

A Two-Item Screening Test for Alcohol and Other Drug Problems

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BACKGROUND. Although nonmedical use of illicit and prescription drugs is not uncommon among American adults, the currently recommended screening tests for substance use disorders (SUDs) focus only on alcohol. This study reports on the criterion validity of a two-item conjoint screening (TICS) test for alcohol and other drug abuse or dependence for a primary care sample.

METHODS. A random sample of 434 primary care patients aged 18 to 59 years responded to nine screening items, which emanated from a focus group process. The DSM-III-R criteria for SUDs, as operationalized by the Composite International Diagnostic Interview–Substance Abuse Module, served as the criterion standard.

RESULTS. At least one positive response to the TICS ("In the last year, have you ever drank or used drugs more than you meant to?" and "Have you felt you wanted or needed to cut down on your drinking or drug use in the last year?") discriminated current SUDs with approximately 81% sensitivity and specificity. The TICS was particularly sensitive to polysubstance use disorders. Respondents with zero positive responses had a 7.4% chance of a current SUD; one positive response, 45.0%; and two positive responses, 75.0%.

CONCLUSIONS. More than 80% of young and middle-aged patients with current alcohol or other drug problems may be recognized by the TICS, which is easily integrated into a clinical interview.

KEY WORDS. Alcoholism; substance abuse; mass screening; drug screening; primary health care. (*J Fam Pract* 1997; 44:151-160)

Previous reports have documented the need for a brief, accurate screening tool for substance use disorders (SUDs) for use in health care settings.^{1,2} Most patients provide accurate responses to direct questions regarding nicotine use,^{3,5} but direct questions may frequently fail to elicit accurate information on the use of other drugs.⁶ Therefore, screening tools are needed particularly for alcohol and other commonly abused drugs besides nicotine.

The screening protocols currently recommended for health care settings focus only on alcohol.⁷⁻¹⁰ Screening protocols developed for other drugs are too inaccurate or lengthy to garner widespread use

in medical settings.^{7,11-15} The need for screening tools that address a wider scope of substance abuse is particularly cogent in light of the proportion of persons who have SUDs involving drugs other than alcohol¹⁶ (Brown, Leonard, Rounds, Papasouliotis, 1996. Unpublished data), the increasing contribution of drug abuse to the spread of the acquired immunodeficiency syndrome (AIDS),¹⁷ and the known effectiveness of many forms of treatment for drug abuse and dependence.¹⁸

A particular advantage to screening for alcohol disorders is that such disorders, when identified early enough, can respond to relatively inexpensive and nonintrusive brief interventions.¹⁹⁻²¹ Studies on the effectiveness of brief interventions for drug abuse are underway. If such interventions do succeed, then a brief screening tool for drug abuse would be a useful way to identify possible candidates for brief interventions.

Brown²² initially advanced the concept of conjoint screening questions in 1992. A conjoint screening question is defined as a question that inquires

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simultaneously and in aggregate about experiences with alcohol and other drugs. An example of a two-item conjoint screening (TICS) question, derived from one of the CAGE questions, is "Have you ever felt guilty about your drinking or drug use?" There are at least three reasons to believe that conjoint questions would be preferred over separate questions for various substances²³.

First, patients who have problems related to multiple substances may more readily respond positively to a conjoint question than to separate questions on individual substances. For example, someone who gets into fights from drinking, suffers exacerbations of asthma due to marijuana smoking, and has frequent absences from work because of cocaine withdrawal might perceive a need to decrease his or her substance use in general more than a need to decrease the use of any particular substance.

Second, patients may be less likely to conceal affirmative responses to conjoint questions than to other questions on the use of particular illicit substances. It is widely understood that patients are often reluctant to inform clinicians about their use of illicit drugs because of stigma, possible legal ramifications, and possible effects on obtaining health and life insurance. Individuals can respond affirmatively to conjoint questions without necessarily indicating that they are using illicit drugs, since their affirmative responses could stem entirely from alcohol use.

Third, conjoint screening questions would allow clinicians to screen for alcohol and drug problems as rapidly as they can screen for alcohol problems. Brevity is important for clinicians because of economic pressures for efficiency and recommendations to conduct many other screening and prevention activities in health care settings.⁷

There may be some disadvantages to conjoint questions, as well²³: (1) individuals who use only alcohol may avoid responding affirmatively, wishing to avoid the possibility of conveying that they are using other drugs, and (2) conjoint questions do not identify particular substances of abuse.

