A Single-Question Screening Test for Drug Use in Primary Care

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Abstract

BACKGROUND—Drug use (illicit drug use and nonmedical use of prescription drugs) is common but under-recognized in primary care settings. We validated a single-question screening test for drug use and drug use disorders in primary care.

METHODS—Adult patients recruited from primary care waiting rooms were asked the single screening question, "How many times in the past year have you used an illegal drug or used a prescription medication for non-medical reasons?" A response of ≥1 was considered positive. They were also asked the 10-item Drug Abuse Screening Test (DAST). The reference standard was the presence or absence of current (past year) drug use or a drug use disorder (abuse or dependence) as determined by a standardized diagnostic interview. Drug use was also determined by oral fluid testing for common drugs of abuse.

RESULTS—Of 394 eligible primary care patients, 286 (73%) completed the interview. The single screening question was 100% sensitive (95% CI 90.6% to 100%) and 73.5% specific (95% CI 67.7% to 78.6%) for the detection of a drug use disorder. It was less sensitive for the detection of self-reported current drug use (92.9%, 95% CI 86.1% to 96.5%) and drug use detected by oral fluid testing or self-report (81.8%, 95% CI 72.5% to 88.5%). Test characteristics were similar to that of the DAST, and were affected very little by subject demographic characteristics.

CONCLUSIONS—The single screening question accurately identified drug use in this sample of primary care patients, supporting the utility of this brief screen in primary care.

INTRODUCTION

Illicit drug use and nonmedical use of prescription drugs are common in the primary care setting and are under-recognized[1, 2]. Screening for drug use allows clinicians to counsel patients and, when indicated, refer them to treatment. Because of this, the Substance Abuse and Mental Health Services Administration (SAMHSA) has promoted the integration of

screening and brief intervention for substance use disorders into the primary care setting 3. Screening for drug use is also useful as part of routine clinical care, for instance to aid in diagnosis and to avoid medication interactions. Few screening instruments for drug use or drug disorders have been validated, however, for use in primary care settings. Time is also limited during the primary care office visit, and commonly-recommended drug screening instruments are comprised of multiple questions, can be time consuming to administer, and may require scoring4, 5. Practice guidelines currently recommend the use of a single screening question for the detection of unhealthy alcohol use in primary care settings 6. Analogous single screening questions may also improve screening for drug use. We therefore set out to validate such a screening question in a sample of primary care patients.

METHODS

SUBJECTS

The study was conducted between October 2006 and June 2007 at an urban safety-net hospital-based primary care clinic at an academic medical center. The subject selection and data collection methods have been described previously7. Briefly, a sample of waiting room patients was selected by a research associate who systematically approached those waiting to be seen according to a predetermined pattern based on waiting room seating, which pattern was varied daily. This was done to minimize biased selection of subjects, as, due to the large number of patients attending the clinic, all patients could not be approached. Prior to being approached for eligibility screening patients saw no advertisement or indication by the research associate as to what the study was about. Patients who were under the age of 18 were excluded, as were those who, in the judgment of the research associate, would be unable to complete the questionnaire because of limited English, cognitive impairment or acute illness. People in the waiting room accompanying patients who reported not themselves being patients of the clinic were also excluded. The Institutional Review Board of Boston University Medical Center reviewed and approved all study procedures.

