4	(6) 1.1*	(105) 19.4	(28) 5.2***
	2	1393	(751) 53.9	(452) 32.4***	(985) 70.7	(374) 26.8***	(380) 27.3	(86) 6.2***	(373) 26.8	(91) 6.5***	(202) 14.5	(60) 4.3***	(321) 23.0	(147) 10.6***
	3	506	(282) 55.7	(56) 11.1***	(235) 46.4	(20) 4.0***	(265) 52.4	(15) 3.0***	(52) 10.3	(1) 0.2***	(21) 4.2	(2) 0.4***	(170) 33.6	(9) 1.8***
	4	49	(15) 30.6	(23) 46.9	(30) 61.2	(18) 36.7**	(20) 40.8	(6) 12.2***	–	–	(12) 24.5	(2) 4.1***	–	–
	5	394	(244) 61.9	(155) 39.3***	(323) 82.0	(139) 35.3***	(80) 20.3	(26) 6.6***	(20) 5.1	(4) 1.0***	(28) 7.1	(8) 2.0***	(79) 20.1	(21) 5.3***
	6	18	(14) 77.8	(2) 11.1***	(11) 61.1	(1) 5.6***	–	–	–	–	–	–	–	–
Total (Sites: 1–6)	2901	(1609) 55.5	(908) 31.3***	(2007) 69.2	(731) 25.2***	(796) 27.4	(158) 5.4***	(519) 17.9	(126) 4.3***	(277) 9.5	(78) 2.7***	(683) 23.5	(205) 7.1***	
Total (Sites: 2, 4, 5, 6)	1854	(1024) 55.2	(632) 34.1***	(1349) 72.8	(532) 28.7***	(486) 26.2	(119) 6.4***	(393) 21.2	(95) 5.1***	(243) 13.1	(70) 3.8***	(408) 22.0	(168) 9.1***	
Hispanic	1	334	(181) 54.2	(118) 35.3***	(213) 63.8	(91) 27.2***	(37) 11.1	(5) 1.5***	(85) 25.4	(19) 5.7***	(16) 4.8	(2) 0.6***	(46) 13.8	(8) 2.4***
	2	166	(108) 65.1	(50) 30.1***	(112) 67.5	(30) 18.1***	(37) 22.3	(7) 4.2***	(46) 27.7	(10) 6.0***	(25) 15.1	(2) 1.2***	(39) 23.5	(16) 9.6***
	3	407	(265) 65.1	(78) 19.2***	(218) 53.6	(23) 5.7***	(246) 60.4	(21) 5.2***	(23) 5.7	(1) 0.2***	(22) 5.4	(2) 0.5***	(87) 21.4	(3) 0.7***
	4	32	(10) 31.3	(12) 37.5	(16) 50.0	(10) 31.3	(13) 40.6	(5) 15.6**	–	–	–	–	–	–
	5	290	(182) 62.8	(117) 40.3***	(232) 80.0	(94) 32.4***	(66) 22.8	(19) 6.6***	(15) 5.2	(2) 0.7***	(23) 7.9	(7) 2.4***	(62) 21.4	(10) 3.4***
	6	12	–	–	(11) 91.7	(3) 25.0***	–	–	–	–	–	–	–	–
Total (Sites: 1–6)	1241	(755) 60.8	(376) 30.3***	(802) 64.6	(251) 20.2***	(405) 32.6	(58) 4.7***	(169) 13.6	(32) 2.6***	(95) 7.7	(16) 1.3***	(238) 19.2	(37) 3.6***	
Total (Sites: 2, 4, 5, 6)	500	(309) 62.8	(180) 36.0***	(371) 74.2	(137) 27.4***	(122) 24.4	(32) 6.4***	(61) 12.2	(12) 2.4***	(57) 11.4	(12) 2.4***	(105) 21.0	(26) 5.2***	

Two sets of data analyses are shown, based on total results from 6 sites and from 4 sites with high follow-up rates. (–) Results suppressed because fewer than 10 subjects reported use of that substance at baseline. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>a</sup> Among subjects qualifying for any level of intervention, the number with data from baseline and follow-up who reported use of one or more illicit drugs at baseline.