Two previous studies have compared the accuracy of the original CAGE questions with the CAGE questions adapted to include drugs (CAGE-AID). The CAGE-AID consists of CAGE questions that have been altered by expanding the scope of the questions to include drug use.²³ A study on a convenience sample of primary care patients found that the CAGE-AID was more sensitive but less

specific for DSM-III-R SUDs than the CAGE questions.²³ A study on a random sample of medical, surgical, and orthopedic inpatients found that the CAGE-AID was more sensitive and specific for DSM-III-R SUDs than the CAGE (Brown, Rounds, Leonard, Papasouliotis. 1996. Unpublished data). The current study extends the work of previous studies by reporting on the criterion validity of nine TICS questions for a random sample of primary care patients.

METHODS

SUBJECTS

The sites of this study were three community, faculty, and residency practices of the Department of Family Medicine at the University of Wisconsin Medical School in Madison. These clinics provide primary medical care to patients of all ages. Two of the clinics, Northeast and Wingra, are located near subsidized housing facilities in Madison, yet draw patients from many neighborhoods. The third is located in the suburb of Verona. The clinics provide care at 49,527 visits per year by 14,419 patients. Two thirds (66%) of these patients have private health insurance; 8%, Medicare; 19%, state or county assistance; and 6%, no insurance.

Prospective subjects were randomly selected for recruitment from clinic schedules. Patients were eligible if they had a scheduled appointment on a randomly selected day that an interviewer was present, were between the ages of 18 and 59 years, had no mental or physical disability that prevented coherent communication, could converse in English, and were not pregnant. Older and pregnant patients were excluded because of the possibility that the screening questions might perform differently for these populations.

Initially, standard informed consent procedures were administered for each prospective subject. Complete confidentiality was promised. The prospective subjects were informed that there would be a one-in-four chance, as determined by random draw, that they would be asked to undergo a urine drug screening test after completing all other study procedures. Urine specimens, they were told, would be labeled only by a code number. The study protocol was approved by the Human Subjects Committee of the University of Wisconsin Center for Health Sciences.

MEASURES

An exhaustive literature search identified potential candidates for screening items. Such items, as well as ideas for new items, were discussed by three focus groups. There were separate groups of addiction clinicians and researchers, patients with current SUDs, and patients with SUDs in remission. The process resulted in the nine items shown in Table 1.

Initially, each subject responded to some "warm-up" questions on general health behaviors, including diet, exercise, and smoking. The reason for including these questions was to allow the interviewer to establish some rapport about topics less sensitive than alcohol and illicit drug use, as typically occurs in clinical practice. Subsequently, each subject responded to the nine conjoint screening items. Item 1, on blackouts, was asked in an open-ended fashion, with any response greater than zero interpreted as positive. Four multiple choice responses were provided for Items 2 through 9: never, rarely, sometimes, and often. The latter three responses were interpret-

ed as positive. This response scheme was chosen over a dichotomous yes-no scheme so that subjects could minimize yet respond affirmatively.

Next, the interviewer administered the Composite International Diagnostic Interview-Substance Abuse Module (CIDI-SAM). The CIDI-SAM was chosen as the criterion standard for substance use disorders because of its excellent test-retest reliability, its agreement with expert diagnostic interviews, and its capacity for administration by individuals without clinical expertise.²⁴⁻²⁷ The scoring algorithm for the CIDI-SAM was derived from the DSM-III-R criteria for substance abuse and dependence,²⁸ with "current" disorders connoting activity in the previous 12 months. There were three interviewers for the study. The interviewers underwent initial intensive training to administer the CIDI-SAM, and their performance was monitored periodically through the study.

