Published in final edited form as:

Alcohol Treat Q. 2012 October 1; 30(4): 433–442. doi:10.1080/07347324.2012.718959.

Comparison of Objective Screening and Self-Report for Alcohol and Drug Use in Traumatically Injured Patients

Lauren M. Sakai¹, Thomas J. Esposito¹, Hieu H. Ton-That¹, Ellen C. Omi², Elizabeth J. Kovacs¹, and Carol R. Schermer³

¹Loyola University Medical Center, 2160 S. 1st Ave, Maywood, IL, 60153

²Advocate Christ Medical Center, 4440 W. 95th St., Oak Lawn, IL, 60453

³Baxter Healthcare Corporation, One Baxter Parkway, Deerfield, IL, 60015

Abstract

Alcohol and drug use is prevalent in trauma patients. Concerns over the validity of self-reporting drug use could make non laboratory screening problematic. This study sought to validate patient self-report of substance use against objective screening to determine the reliability of self-report in trauma patients. Patients admitted to either the Trauma or Burn services who were at least 18 years old were screened for alcohol and drug use with validated screening tools. Exclusion criteria were altered mental status, non English speaking, inability to answer questions for other reasons, under police custody, or admission for < 24 hours. Results from admission Blood Alcohol Concentration BAC and Urine Drug Screen UDS were also collected and compared to self-reported use to determine its reliability. Alcohol use was queried in 128 patients, 101 of whom had a BAC drawn. Of those 101, 34 (33.7%) had a BAC > 0 mg%. Alcohol Use Disorder Identification Test AUDIT screening revealed 13 (12.9%) patients who were self-reported non drinkers, none of which had a BAC > 0 mg%. Drug use was queried in 133 patients, 93 of whom had a UDS. A positive was found in 26 (28.0%) of the patients, only 12 (46.2%) of whom reported drug use in the past year. Though substance use in trauma patients is prevalent, self-report screening techniques for drugs may be inadequate at determining those patients whom could benefit from brief interventions while in the hospital. Further investigation is needed to determine the discrepancy between alcohol and drug use screening in trauma patients and more acceptable means of drug use discussion.

Introduction

Injured patients have a high prevalence of substance use. Twenty to forty percent of patients have a recorded positive blood alcohol concentration (Field, Caetano, & Pezzia, 2009; Langdorf et al., 2002; Schermer et al., 2008; Soderstrom et al., 1992) and 26% or more have a positive urine drug screen (Langdorf et al., 2002; Paran et al., 1995; Rivara et al., 1989; Soderstrom et al., 1988). The alarming relationship between alcohol use and trauma has led to extensive study of alcohol and injury. The use of standardized screening tools for alcohol misuse has arisen from such research and has been widely successful. Furthermore, brief

interventions for those exhibiting at-risk behaviors can decrease alcohol consumption (Gentilello et al., 1999; Schermer et al., 2006), subsequent injury (Gentilello et al., 1999), and other injury-related behaviors (Schermer et al., 2006; Schermer et al., 2008). The relationship between alcohol and injury and the beneficial results of screening and brief intervention (SBI) studies have led The American College of Surgeons Committee on Trauma to require all level one trauma centers to have the ability to provide screening and brief intervention (SBI) for alcohol use to their patients (American College of Surgeons, Committee on Trauma, 2006).

Screening by self-report for illicit drug use, in contrast, has remained less well studied in trauma patients, and screening has not yet been shown to be successful in this setting. Despite its use in other healthcare settings, few have evaluated the false negative rate of self-reported screening, and the use of a standardized screening tool has yet to be established. Previous studies of screening tools seeking self-reported drug use have shown conflicting results based on the populations screened (Bohn, Babor, & Kranzler, 1991; Cook, Bernstein, & Andrews, 1997; Rockette et al., 2003). Negative societal perceptions of illicit drugs may prevent some patients from disclosing their use, resulting in a sense of “alienation” and “devaluation” that can lead to a detrimental affect on mental and physical health (Ahern et al., 2007). These negative perceptions can also cause some to conceal their drug use in an attempt to increase their access to care (Kurtz et al., 2005). Combined, these factors may impede the identification of patients who could otherwise benefit from services such as brief interventions.