Table 7  
Use of Substances at Baseline and Follow-Up Among Those Reporting Use of Specific Illicit Drugs At Baseline

Substance	Site	N <sup>a</sup>	Heavy alcohol (n) %		Marijuana (n) %		Cocaine (n) %		Methamphetamine (n) %		Heroin (n) %		Other drugs (n) %	
			Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U	Baseline	F/U
Marijuana reported at baseline	1	756	(420) 55.6	(319) 42.2***	(756) 100.0	(298) 39.4***	(42) 5.6	(24) 3.2**	(66) 8.7	(26) 3.4***	(12) 1.6	(4) 0.5*	(59) 7.8	(34) 4.5**
	2	1360	(812) 59.7	(475) 34.9***	(1360) 100.0	(455) 33.5***	(317) 23.3	(75) 5.5***	(262) 19.3	(74) 5.4***	(115) 8.5	(38) 2.8***	(245) 18.0	(130) 9.6***
	3	829	(503) 60.7	(109) 13.1***	(829) 100.0	(73) 8.8***	(358) 43.2	(21) 2.5***	(46) 5.5	(2) 0.2***	(16) 1.9	(1) 0.1***	(165) 19.9	(10) 1.2***
	4	300	(75) 25.0	(120) 40.0***	(300) 100.0	(111) 37.0***	(83) 27.7	(25) 8.3***	–	–	(43) 14.3	(19) 6.3***	–	–
	5	412	(278) 67.5	(179) 43.4***	(412) 100.0	(171) 41.5***	(57) 13.8	(18) 4.4***	(14) 3.4	(2) 0.5**	–	–	(56) 13.6	(24) 5.8***
	6	389	(316) 81.2	(129) 33.2***	(389) 100.0	(70) 18.0***	(58) 14.9	(16) 4.1***	(10) 2.6	(0) 0.0**	–	–	(33) 8.5	(3) 0.8***
	Total (Sites: 1–6)	4046	(2404) 59.4	(1331) 32.9***	(4046) 100.0	(1178) 29.1***	(915) 22.6	(179) 4.4***	(399) 9.9	(104) 2.6***	(201) 5.0	(67) 1.7***	(565) 14.0	(203) 5.0***
Total (Sites: 2, 4, 5, 6)	2461	(1481) 60.2	(903) 36.7***	(2461) 100.0	(807) 32.8***	(515) 20.9	(134) 5.4***	(287) 11.7	(76) 3.1***	(173) 7.0	(62) 2.5***	(341) 13.9	(159) 6.5***	
Cocaine reported at baseline	1	98	(61) 62.2	(51) 52.0	(42) 42.9	(24) 24.5***	(98) 100.0	(15) 15.3***	(15) 15.3	(7) 7.1*	–	–	(13) 13.3	(6) 6.1
	2	648	(373) 57.6	(192) 39.6***	(317) 48.9	(111) 17.1***	(648) 100.0	(121) 18.7***	(164) 25.3	(37) 5.7***	(180) 27.8	(54) 8.3***	(183) 28.2	(69) 10.6***
	3	981	(648) 66.1	(106) 10.8***	(358) 36.5	(29) 3.0***	(981) 100.0	(56) 5.7***	(47) 4.8	(1) 0.1***	(27) 2.8	(2) 0.2***	(137) 14.0	(9) 0.9***
	4	367	(104) 28.3	(101) 27.5	(83) 22.6	(54) 14.7**	(367) 100.0	(96) 26.2***	–	–	(123) 33.5	(46) 12.5***	(18) 4.9	(3) 0.8***
	5	101	(73) 72.3	(51) 50.5***	(57) 56.4	(24) 23.8***	(101) 100.0	(21) 20.8***	(1) 20.8***	–	(14) 13.9	(6) 5.9**	(27) 26.7	(8) 7.9***
	6	108	(86) 79.6	(23) 21.3***	(58) 53.7	(9) 8.3***	(108) 100.0	(13) 12.0***	–	–	–	–	(18) 16.7	(1) 0.9***
	Total (Sites: 1–6)	2303	(1345) 58.4	(524) 22.8***	(915) 39.7	(251) 10.9***	(2303) 100.0	(322) 14.0***	(241) 10.5	(47) 2.0***	(355) 15.4	(112) 4.9***	(396) 17.2	(96) 4.2***
Total (Sites: 2, 4, 5, 6)	1224	(636) 52.0	(367) 30.0***	(515) 42.1	(198) 16.2***	(1224) 100.0	(251) 20.5***	(179) 14.6	(39) 3.2***	(321) 26.2	(107) 8.7***	(262) 20.1	(81) 6.6***	
Methamphetamine reported at baseline	1	175	(76) 43.4	(46) 26.3***	(66) 37.7	(34) 19.4***	(15) 8.6	(3) 1.7**	(175) 100.0	(33) 18.9***	–	–	(25) 14.3	(11) 6.3**