The subjects also responded to several demographic questions, questions on the occurrence of several specific health and social consequences of

TABLE 1

The Two-Item Conjoint Screening Items Tested

Item Number	Text	Brief Descriptor
1	In the last year, how many times have you not remembered things that happened while you were drinking or using drugs?	Blackouts
2	In the last year, have you ever drank or used drugs more than you meant to?	Used more than intended
3	In the last year, have you been bothered by someone complaining about your drinking or drug use?	Bothered by complaints
4	Have you felt you wanted or needed to cut down on your drinking or drug use in the last year?	Need to cut down
5	Have you had any problems related to your drinking or drug use in the last year?	Use-related problems
6	In the last year, has anyone ever been concerned about your drinking or drug use?	Concern by others
7	In the last year, have you drank or used nonprescription drugs to deal with your feelings, stress, or frustration?	Use for feelings
8	As a result of your drinking or drug use, did anything happen in the last year that you wish didn't happen?	Regret
9	Do you think you've had a problem with your use of alcohol or drugs in the last year?	Problem

substance use, and the 13-item version of the Marlowe-Crowne Social Desirability Scale.^{29,30} The latter scale was intended to measure the degree to which subjects' responses may have been influenced by their perceptions of social desirability.

At the conclusion of the interview the subjects were asked to complete a brief, written questionnaire. On this questionnaire, they indicated their level of comfort with the interviewer by checking four choices: "very uncomfortable," "mostly uncomfortable," "mostly comfortable," and "very comfortable." They also indicated whether they "told all," "held back a little," or "held back a lot" regarding the amount and frequency of their alcohol use, the amount and frequency of their drug use, problems they may have had as a result of drinking alcohol, and problems they may have had as a result of using drugs. The subjects completed this questionnaire and placed it in a sealed envelope. They were assured that the interviewers would never see their individual responses.

After all the questionnaires were completed, each subject blindly drew one of four marbles out of a pouch. The subjects who drew one particular marble were asked to submit a urine specimen for a drug test. Urine specimens and reports were labeled by subject identification number only. A laboratory with certification by the US Substance Abuse and Mental Health Services Administration performed enzyme multiplied immunoassay tests for amphetamine, barbiturates, benzodiazepines, cocaine, marijuana, methadone, methaqualone, opiates, phencyclidine, and propoxyphene. Introducing the chance of undergoing a drug screening test was intended primarily to maximize the accuracy of the subjects' responses to the CIDI-SAM. To avoid discouraging participation, the greater proportion of subjects were not asked to undergo urine drug tests.

ANALYSIS

All data were entered into a microcomputer database system and transferred to a Sun SPARCstation (Sun Microsystems, Mountain View, Calif) for analysis by SAS software (SAS Institute, Cary, NC). Standard chi-square tests were used to assess for associations between two dichotomous variables. Standard logistic regression techniques were used to guide the selection of screening items.³¹

Sensitivity was defined as: of those subjects with SUDs according to the CIDI-SAM, the proportion

whose screening tests were positive. Specificity was defined as: of those subjects without SUDs according to the CIDI-SAM, the proportion whose screening tests were negative.

RESULTS

SUBJECTS

A total of 494 patients were recruited. Forty-five (9.1%) patients declined. Fifteen (3.0%) patients initially agreed to participate but were repeatedly unable to determine a satisfactory time for the interview. There were 434 participants, yielding a response rate of 87.9%.

The demographic attributes of the participants and the nonparticipants are shown in Table 2. The differences in proportions of patients drawn from the three clinics mirror the phasing in of the study at each clinic. The preponderance of women is consistent with the well-described gender differences in health care utilization. Each age cohort is well represented, although there were fewer subjects in the oldest decile than the others. The distribution of race/ethnicity reflects more diversity than actually exists in Madison, because two of the clinics are located in neighborhoods of marked diversity. The sample was particularly diverse with regard to educational level. Although publicly insured and uninsured patients are represented, most of the subjects had private insurance. The nonparticipants appeared more likely than the participants to be white and to have private insurance.

The distribution of SUDs is shown in Table 3. Slightly over one half of the subjects had lifetime SUDs. Slightly over one third had a lifetime history of substance dependence. Most of the lifetime SUDs involved only alcohol, and of the remainder, most involved alcohol and other drugs; there was only a 3.9% frequency of subjects with lifetime SUDs not involving alcohol. After alcohol, marijuana was the most frequently problematic substance, followed in order by cocaine, stimulants, sedative/tranquilizers, opioids, hallucinogens, and inhalants. Slightly over 20% had lifetime problems with more than one substance.