Biochemical screening has also been employed to help identify patients who use drugs, particularly in emergency departments and trauma contexts. However, it too has had limited success. Some trauma centers are reluctant to use biochemical screening because it may not be performed consistently on all patients due to bias (Soderstrom, Dailey, & Kerns, 1994). It may also interfere with reimbursement (Rivara et al., 2000; Gentilello et al., 2005; O’Keeffe et al., 2009).

The purpose of this study is to assess the reliability of standardized screening for drug and alcohol use through self-report in comparison to biochemical screening. It also sought to determine differences between veracity of alcohol and other drug use self-reporting by injured patients.

Method

This prospective study was conducted at a Level I Trauma Center that is also an American Burn Association verified Burn Center. The study protocol was reviewed and approved by the Institutional Review Board. Inclusion criteria required patients to be at least 18 years of age and admitted for a traumatic injury or burn. Patients were excluded from participation if they were found to have altered mental status, be non English speaking, unable to answer questions for other reasons, under police custody, or were admitted for less than 24 hours.

Eligible patients were approached for participation and informed that all data collected would remain anonymous. Those who agreed to participate were interviewed face-to-face

about substance use by a member of the research team who was not involved in the clinical care of the patient. Self-report of illicit drug use was conducted with the Drug Abuse Screening Test (DAST). The DAST was developed by the Addiction Research Foundation to identify risky drug use habits (Skinner, 1982). Modeled after the Michigan Alcohol Screening Test (MAST) and modified from its original 28 question format to 10 questions, the DAST-10 has become a commonly used questionnaire to detect at-risk drug users for substances other than alcohol or tobacco. Questions relate to consumption, tolerance, dependence, and consequences of drug use with an emphasis on questions relating to consequences. Responses are given as either yes or no and are scored from 0–1 points for each question. At-risk drug use was defined as having a DAST-10 score of 3 or higher (Bohn et al., 1991). In this study, a positive screening for drug use was defined as answering yes to the first question on the DAST-10 “have you used drugs other than those required for medical reasons (in the past 12 months)?” This answer was then compared to the UDS. A positive UDS was defined as the presence of drugs detected by the UDS. This data is reported at our institution as either present or absent by this test. Due to the fact that there is no numerical value associated with this test result the varying degree of detected drugs was not measured.

Screening for alcohol use was conducted with the Alcohol Use Disorder Identification Test (AUDIT) (Saunders et al., 1993). The AUDIT was developed by the World Health Organization as a short self-report questionnaire used to identify early at-risk drinkers, e.g. those at-risk for consequences associated with alcohol use. It consists of 10 questions relating to consumption, tolerance, dependence, and consequences of alcohol use. Answers are given as a graded response to determine quantity and frequency of alcohol related events and scored from 0–4 points each. At-risk drinking was defined as an AUDIT score of 8 or higher for those 21 years and older and 4 or higher for those 18–20 years old (Saunders et al., 1993). In this study, a positive screening for alcohol use was defined as answering more than “never” to the first question on the AUDIT “how often do you have a drink containing alcohol (in the past 12 months)?” This was compared to a positive BAC which was defined as a BAC greater than 0 mg% indicating any presence of alcohol in the system. The legal definition of intoxication, 0.8mg%, was also used to compare against the AUDIT.

Blood toxicology results were also analyzed when available. They consisted of the admission blood alcohol concentration (BAC) and urine drug screen (UDS). The UDS was used to detect cannabinoids, cocaine, amphetamines, phencyclidine, and barbiturates. Opiates and benzodiazepines were excluded due to potential iatrogenic administration during pre-hospital and early medical care of patients. Analysis consisted of comparison of BAC and UDS results to self-reported substance use screening results using chi-square and Fisher’s exact tests. Significance was set at $p < 0.05$.