	2	455	(211) 46.4	(122) 26.8***	(262) 57.6	(86) 18.9***	(164) 36.0	(26) 5.7***	(455) 100.0	(73) 16.0***	(83) 18.2	(26) 5.7***	(124) 27.3	(39) 8.6***
	3	83	(53) 63.9	(9) 10.8***	(46) 55.4	(4) 4.8***	(47) 56.6	(1) 1.2***	(83) 100.0	(1) 1.2***	–	–	(36) 43.4	(2) 2.4***
	5	24	(14) 58.3	(8) 33.3*	(14) 58.3	(5) 20.8**	(9) 37.5	(4) 16.7*	(24) 100.0	(3) 12.5***	–	–	–	–
	6	15	–	–	(10) 66.7	(2) 13.3**	–	–	(15) 100.0	(0) 0.0	–	–	–	–
	Total (Sites: 1–6)	753	(364) 48.3	(186) 24.7***	(399) 53.0	(131) 17.4***	(241) 32.0	(34) 4.5***	(753) 100.0	(110) 14.6***	(101) 13.4	(31) 4.1***	(196) 26.0	(54) 7.2***
	Total (Sites: 2, 4, 5, 6)	495	(235) 47.5	(131) 26.5***	(287) 58.0	(93) 18.8***	(179) 36.2	(30) 6.1***	(495) 100.0	(76) 15.4***	(87) 17.6	(27) 5.5***	(135) 27.3	(41) 8.3***
Heroin reported at baseline	1	31	(12) 38.7	(5) 16.1	(12) 38.7	(8) 25.8	–	–	–	–	(31) 100.0	(6) 19.4***	–	–
	2	266	(102) 38.3	(55) 20.7***	(115) 43.2	(38) 14.3***	(180) 67.7	(47) 17.7***	(83) 31.2	(29) 10.9***	(266) 100.0	(62) 23.3***	(106) 39.8	(33) 12.4***
	3	60	(32) 53.3	(5) 8.3***	(16) 26.7	(2) 3.3***	(27) 45.0	(3) 5.0***	–	–	(16) 100.0	(4) 6.7***	(17) 28.3	(2) 3.3***
	4	242	(39) 16.1	(56) 23.1*	(43) 17.8	(26) 10.7*	(123) 50.8	(41) 16.9***	–	–	(242) 100.0	(75) 31.0***	(27) 11.2	(8) 3.3***
	5	28	(12) 42.9	(9) 32.1	–	–	(14) 50.0	(7) 25.0*	–	–	(28) 100.0	(8) 28.6***	(16) 57.1	(6) 21.4***
	Total (Sites: 1–6)	634	(201) 31.7	(131) 20.7***	(201) 31.7	(81) 12.8***	(355) 56.0	(102) 16.1***	(101) 15.9	(33) 5.2***	(634) 100.0	(156) 24.6***	(175) 27.6	(53) 8.4***
	Total (Sites: 2, 4, 5, 6)	543	(157) 28.9	(121) 22.3**	(173) 31.9	(71) 13.1***	(321) 59.1	(95) 17.5***	(87) 16.0	(30) 5.5***	(543) 100.0	(146) 26.9***	(154) 28.4	(48) 8.8***
Other drugs reported at baseline	1	169	(85) 50.3	(46) 27.2***	(59) 34.9	(29) 17.2***	(14) 7.7	(9) 5.3	(25) 14.8	(8) 4.7***	–	–	(169) 100.0	(12) 7.1***
	2	414	(257) 62.1	(119) 28.7***	(245) 59.2	(78) 18.8***	(183) 44.2	(41) 9.9***	(124) 30.0	(37) 8.9***	(106) 25.6	(38) 9.2***	(414) 100.0	(68) 16.4***
	3	351	(201) 57.3	(37) 10.5***	(165) 47.0	(17) 4.8***	(137) 39.0	(8) 2.3***	(36) 10.3	(2) 0.6***	(17) 4.8	(1) 0.3***	(351) 100.0	(8) 2.3***
	4	35	(15) 42.9	(14) 40.0	(7) 20.0	(6) 17.1	(18) 51.4	(6) 17.1***	–	–	(27) 77.1	(9) 25.7***	(35) 100.0	(5) 14.3***
	5	91	(55) 60.4	(41) 45.1**	(56) 61.5	(30) 33.0***	(27) 29.7	(9) 9.9***	–	–	(16) 17.6	(6) 6.6**	(91) 100.0	(16) 17.6***
	6	49	(35) 71.4	(10) 20.4***	(33) 67.3	(8) 16.3***	(18) 36.7	(3) 6.1***	–	–	–	–	(49) 100.0	(3) 6.1***
	Total (Sites: 1–6)	1109	(648) 58.4	(267) 24.1***	(565) 50.9	(168) 15.1***	(396) 35.7	(76) 6.9***	(196) 17.7	(48) 4.3***	(175) 15.8	(57) 5.1***	(1109) 100.0	(112) 10.1***
Total (Sites: 2, 4, 5, 6)	589	(362) 61.5	(184) 31.2***	(341) 57.9	(122) 20.7***	(246) 41.8	(59) 10.0***	(135) 22.9	(38) 6.5***	(154) 26.1	(55) 9.3***	(589) 100.0	(92) 15.6***	