Slightly more than one fourth of the subjects had a current SUD. One fifth of the subjects were currently dependent on at least one substance. Six percent of the subjects had problems with alcohol plus at least one other drug, and 3.0% had problems only

with drugs other than alcohol. Thus, of those subjects with current SUDs, slightly more than one third had current problems that involved drugs other than alcohol. After alcohol, marijuana was the most frequently problematic drug, followed by cocaine, sedative/tranquilizers, opioids, stimulants, and hallucinogens; 6.5% of the subjects had current problems with more than one substance.

SCREENING PERFORMANCE

Independent item analyses for each of the nine TICS items are shown in Table 4. For each item, chi-square tests produced *P* values of less than .0001 for the two-by-two tables that compared dichotomous item responses with the presence or absence of current SUDs. Items 2 and 4 exhibited the best individual performances, followed by items 7 and 8.

An exhaustive analysis of combinations of items found that the best two-item screening strategy was to regard a positive response to item 2 or item 4 or both as a positive screening result. Table 5 demonstrates that this strategy yielded a sensitivity and specificity of approximately 81%.

The TICS was significantly less specific for patients aged 30 to 39 years ($\chi^2 = 4.76$, *df* = 1, *P* = .029) and less sensitive for patients aged 40 to 49 years ($\chi^2 = 16.24$, *df* = 1, *P* < .0001), compared with the other age groups. Neither of these differences could be explained by differences among the age groups in the prevalence of various kinds of SUDs. There were no other demographic differences in the performance of the TICS.

The TICS performed well across all substances of abuse. It was more sensitive for subjects who were dependent on at least one substance than for subjects with substance abuse but not dependence (88.5% vs 54.2%, *P* < .001). The sensitivity was particularly high, 96.2%, for the 26 subjects whose substance use disorders involved alcohol and at least one other drug.

With the 25.6% prevalence of current SUDs in this sample, the positive predictive value (the probability that an individual with a positive screen has a SUD) was 59.2%, and the negative predictive value (the probability that an individual with a negative screen does not have a SUD) was 92.6%. The Figure shows the probabilities of current SUDs given particular numbers of positive responses to the TICS. Among the 282 subjects with a negative

TABLE 2

Demographic Attributes of the Participants and Nonparticipants in the Conjoint Screening Study

	% Participants n=434	% Nonparticipants n=60
Clinic		
Northeast clinic	41.9	31.6
Verona clinic	34.8	31.6
Wingra clinic	23.3	36.6
Sex		
Male	35.5	38.3
Female	64.5	61.6
Age, y		
18 - 29	27.6	18.3
30 - 39	32.3	36.6
40 - 49	26.0	26.6
50 - 59	14.1	18.3
Race/ethnicity		
African-American	11.5	1.6
Asian-American	0.9	0.0
White	83.6	98.3
Hispanic/Latino	2.3	0.0
Native American	0.7	0.0
Other	0.9	0.0
Insurance status		
Private insurance	70.3	93.3
Public insurance	18.2	3.3
No insurance	5.3	3.3
Other	6.2	0.0
Level of education		
Less than high school	16.8	N/A
High school graduate or equivalent	46.6	N/A
Associate/vocational/ technical degree	11.5	N/A
Bachelor's degree	15.4	N/A
Advanced degree	9.7	N/A

N/A = not available.

TICS, there was a 7.4% prevalence of SUDs. Among the 80 subjects who responded affirmatively to one but not both of the two items, there was a 45.0% prevalence of SUDs. Among the 72 sub-

jects who responded affirmatively to both items, the prevalence of SUDs was 75.0%.

In attempts to find a screening tool that is superior to the TICS, several logistic regressions were performed with additional items. Adding item 7 to the TICS increased the sensitivity by 3.6 percentage points but blunted the specificity by 9.3 percentage points. The separate addition of other items increased the sensitivity by no more than one percentage point while decreasing the specificity slightly.