Results

Over the seven month study period, the Trauma and Burn Services admitted 464 patients for an acute injury. Figure 1 outlines excluded and ineligible patients who could not be approached for participation. The greatest number of ineligible patients was due to an admission of less than 24 hours, discharge, or early death. This was followed by patients that

were persistently ventilated, non English speakers, and those found to have an altered mental status or a psychiatric condition which inhibited their cognition or decision making ability. Of the 143 patients found to be eligible, only 10 (7.0%) declined participation, leaving 133 patients who participated.

The participants had a mean age of 44.4 years. Seventy two percent of the patients were male and 28% were female. The mechanisms of injury which brought the patients to the hospital are outlined in Table 1. A larger percentage of burn patients was eligible for screening than of trauma patients.

Toxicology results for the entire population are noted in Table 2. A BAC was obtained on admission in 78.9% (n=101) of patients. Thirty four percent (n=34) of those with a measured BAC were found to have a positive BAC (BAC > 0 mg%) and of those 64.7% (n=23) had a BAC > 0.8 mg% (generally considered the legal definition of intoxication). AUDIT screening found that patients with a positive BAC on admission had a mean AUDIT score of 9.3. Thirteen (12.9%) patients were self-reported non drinkers, none of these 13 had a recorded BAC > 0.

A UDS was obtained in 69.9% (n=93) of patients. After excluding opiates and benzodiazepine results from analysis, the UDS was found to be positive for one or more substances in 28.0% (n=26) of patients. Cannabis and cocaine were the only two drugs detected in this population. Cannabis was present alone in the UDS in 57.7% (n=15) followed by cocaine only (26.9%, n=7) and cocaine and cannabis (15.4%, n= 4). DAST-10 screening was not reliable in recognizing drug using patients that were identified through UDS. Median DAST-10 score for UDS positive patients was 0 with a standard deviation of 1.3 with 46.2% of those patients having a DAST-10 score of 1 or greater.

Disclosure of alcohol or drug use was determined through the use of the AUDIT and DAST-10 screening tests. All of the patients with a positive BAC had an AUDIT > 0. In addition, 54 patients with a BAC=0 were found to have an AUDIT > 0. In contrast, of the 26 patients identified as having a positive UDS, only 12 (46.2%) had a DAST > 0. Six patients with a negative UDS were also identified as having a DAST > 0. Comparison rates of disclosure of either alcohol or drug use in patients with a positive toxicology result is summarized in Figure 2. There was a statistically significant difference in disclosure rates of alcohol use and drug use in patients with a positive toxicology result ($p < 0.001$) with the use Fisher's Exact test, 100% for alcohol use compared to 46.2% for drug use.

Discussion

This study found an association between drug use screening by self-report and biochemical methods to be low. It is in contrast to the high rate of association noted between self-reported screening and biochemical markers of alcohol use. Formal screening tools for assessing self-reported substance use behaviors are currently not widely utilized in trauma care. BAC or UDS obtained at time of admission are more commonly used. Though this information can be helpful, the utility of biochemical screening is limited. Studies have noted low and inconsistent acquisition rates of these "routine" labs (Buchfuhrer & Radecki,

1996; Field et al., 2009), leading to claims of selection bias. Biochemical screening alone also fails to capture individuals who may have a negative toxicology screen but otherwise exhibit risky substance use habits. Research on alcohol use screening has found that use of tools for self-reporting increase the identification of at-risk drinkers markedly (Albright et al., 2009; Schermer et al., 2003). In contrast, screening by self-reported methods for illicit drug use in this study did not to identify 53.8% of patients with a positive UDS.

Despite the potential utility of screening by self-report, this study found the rate of drug use disclosure compared to biochemical detection to be less consistent than that of alcohol use. Only 46.2% of patients with a positive UDS admitted to drug use compared to a 100% disclosure of alcohol use in BAC positive patients. Similar studies have also found low rates of correspondence for drug use screening (Maisto, McKay, & Connors, 1990, McNagny & Parker, 1992; Hser, 1997; Cook, Bernstein, & Andrews 1997; Rockett et al., 2003). One study evaluating patients in an STD clinic, Emergency Department, or a County Jail found a failure to disclose drug use ranging from 23–100%, depending on the substance being queried and the setting of inquiry (Hser, 1997). In a workplace population, denial of drug use was found to be similarly high, with a 54% denial rate in those with a positive UDS (Cook et al., 1997). Though none of these studies employed a standardized screening tool, some have suggested simple tools for screening (Ramchand et al., 2009). This finding leads us to question what is the optimal method for screening for illicit drug use in this population.