Two sets of data analyses are shown based on total results from 6 sites and from 4 sites with high follow-up rates. (–) Results suppressed because fewer than 10 subjects reported use of that substance at baseline. \**p*<0.05; \*\**p*<0.01; \*\*\**p*<0.001.

<sup>a</sup> Among subjects qualifying for any level of intervention, the number with data from baseline and follow-up who reported use of the drug listed on the left at baseline.

ining patients who were screened positive, the most common substances reported varied considerably across the six sites (Table 2). Alcohol was the most commonly reported substance among patients screening positive at all sites. Marijuana was the second most common substance at all sites except Site 4, where cocaine was more commonly endorsed. Heroin was particularly common at Site 4 where it was endorsed by 4.1% overall (18.8% of the overall group screening positive). Methamphetamine was not common in any of the sites except Site 2 where it was reported by 3.9% of patients (9.9% of the overall group screening positive). Other drugs including prescription-type sedatives and opioids as well as hallucinogens and inhalants, were reported, on average, by 6.6% of patients screening positive.

Of the people randomly selected for follow-up and recommended for a BI, BT or RT, the majority were determined to need a BI, and fewer a BT or RT. Comparing baseline to follow-up rates of heavy alcohol use and illicit drug use (Tables 3–7), shows that in the majority of cases with adequate numbers of subjects, self-reported rates diminished from baseline to follow-up. At the bottom of each data set combined results are analyzed two ways. The first (Total Sites 1–6) includes data from all sites, regardless of follow-up rates. The second (Total Sites 2,4,5,6) averages data from sites which had follow-up rates exceeding 70% of the required number of follow-ups and excluded Sites 1 and 3 with low follow-up rates. Most of these reductions in substance use were statistically significant. Table 3 shows that irrespective of whether the sample includes those who reported using heavy alcohol, using an illicit drug, or using heavy alcohol or illicit drugs, reductions were seen across all substances examined, and similar data were obtained from combined sites with varying follow-up rates or from totals which excluded Sites 1 and 3. Summarized in Fig. 1 (Total Sites 2, 4, 5, 6) are the statistically significant reductions ( $p < 0.001$ ) in heavy alcohol, marijuana, cocaine, methamphetamine, heroin and other drugs, with data sets from Sites 1 and 3 omitted because of the low follow-up rates. Additional analyses were conducted to determine whether changes reported overall for persons who reported illicit drug use at baseline were also seen among different age, gender and race/ethnic groups (Tables 4–6). Baseline to follow-up rates of heavy alcohol and illicit drug use were compared for men and women separately (Table 4), ages less than 25, 25–34, 35–44 and 45–54 (Table 5) and different race/ethnic groups (Table 6). Of note, in all cases where an adequate number of subjects allowed calculation of rates, decreases were seen from baseline to follow up across nearly every substance category. In both genders, in different age groups and in different race/ethnic groups, most of these reductions were statistically significant. The one exception was Site 4 where heavy alcohol consumption increased from baseline to follow-up among the group reporting illicit drugs at baseline. In contrast, no increases were seen at Site 4 among the overall group reporting either alcohol or drugs at baseline and decreases in heavy alcohol were seen when the group included just those reporting heavy alcohol at baseline. The overall increases in heavy alcohol at Site 4 for those reporting illicit drugs at baseline were seen in men, younger cohorts and African Americans, but not women, older cohorts, and the other race/ethnic groups. Table 7 shows the results among those