Many logistic regressions were performed with the TICS plus additional variables representing demographic and clinical information about the subjects. The regression that was most promising included the following variables: a positive response to item 2 or item 4 or both, male sex, tobacco use in the past 3 months, and the occurrence in the past 12 months of three out of four common manifestations of alcohol or drug problems. The manifestations were injury from a fight, stomach irritation or bleeding, sleep problems, and long-lasting spells of sadness or depression. Each of the regression coefficients of variables yielded *P* values of less than .01. When the cutpoint was adjusted to produce a speci-

ficity of just over 80%, however, the resulting sensitivity was 81.1%. Thus, the inclusion of several additional pieces of clinical information in the screening strategy provided no substantial improvement in discrimination over the TICS.

VALIDITY CHECKS

The raw scores of the Marlowe-Crowne social desirability scale ranged from 1 to 11, with lower scores representing a greater propensity to provide socially desirable responses. The median was 6; the mean, 5.80; and the standard deviation, 2.04. The distribution appeared normal except for a slight skew toward the higher values. Dichotomized Marlowe-Crowne scores, with 1 to 6 points taken as low and 7 to 11 points taken as high, were not significantly associated with the result of the two-item screening test for both the group of subjects with SUDs ($\chi^2 = 0.050$, *df* = 1, *P* = .823) and the group of subjects without SUDs ($\chi^2 = 1.342$, *df* = 1, *P* = .247).

The data from the two-by-two table (Table 5) were disaggregated into three separate tables, one for each clinic. A test for equality of the unconditional cell proportions of these tables yielded a chi-square of 4.41 with 6 degrees of freedom and a *P* value of .622. A similar analysis for each of three interviewers resulted in a chi-square of 10.02 with 6 degrees of freedom and a *P* value of .124. Thus, the findings regarding the accuracy of the TICS varied neither by clinic site nor by interviewer.

In the final, sealed questionnaire, 12.9% of the subjects reported being mostly or very uncomfortable with the interviewer; 10.9% of the subjects stated that they held back a little information; and 0.5% stated that they held back a lot. Over three fourths (76.3%, *n* = 331) of all subjects reported being very or mostly comfortable and holding back no information. For these subjects, the two-item screen was 77.8% sensitive and 83.6% specific, which is not significantly different from the findings for the whole sample.

Of the 100 subjects who were asked to undergo urine drug screening, seven did not submit urine samples. Five of these seven patients had just undergone urinalyses as part of their office visit and stated that they could not produce more urine; one was disabled and refused because of