Although screening methods for use may need to differ between alcohol and drugs, those that are identified as misusers and receive brief intervention are likely to benefit from the session. The largest SBI service effort to date has reported significant reductions in illicit drug use in those screening positive and receiving intervention as well as a decrease in arrests in the past 30 days across all sites and an increase in employment across most sites at 6 month follow-up (Madras et al., 2009). Clinical trials comparing intervention methods to current standard of care should be conducted to further strengthen the argument for SBI.

There are several limitations to the study. While some feel disclosure rates of sensitive information are higher with the use of a self-administered questionnaire (Bradburn, 1983), the use of the face-to-face interaction for screening is commonly utilized for inpatient populations receiving SBI for alcohol use (Schermer et al., 2006; Smothers, Yahr, & Ruhl, 2004). Furthermore, if a patient is to benefit from SBI after disclosure of this information, the patient must be willing to discuss these issues face-to-face. Secondly, BAC and UDS were not obtained in all cases, potentially affecting the true rate of disclosure given the relatively small sample size.

Increasing recommendations from the American Medical Association (n.d.), the United States Preventive Task Force (2004), and other organizations are expanding the settings in which substance use habits are being discussed and screening is occurring. Improvements in patient disclosure of drug use have implications across all these settings. The trauma setting is of particular interest in identifying patients with drug abuse given the high percentage of drug using patients and evidence that SBI may be efficacious in decreasing drug use and its consequences. However, existing self-report screening techniques for drugs may be inadequate at determining those patients whom could benefit from brief interventions while

in the hospital. Further investigation is needed to determine the discrepancy between alcohol and drug use screening in trauma patients and more acceptable means of drug use discussion. Moreover, the determination of barriers to patient's open discussion of drug use is needed to improve the utilization of these and other screening tools not only in trauma patients, but in all healthcare settings.

Acknowledgments

The authors acknowledge support, in part, by the National Institutes of Health T32 AA013527 Institutional Training Grant and R01 AA015067 Research Project Grant.