Table 8  
Past 30-day health, mental health, and social outcomes at baseline and 6-month follow-up among those reporting any illicit drug at baseline<sup>a</sup>

Subgroup	Site	N <sup>b</sup>	Mean overall health status <sup>c</sup>		Emotional problems in past 30 days <sup>d</sup> (%)		Currently employed <sup>e</sup> (%)		Any arrests in past 30 days (%)		Currently homeless <sup>f</sup>	
			F/U mean	F/U (n) %	Baseline (n) %	F/U (n) %	Baseline (n) %	F/U (n) %	Baseline (n) %	F/U (n) %	Baseline (n) %	F/U (n) %
Any	1	1022	2.26	3.06***	(252) 24.7	(194) 19.0***	(449) 43.9	(509) 49.8**	(113) 11.1	(31) 3.0***	(106) 10.4	(35) 3.4***
illicit	2	1978	2.09	2.83***	(561) 28.4	(446) 22.5***	(576) 29.1	(684) 34.6***	(227) 11.5	(102) 5.2***	(339) 17.1	(209) 10.6***
drug	3	1618	2.27	2.81***	(461) 28.5	(151) 9.3***	(511) 31.6	(577) 35.7***	(257) 15.9	(71) 4.4***	(176) 10.9	(67) 4.1***
reported	4	696	2.00	2.65***	(145) 20.8	(144) 20.7	(107) 15.4	(154) 22.1***	(59) 8.5	(31) 4.5***	(70) 10.1	(34) 4.9***
at	5	495	2.72	3.10	(129) 26.1	(85) 17.2***	(184) 37.2	(193) 39.0	(52) 10.5	(24) 4.8***	(14) 2.8	(24) 4.8
base-	6	453	3.12	3.24	(54) 11.9	(81) 17.9***	(133) 29.4	(145) 32.0	(59) 13.0	(15) 3.3***	(36) 7.9	(33) 7.3
line	Total (Sites: 1–6)	6262	2.25	2.91***	(1602) 25.6	(1101) 17.6***	(1960) 31.3	(2262) 36.1***	(767) 12.2	(274) 4.4***	(741) 11.8	(402) 6.4***
	Total (Sites: 2, 4, 5, 6)	3622	2.24	2.89***	(889) 24.5	(756) 20.9***	(1000) 27.6	(1176) 32.5***	(397) 11.0	(172) 4.7***	(459) 12.7	(300) 8.3***

Two sets of data analyses are shown based on total results from 6 sites and from 4 sites with high follow-up rates. GPR data are based on an approved uniform instrument, hence, all grantees use the same questions on substance use as well as other outcomes. "Other outcomes" (employment, arrests, etc.) are reported only for patients in need of a brief treatment (BT) or a referral to a specialty treatment (RT) program. A BT can be as many as 10 sessions and is designed to address more than simply motivation to change behavior (the focus of brief interventions). \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>a</sup> Note that these outcomes are only available for persons with moderate to severe substance abuse at baseline (i.e. those receiving brief treatment or referred to specialty treatment).

<sup>b</sup> Number responding to these questions at baseline and follow-up.

<sup>c</sup> Excellent = 5; very good = 4; good = 3; fair = 2; poor = 1.

<sup>d</sup> Any reported days of experiencing serious depression, serious anxiety, hallucinations, suicide attempts, trouble controlling violent behavior, trouble with memory or concentration or taking prescribed medications for psychological/emotional problems.

<sup>e</sup> Full time or part time.

<sup>f</sup> Not living in a domicile or residential facility.

reporting use of specific substances. Although the sample size was too small for certain of these analyses, in all cases for which there were sufficient samples, the numbers decreased from baseline to follow-up; in most cases, these reductions were statistically significant.

Notwithstanding the fact that sites differed on the basis of protocols, screening tools, cut-off scores, definitions and populations, heavy alcohol users and illicit drug abusers self-reported significant reductions at 6-month follow-up (Tables 3–7, Fig. 1).