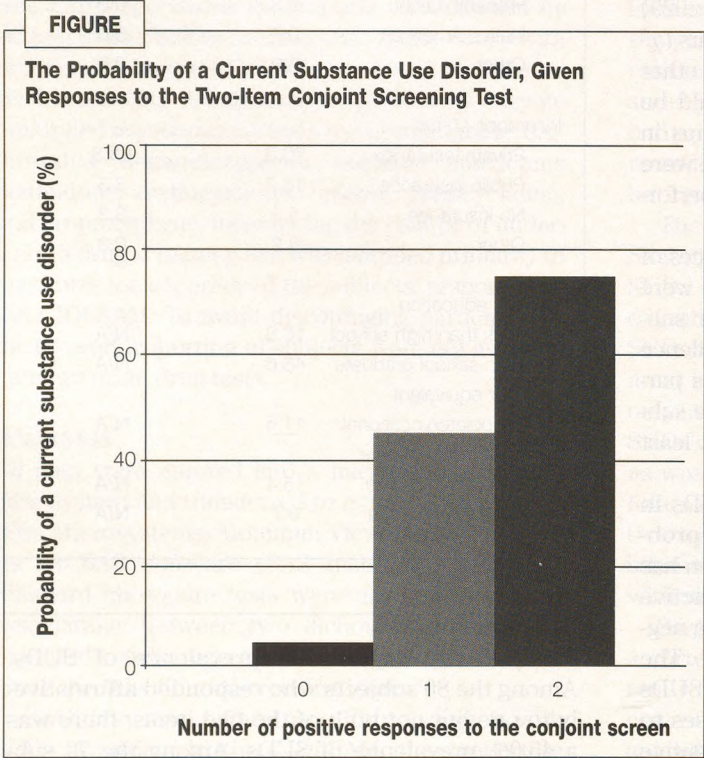


TABLE 3

Description of the Substance Use Disorders in the Sample

Substance Use Disorder	Current Disorder, %	Lifetime Disorder, %
No problem	74.4	48.8
Any problem	25.6	51.2
Alcohol problem	22.6	47.2
Sedative/tranquilizer problem	1.8	7.4
Stimulant problem	0.9	8.3
Marijuana problem	6.0	20.5
Cocaine problem	2.3	8.8
Hallucinogen problem	0.5	4.1
Opioid problem	1.4	5.3
Inhalant problem	0.0	1.2
Dependent on at least one substance	20.0	35.3
Abuse but no dependence	5.5	15.9
Alcohol problem, but no drug problem	16.6	26.0
Drug problem, but no alcohol problem	3.0	3.9
Problem with alcohol and at least one other drug	6.0	21.2
Problem with one substance	19.1	29.0
Problem with two substances	3.7	10.1
Problem with three substances	2.1	3.2
Problem with more than three substances	0.7	8.8

*"Problem" refers to a DSM-III-R diagnosis of substance abuse or substance dependence.

great inconvenience; and one refused without further explanation. Of 93 subjects who underwent urine drug tests, there were four subjects who had discrepancies between their urine drug screening results and their reported recent substance use and who, according to the CIDI-SAM, did not have a current SUD. For the 89 subjects whose urine drug screening results did not suggest the possibility of an unrecognized SUD, the TICS was 91.7% sensitive and 86.2% specific.

Next, the performance of the TICS was analyzed for the group of subjects who did not exhibit any possible indication of risk for prevarication in their responses. For this analysis, subjects were excluded if they reported being mostly or very uncomfortable with the interviewer, if they reported withholding any information, if they refused to undergo a urine drug test, and if there was a discrepancy between their urine drug test results and their self-report. For the 321 subjects at no special risk for prevarication, the TICS was 78.2% sensitive and 84.0% specific, which is not significantly different from the findings for the whole sample.

DISCUSSION

In previous studies of conjoint screening questionnaires, on a convenience sample of primary care patients and a random sample of medical, surgical, and orthopedic inpatients, three of the CAGE-AID questions exhibited sensitivity and specificity rates of approximately 70%. The current study tested the criterion validity of conjoint items developed de novo with the assistance of focus groups of addiction professionals, patients with SUDs in remission, and patients with active SUDs. With one positive response taken as a positive screening result, two of the items yield a sensitivity and specificity of approximately 81% for current alcohol or drug abuse or dependence, excluding nicotine. These two questions, "In the last year, have you ever drank or used drugs more than you meant to?" and "Have you felt you wanted or needed to cut down on your drinking or drug use in the last year?"

can be integrated quickly and easily into routine clinical interviews.

There were several strengths regarding the internal validity of this study. The sample was drawn randomly from a population of primary care clinics, and the response rate was quite high. The criterion standard for SUDs was a state-of-the-art, well-validated diagnostic interview, administered by trained and monitored interviewers. While self-report measures may be susceptible to some inaccuracy, self-report has been found to be the best measure of SUDs.³²⁻³⁷ Self-report is thought to be particularly valid when confidentiality is likely, when the subjects have no reason to believe that providing accurate information could hurt or help them, and when there may be subsequent substantiation of some of their informa-

TABLE 4

Performance Analyses of Nine Two-Item Conjoint Screening Items in the Study

	Item	Sensitivity, %	Specificity, %
1	Blackouts	37.8	92.0
2	Used more than intended	71.2	83.0
3	Bothered by complaints	32.4	96.6
4	Need to cut down	58.6	92.3
5	Use-related problems	28.8	96.0
6	Concern by others	32.4	94.1
7	Use for feelings	57.7	83.9
8	Regret	40.5	95.7
9	Problem	37.8	96.3

It is useful to place the TICS in the context of other screening devices. The original 25-item Michigan Alcoholism Screening Test (MAST) and its shortened analogs of 10 to 13 items were among the first alcohol screening tests developed. Despite their greater length, studies have suggested that they are no more accurate than the four CAGE questions at detecting current SUDs.^{23,38,39} The accuracy of the CAGE test, however, is extremely variable, with sensitivity rates ranging from 60% to 95%, and specificity rates ranging from 40% to 95%.²⁰

In 1988, two alcohol screening items were recommended: "Have you ever had a drinking problem?" and "When was your last drink?" with a recency of 24 hours or less considered as a positive response.⁴⁰ These two items were highly sensitive and specific for lifetime alcohol problems but only in comparison with the MAST, which is itself an imperfect screen and not a valid criterion measure of alcohol problems. The accuracy of this two-item alcohol screen relative to a more acceptable criterion standard is unknown.