References

- Ahern J, Stuber J, Galea S. Stigma, discrimination and the health of illicit drug users. *Drug Alcohol Depend.* 2007; 88:188–196. [PubMed: 17118578]
- Albright JM, Kovacs EJ, Gamelli RL, Schermer CR. Implications of formal alcohol screening in burn patients. *J Burn Care Res.* 2009; 30:62–69. [PubMed: 19060726]
- American College of Surgeons, Committee on Trauma. Resources for optimal care of the injured patient: 2006. Chicago, IL: American College of Surgeons; 2006.
- American Medical Association. H-30.955 Sequelae of alcohol intake. AMA policies on alcohol: alcohol and other drug screening and testing. Available from: http://www.ama-assn.org/ama1/pub/upload/mm/388/alcohol_screening.pdf
- Bohn MJ, Babor TF, Kranzler HR. Validity of the drug abuse screening test (DAST-10) in inpatient substance abusers. *Problems of Drug Dependence.* 1991; 119:233–235.
- Bradburn, NM. Response effects. In: Rossi, PH.; Wright, JD.; Anderson, AB., editors. *Handbook of Survey Research.* New York, NY: Academic Press; 1983. p. 289-328.
- Buchfuhrer LA, Radecki SE. Alcohol and drug abuse in an urban trauma center: Predictors of screening and detection. *J Addictive Diseases.* 1996; 15:65–73.
- Cook, RF.; Bernstein, AD.; Andrews, CM. Assessing drug use in the workplace: A comparison of self-report, urinalysis, and hair analysis. In: Harrison, L.; Hughes, A., editors. *The validity of self-reported drug use: Improving the accuracy of survey estimates.* Rockville, MD: National Institute on Drug Abuse; 1997. p. 247-272.
- Field C, Caetano R, Pezzia C. Process evaluation of serial screening criteria to identify injured patients that benefit from brief intervention: Practical implications. *J Trauma.* 2009; 66:1704–1711. [PubMed: 18797416]
- Gentilello LM, Rivara FP, Donovan DM, Jurkovich GJ, Daranciang E, Dunn CW, Ries RR. Alcohol interventions in a trauma center as a means of reducing the risk of injury recurrence. *Ann Surgery.* 1999; 230:473– 483.
- Gentilello LM, Samuels PN, Henningfield JE, Santora PB. Alcohol screening and intervention in trauma centers: Confidentiality concerns and legal considerations. *J Trauma.* 2005; 59:1250–1254. [PubMed: 16385312]
- Hser, YI. Self-reported drug use: results of selected empirical investigations of validity. In: Harrison, L.; Hughes, A., editors. *The validity of self-reported drug use: Improving the accuracy of survey estimates.* Rockville, MD: National Institute on Drug Abuse; 1997. p. 320-343.
- Kurtz SP, Surratt HL, Kiley MC, Inciardi JA. Barriers to health and social services for street-based sex workers. *J Health Care Poor Underserved.* 2005; 16:345–361. [PubMed: 15937397]
- Langdorf MI, Rudkin SE, Dellota K, Fox JC, Munden S. Decision rule and utility of routine urine toxicology screening of trauma patients. *Eur J Emerg Med.* 2002; 9:115–21. [PubMed: 12131632]
- Madras BK, Compton WM, Avula D, Stegbauer T, Stein JB, Clark HW. Screening, brief interventions, referral to treatment (SBIRT) for illicit drug and alcohol use at multiple healthcare sites: Comparison at intake and 6 months later. *Drug Alcohol Depend.* 2009; 99:280–95. [PubMed: 18929451]

- Maisto SA, McKay JR, Connors GJ. Self-report issues in substance abuse: State of the art and future directions. *Behav Assess*. 1990; 12:117–134.
- McNaghy SE, Parker RM. High prevalence of recent cocaine use and the unreliability of patient self-report in an inner-city walk-in clinic. *JAMA*. 1992; 267:1106–1108. [PubMed: 1735928]
- O’Keeffe T, Shafi S, Sperry JL, Gentilello LM. The implications of alcohol intoxication and the Uniform Policy Provision Law on trauma center: A national trauma data bank analysis of minimally injured patients. *J Trauma*. 2009; 66:495–498. [PubMed: 19204527]
- Parran TV, Weber E, Tasse J, Anderson B, Adelman C. Mandatory toxicology testing and chemical dependence consultation follow-up in a level-one trauma center. *J Trauma*. 1995; 38:278–280. [PubMed: 7869453]
- Ramchand R, Marshall GN, Schell TL, Jaycox LH, Hambarsoomians K, Shetty V, Belzberg H. Alcohol abuse and illegal drug use among Los Angeles County trauma patients: Prevalence and evaluation of single item screener. *J Trauma*. 2009; 66:1461–1467. [PubMed: 19430255]
- Rivara FP, Mueller BA, Fligner CL, Luna G, Raisys VA, Copass M, Reay DT. Drug use in trauma victims. *J Trauma*. 1989; 29:462–470. [PubMed: 2565405]
- Rivara FP, Tollefson S, Tesh E, Gentilello LM. Screening trauma patients for alcohol problems: Are insurance companies barriers? *J Trauma*. 2000; 48:115–118. [PubMed: 10647575]
- Rockett IR, Putnam SL, Jia H, Smith GS. Assessing substance abuse treatment need: A statewide hospital emergency department study. *Ann Emerg Med*. 2003; 41:802–813. [PubMed: 12764335]
- Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption—II. *Addiction*. 1993; 88:791–804. [PubMed: 8329970]
- Schermer CR, Bloomfield LA, Lu SW, Demarest GB. Trauma patient willingness to participate in alcohol screening and intervention. *J Trauma*. 2003; 54:701–706. [PubMed: 12707531]
- Schermer CR, Moyers TB, Miller WR, Bloomfield LA. Trauma center brief interventions for alcohol disorders decreases subsequent driving under the influence arrests. *J Trauma*. 2006; 60:29–33. [PubMed: 16456433]
- Schermer CR, Omi EC, Ton-That H, Grimley K, Van Auken P, Santaniello J, Esposito TJ. A clustering of injury behaviors. *J Trauma*. 2008; 65:1000–4. [PubMed: 19001964]
- Skinner HA. The drug abuse screening test. *Addict Behav*. 1982; 7:363–371. [PubMed: 7183189]
- Smothers BA, Yahr HT, Ruhl CE. Detection of alcohol use disorders in general hospital admission in the United States. *Arch Intern Med*. 2004; 164:749–756. [PubMed: 15078644]
- Soderstrom CA, Trifillis AL, Shankar BS, Clark WE, Cowley RA. Marijuana and alcohol use among 1023 trauma patients: A prospective study. *Arch Surg*. 1988; 123:733–737. [PubMed: 2835941]
- Soderstrom CA, Dischinger PC, Smith GS, McDuff DR, Hebel JR, Gorelick DA. Psychoactive substance dependence among trauma center patients. *JAMA*. 1992; 267:2756–2759. [PubMed: 1578594]
- Soderstrom CA, Dailey JT, Kerns TJ. Alcohol and other drugs: An assessment of testing and clinical practices in U.S. trauma centers. *J Trauma*. 1994; 36:68–73. [PubMed: 8295251]
- United States Preventive Services Task Force. Screening and behavioral counseling interventions in primary care to reduce alcohol misuse: Recommendation statement. Rockville, MD: Agency for Healthcare Research and Quality; 2004.