### 3.3. Baseline and follow-up health, employment, criminal behavior and homelessness

GPRA also required grantees to report other outcomes using an approved uniform instrument. “Other outcomes” (employment, arrests, etc.) were reported only for patients recommended for a brief treatment (BT) or a referral to a specialty treatment (RT) program. Baseline and follow-up measures of past 30 day general physical health, symptoms of mental illnesses, employment, criminal behavior and homelessness were also collected among patients who required the more intense clinical interventions (brief therapy or referral to specialty treatment). Among persons that received a BT or RT, self-reported drug use declined significantly at follow-up. Self perception of overall health status improved significantly from baseline to follow-up at four sites (Table 8). Similarly, employment improved significantly at four of the six sites, self-reported arrests decreased significantly across all six sites and homelessness decreased significantly at four of the six sites. Emotional problems improved at four sites but at Site 6, self-report of emotional problems increased ( $p < 0.01$ ) from baseline to follow-up. As a BT can be delivered in as many as 10 sessions and was designed to address more than simple motivation to change behavior (the focus of brief interventions), it is not unreasonable that BT could contribute to changes in these other outcomes.

## 4. Discussion

### 4.1. Summary

SBIRT is the largest service program to provide screening for combined illicit and alcohol use in a large and diverse population (>450,000 patients) and in a wide range of healthcare settings. Combined screening and brief interventions for illicit drug and heavy alcohol use was feasible across all sites, with personnel hired specifically for this purpose. Secondary analysis of a sample population reporting illicit drug abuse at baseline and at 6-month follow-up at four of the six sites with high follow-up rates, indicate that rates of drug use were lower by 67.7% ( $p < 0.001$ ) and heavy alcohol use by 38.6% ( $p < 0.001$ ). Persons requiring brief treatment or referral to specialty treatment self-reported improvements in general health, mental health and important social measures, across most sites. For the first time, in a large screened population ( $n > 450,000$ ) and implemented in a broad spectrum of sites, demographics, and using various procedures, the self-reported patient status at 6 months indicated signif-

icant improvements over baseline in illicit drug and alcohol use.

### 4.2. Objectives and outcome measures

Our first objective was to assess the feasibility of providing screening for illicit drug use in the context of simultaneous screening for risky alcohol use in a service program across a range of healthcare settings. Screening for a wide range of illicit drugs, in addition to alcohol, was clearly feasible and clinically appropriate in diverse healthcare settings and for various populations. The prevalence of illicit drug abuse was clinically significant across a range of substances among the full population screened.

Our next objectives were, in populations screening positive for illicit drugs and/or alcohol and offered score-based progressive interventions (brief intervention, brief treatment, referral to specialty treatment) at intake, to compare self-reported use at intake and 6 months later. In this secondary analysis of service data, patients that screened positive (22.7% overall) self-reported significant reductions in illicit drug abuse and heavy use at 6-month follow-up. Results were consistent for most age, race/ethnic and gender subgroups across the different sites, across all the specific substances for which adequate numbers of subjects were available for consideration. These data are consistent with positive trends in published results conducted with smaller sample sizes that demonstrate an association between screening, brief interventions with reductions in marijuana, amphetamine-type stimulants, cocaine and heroin in the majority (Bernstein et al., 2005; Copeland et al., 2001; McCambridge and Strang, 2004; Stotts et al., 2001; World Health Organization Report, 2008), but not all studies (Marsden et al., 2006). The results for illicit drug use are consistent with findings from the WHO multi-national randomized, control trial, which found that overall, 82.8% of all participants who received the brief intervention at baseline reported attempting to cut down on substance use as a result of feedback they received. Of this population, 60.2% ( $n = 224$ ) reduced illicit drug use, as measured by the ASSIST scale (World Health Organization Report, 2008).

Alcohol data were included both for comparative purposes and to compare procedural effects on heavy alcohol with illicit drug use. The decline in alcohol use was consistent with previously reported reductions in heavy alcohol use (Fleming et al., 1997, 2002; Gentilello et al., 1999, 2005; Schermer et al., 2006; Soderstrom et al., 2007), supporting the validity of the current findings. Nonetheless, settings, interventions, self-reports, patient populations and other factors can affect response rates (Babor et al., 1987, 2000; Bien et al., 1993; Edwards and Rollnick, 1997; Wilk et al., 1997). For example, a population of medical inpatients, the majority with alcohol dependence, was unresponsive to brief interventions (Saitz et al., 2007).