The length of the 10-item Alcohol Use Disorders Identification Test (AUDIT) and the need to administer it in writing are potential reasons for the unpopularity of the AUDIT in the United States as compared with the CAGE questions. Nevertheless, the AUDIT is highly accurate for current alcohol disorders (over 90% sensitivity and specificity compared with expert diagnosis). The AUDIT succeeds in part because of its direct questions on the quantity and frequency of alcohol use. These direct questions may not serve as a useful prototype for a con-

tion,³⁷ as in the current study. Several findings of this study lend credence to the results. The prevalence of disorders found in the sample affords some confidence that few diagnoses were missed by the criterion standard. Most of the subjects reported, through a questionnaire that was not seen by their interviewers, that they were comfortable with the interviewers, and very few reported having withheld information on their substance use and related consequences. Few subjects had urine drug screening test results that suggested the possibility of an unrecognized SUD. When the subjects at highest risk for prevarication were removed from the sample, the results on the accuracy of the screen were essentially unchanged.

A potential limitation of the study is the exploratory nature of the analysis, namely, that the two most predictive items were identified from a total pool of nine items. Similar results obtained on another sample from the same population would be reassuring.

Generalizability is another potential limitation to this study. Although the population of the present study was fairly heterogeneous with regard to the subjects' age, sex, race/ethnicity, insurance status, and education, all the subjects were recruited from three clinics in one midwestern US city. Thus, extending this study to other clinical populations would be useful.

TABLE 5

Performance of the Optimal Strategy for Conjoint Screening of Alcohol and Drug Problems

At Least One Affirmative Response to Items 2 and 4	CIDI-SAM Substance Use Disorder		Totals
	Present	Absent	
Yes	90	62	152
No	21	261	282
Totals	111	323	434

Sensitivity = 90/111 = 81.1%; specificity = 261/323 = 80.8%; positive predictive value = 90/152 = 59.2%; negative predictive value = 261/282 = 92.6%.

joint screening tool because of the lack of sensitivity of direct questions on drug use.⁶ It might be useful, however, to assess whether additional items on the quantity and frequency of alcohol consumption would enhance the accuracy of the TICS.

Although administered in writing for this study, the TICS can easily be administered verbally from memory and incorporated into medical interviews. Compared with the CAGE, the TICS has similar accuracy, is briefer, and is intended to screen for current alcohol and drug disorders rather than lifetime alcohol disorders. Compared with other screening tests for drug problems,¹¹⁻¹⁵ the TICS is briefer, includes a focus on alcohol, and has competitive sensitivity and specificity.

The clinical utility of screening devices is illustrated best not by the sensitivity or specificity but by predictive values. In this study, with a 25.6% current prevalence of SUDs, the negative predictive value of the screening test was 92.6%, indicating that only 7.4% of those with a negative screening test have a SUD. The positive predictive value was 59.2%, indicating almost 3-to-2 odds that an individual with a positive test will have a SUD. More specifically, one positive response indicated a 45.0% chance of a SUD, while two positive responses indicated a 75.0% chance. Thus, the TICS allowed the rapid classification of primary care patients of ages 18 through 59 into three distinctly different risk groups for alcohol and drug problems.

It is important to emphasize that the TICS can produce false-positive results. Thus, clinicians must not assume that all patients with positive screening results have current SUDs. Positive screening results are useful as prompts to perform diagnostic assessments, as described elsewhere,^{21,22} or to refer patients for such assessments.

CONCLUSIONS

This study suggests that two screening questions can identify over 80% of young and middle-aged adults who have SUDs, and can classify them as low- (7.4%), medium- (45.0%), and high- (75.0%) risk groups for alcohol and drug disorders. Further studies are needed to ascertain whether these results are stable over populations of different regions and cultures, to determine whether the accuracy of screening depends on whether screening occurs in the context of a confidential study or a clinical practice, and

to discern whether conjoint screening for alcohol and drug problems can result in improved health, social, and economic outcomes.

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