Fig. 1.
Eligible Patient Included in the Study. Numbers indicate n values.

		Positive BAC	Positive UDS
Self-Reported	Yes*	34 (100%)	12 (46.2%)
	No	0 (0%)	14 (53.8%)

Fig. 2.

Self-Report of Alcohol and Drug Use by Positive Biochemical Screen. Rates of admission to the use of alcohol or drugs were compared in those with a positive biochemical screen (BAC or UDS). Positive biochemical screening groups were either positive BAC (n=34) or positive UDS (n=26) indicating 100% disclosure in the positive BAC group compared to a 46.2% disclosure in the positive UDS group.

* $p < 0.001$ comparing percent who disclosed use between positive biochemical screens using Fisher's Exact test.

Table 1

Baseline Characteristics for Eligible Patients (n = 133)

Male, n (%)	96 (72.2%)
Age, mean years (SD)	44.4 (19.7)
Mechanism of Injury	
MVC/MCC, n (%)	43 (32.2%)
Burn, n (%)	41 (30.8%)
Fall, n (%)	18 (13.5%)
Penetrating Trauma, n (%)	13 (9.8%)
Pedestrian vs. Auto, n (%)	8 (6.0%)
Assault, n (%)	5 (3.8%)
Other, n (%)	5 (3.8%)

MVC, motor vehicle collision; MCC, motor cycle collision

Table 2**Biochemical and Self-Reported Screening Results**

Toxicology	
BAC obtained, n (%)	101 (78.9%)
BAC > 0 mg%, n (%)	34 (33.7%)
Average positive BAC (mg %), mean (SD)	0.14 (107.4)
BAC ≥ 0.8 mg%, n (%)	23 (67.8%)
Mean AUDIT score	
Overall, mean (SD)	4.8 (5.7)
For a BAC > 0 mg%, mean (SD)	9.3 (7.4)
UDS obtained	93 (69.9%)
Positive UDS, n (%)	26 (28.0%)
Cannabis only, n (%)	15 (57.7%)
Cocaine only, n (%)	7 (26.9%)
Cocaine and cannabis, n (%)	4 (3.9%)
Median DAST-10 Score	
Overall, median (SD)	0 (0.85)
For UDS positive, median (SD)	0 (1.43)

BAC, blood alcohol concentration; AUDIT, alcohol use disorder identification test; UDS, urine drug screen; DAST-10, drug abuse screen test-10