The SBIRT programs also collected data on whether participants who received more intense interventions (brief treatment or referral to specialty treatment), reported changes in health and social outcomes. Patients in this group self-reported significant improvements across general and mental health measures, arrests, homelessness and employment, reflecting the potential

for SBIRT to shift not just drug abuse, but also distal health and social outcomes.

### 4.3. Limitations

Notwithstanding these promising findings, it is appropriate to reflect on limitations in design, procedures and data collection. Foremost are concerns associated with reporting analysis of service/administrative data, and not research data. Yet this form of data is both a weakness (data gaps and differences in implementation procedures across sites) and a strength (data reflect a large and realistic view of practice). In this regard, authors of the WHO randomized control study speculated that the extensive protocol for informed consent in the USA research component of the study may have served as a brief intervention, potentially confounding outcome measures (World Health Organization, 2008). Another concern is the reliance on self-reports to screen populations and to determine drug use at 6-month follow-up. Previous studies indicated the reliability of self-reports under various conditions (Babor et al., 1987, 2000; Donohue et al., 2007; Lennox et al., 2006), but inclusion of simultaneous biological testing at baseline and follow-up may assist in diminishing under- or over-reporting of drug (Vitale et al., 2006). On the other hand, results from a single biometric measure cannot provide information on quantity or frequency to be of adequate value in strengthening the accuracy of self-reporting. Self-reports of general health, mental health status (primarily depression), housing, employment, and arrests might have been independently verified (via rating scales, physical exam and official documents), but this was outside the scope of the GPRA reporting requirements. Equally important for future studies is whether apparent reductions in illicit drug use and heavy alcohol use persist beyond the 6-month period. Finally, the absence of comparison groups (e.g. randomized controls) could have resulted in a Type 1 error (i.e. that the improvements were unrelated to the procedures), arising from regression to the mean phenomenon (a tendency for those scoring differently from the population mean to regress towards the mean when re-assessed, Finney, 2007), self-selection by patients who volunteered their responses to screening questions, or screening effects alone, as demonstrated by the WHO report (2008).

Another limitation was the relatively low level of rates of follow-up at two sites. For this reason, all results were stratified by site and analysis was performed on all six sites and compared with outcomes from 4 sites with high follow-up rates. With the exception of Site 3, the fact that sites with high or low follow-up rates showed reductions in drug use of a similar magnitude, suggests that reductions in drug use were not compromised by rates of follow-up.

### 4.4. Conclusions and future research

The tentative conclusion that SBIRT services may be associated with a reduction in substance use is supported by a number of randomized controlled trials (e.g. Bernstein et al., 2005; Fleming et al., 1997, 2002; Gentilello et al., 1999, 2005; Soderstrom et al., 2007; WHO, 2008). Based on published reports, reductions in substance abuse can be attributable to the

screening procedure alone or combined with the intervention or to other factors. The general consistency of the data across the majority of the sites and of most measures for these outcomes adds strength to the conclusions. As the majority of persons intended to receive an intervention received one, we are confident that the intervention was delivered adequately. Accordingly, the results demonstrate a promising strategy for addressing this public health burden.

Overall, the SBIRT program demonstrated that a rapid and simple set of procedures has potential for impacting the public health burden of substance abuse. There are substantive reasons for engagement in these procedures by medical professionals. The association between substance use and trauma/injuries is one of a mounting list of medical consequences or of associations of medical conditions and substance abuse (Bedard et al., 2007; Caputo et al., 2007; Centers for Disease Control, 2005; Dept of Transportation (US), National Highway Traffic Safety Administration (NHTSA), 2006; Hayatbakhsh et al., 2007; Howard et al., 2004; Macdonald et al., 2003; McFadden et al., 2005; Mertens et al., 2003, 2005; Moore et al., 2007; Nyenwe et al., 2007; O'Malley and Johnston, 2003; Rivara et al., 1997; Rootman et al., 2007; Shoptaw and Reback, 2007; Stein and Friedmann, 2006; Strathdee et al., 2001; Sullivan et al., 2005; Swanson et al., 2007; Sweeney et al., 2000; Volkow et al., 2007; Westover et al., 2007; Wilson and Saukkonen, 2004; Yeo et al., 2007). SBIRT provides a opportunistic teaching moment for primary care or emergency service providers to take proactive measures for their patients who may be engaged in risky use of substances, but are not currently seeking assistance and are not in need of specialty treatment. The documented cost-savings of approximately \$4 for each \$1 expended for alcohol SBI (Gentilello et al., 2005; Fleming et al., 2002) is another potential benefit for these procedures, but requires corresponding cost-savings analysis for illicit drug SBI, particularly for unrecoverable hospital costs (Swanson et al., 2007). For both alcohol and illicit drugs, the SBIRT program in Washington State (S. Estee, personal communication) was calculated to save Medicaid approximately \$2,000,000 for each 1000 Medicaid patients administered these services, with a significant portion attributable to reductions in re-hospitalizations.

In recognition of the value of screening, brief intervention procedures, new reimbursable procedural codes (CPT<sup>®</sup>, "H", "G" for third party insurers, Medicaid, Medicare, respectively) were introduced in 2007 and 2008. As a further incentive for implementing these procedures, patients who receive counseling services for alcohol problems reportedly perceive that they are receiving a higher level of primary care (Saitz et al., 2008). Even with promising evidence of effectiveness, cost-effectiveness, positive patient response, the widespread implementation of even alcohol SBI procedures remains an elusive goal (Kuehn, 2008). Although the SBIRT program provided sufficient funds to staff an SBIRT team, the combination of effectiveness measures, cost-savings, new procedural billing codes, and positive patients' perception of high quality of care, may catalyze widespread implementation of these practices in healthcare settings.

Another notable feature of SBIRT is its potential to identify patients at higher risk for prescription drug abuse. In the United States, non-medical use/abuse of prescriptions drugs ranks second (after marijuana) among illicit drug users (Substance Abuse and Mental Health Services Administration, 2007a). Patients with risky alcohol consumption or illicit drug use are at increased risk for prescription drug abuse, including opioid analgesics (Compton and Volkow, 2006; Huang et al., 2006; McCabe et al., 2006; McCabe and Teter, 2007; Simoni-Wastila and Strickler, 2004). Effective prescription drug abuse screening questions should be incorporated into standardized screening questionnaires to identify non-medical use of prescription drugs.

This report also serves as a guide to steer future research and practice. Randomized controlled trials that control for potential ecological confounds, and investigate populations at risk, those challenged by psychiatric diseases, stress, anxiety, depression (Oslin et al., 2006), unemployment, absence of family and social supports will further advance the scientific basis of these procedures. It remains to be shown whether SBIRT services can attenuate progression to drug addiction (Wagner and Anthony, 2002; Chen et al., 2005; O'Brien and Anthony, 2005) and whether SBIRT will improve medical conditions precipitated or exacerbated by illicit drug abuse (e.g. HIV-AIDS), alleviate prescription drug abuse, and lower the national burden of healthcare, legal, social, work-place costs.

Overall, these SBIRT service programs document reductions in illicit drug and alcohol abuse 6 months after a random sample of patients screened positive, with the majority receiving, at a minimum, a brief intervention. Given high rates of overlap across drugs and alcohol documented in this report, it makes great sense to encourage bundling of screening and intervention services for patients presenting in medical settings. An effective program should also provide for seamless referrals to treatment for the addicted, either to physicians' office-based practices or referral to specialty ambulatory or residential treatment, as necessary. SBIRT is a promising service for identifying illicit drug abuse and its associated adverse consequences in health care settings.

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### Contributors

Dr. Bertha Madras conceived, wrote and edited the manuscript and made substantial contributions to data analysis and data/statistical interpretation and administrative support for the program. Dr. Madras, Dr. Compton and Ms. Avula take responsibility for data integrity, and had full access to the data. Dr. Compton made substantial contributions to conception and

design of the analysis, analysis and interpretation of the data, drafting of the manuscript, statistical analysis and technical support. Ms. Avula made substantial contributions to acquisition of data, data analysis, revision of the manuscript, and statistical analysis. Tom Stegbauer and Dr. Jack Stein contributed to the writing, reviews, and editing of drafts of the manuscript. Dr. Westley Clark, Director of the Center for Substance Abuse Treatment at SAMHSA, contributed to the manuscript by data acquisition, analysis, drafting and manuscript revision, and by providing administrative support and supervision.

### Conflict of interest

All authors are current employees of the United States Government and have no conflicts of interest or financial interests. Dr. Madras is on leave of absence as Professor of Psychobiology in the Department of Psychiatry at Harvard Medical School. The SBIRT program is funded by SAMHSA grants to States and administered by the States, via local experts.

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