DATA COLLECTION

Interviews were conducted by trained research staff in a private setting and data were recorded anonymously, unaccompanied by any unique identifiers. Subjects were first asked the single screening question, "How many times in the past year have you used an illegal drug or used a prescription medication for non-medical reasons?" (where a response of ≥1 is considered positive). If asked to clarify the meaning of "non-medical reasons", the research associate added "for instance because of the experience or feeling it caused". After subjects responded to the single screening question, they were asked if they had ever experienced any of a list of problems related to drug use. For this we modified the previously described Short Inventory of Problems-Alcohol and Drug (SIP-AD) questionnaire, which asks about problems ever experienced in the subject's lifetime related to alcohol or drug use8. We modified this by eliminating the word alcohol from the questions, a modification we hereafter refer to as the Short Inventory of Problems- Drug Use (SIP-DU). In a separate analysis (but in these subjects) we determined the reliability and validity of the SIP-DU as a measure of drug use consequences 9. The computerized version of the Composite International Diagnostic Interview (CIDI) Substance Abuse Module was used for the assessment of current (12-month) drug use disorders 10. This structured interview yields a Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) diagnosis of drug abuse or dependence. In addition, as part of the CIDI, subjects were asked detailed questions about current (past year) use of illicit drugs (marijuana, cocaine, heroin, stimulants or hallucinogens) and non-medical use of prescription drugs. Following the interview subjects were asked to undergo oral fluid testing for the presence of common drugs of abuse (opiates, benzodiazepines, cocaine, methamphetamines, tetrahydrocannabinol (THC). Once

collected, oral fluid was sent to an outside laboratory for analysis using methodology that yields results comparable to urine drug screening (Intercept™ immunoassay, OraSure Technologies, Bethlehem, PA)11–14. In order to aid in the interpretation of drug test results subjects had been asked, as part of the interview, if they had recently been prescribed any drugs from a list of opiates or benzodiazepines. Because this question was added to the questionnaire during the study, responses were missing from 23 subjects who underwent oral fluid testing. Subjects were not told that they would be asked to undergo drug testing until the interview was complete. After completing the interview, they were compensated and thanked for their participation. They were then asked to undergo oral fluid testing and a second informed consent process was completed. Following the single drug screening question, but before the other assessments, the 10-item Drug Abuse Screening Test (DAST-10) was administered for comparison 4. As part of a parallel study on screening for unhealthy alcohol use, subjects were also asked a single alcohol screening question (preceding the drug screening question), two other brief alcohol screening questionnaires and a calendar based assessment of past-month alcohol consumption (all after the drug screen and prior to the CIDI) 7.

REFERENCE STANDARD

Subjects were considered to have current drug use if, during the CIDI, they reported the use of an illicit drug (marijuana, cocaine, heroin, stimulants or hallucinogens), or the use of a prescription drug for non-medical reasons, during the past 12 months. A second analysis included only subjects who consented to oral fluid testing. Subjects in this analysis were considered to have current drug use if they met the above criteria or if oral fluid testing was positive for cocaine, THC, or methamphetamines or if it was positive for opiates or benzodiazepines and they had not reported receiving a recent prescription for one of these medications. Subjects were considered to have drug related problems if they had current drug use and responded positively to any of the 15 SIP-DU questions. Subjects with drug abuse or dependence as determined by the CIDI and who reported experiencing symptoms within the past 12 months were considered to have a current drug use disorder.

STATISTICAL ANALYSIS

We calculated the sensitivity, specificity, likelihood ratios and area under the receiver operating curve (AUC) of the single-question screen for the detection of drug use, drug use associated with problems, and a current drug use disorder as defined above under "reference standards." The AUC, a measure of a test's discriminatory power, can be interpreted as the probability, given one subject without drug use and one subject with drug use drawn at random from the population, that the subject with drug use will score higher on the test. An AUC of 1.0 indicates perfect discrimination, an AUC of > 0.8 indicates good discrimination, and an AUC of < 0.7 indicates poor discrimination15. For comparison with the single-question screen, we calculated the sensitivity, specificity, likelihood ratios and AUC of another longer screening test, the DAST-10, for the detection of the same conditions. The DAST-10, which consists of 10 items, yields a score between 0 and 10. A total of more than two points is considered a positive screening test 4. We calculated 95% confidence intervals using published formulas 16. Statistical analyses were performed using Version 9.1 of the SAS System (copyright SAS Institute Inc.).

RESULTS

Subject Recruitment

Of the 1,781 people approached, 903 (51%) agreed to be screened for study eligibility (Figure 1). Of these, 509 (56%) were ineligible for the study: 302 (33%) did not speak English and 207 (23%) were not clinic patients. Of the 394 patients who were eligible, 76%

participated: 4 (1%) refused to participate, 87 (22%) did not show up for the planned interview after the visit with their physician, and of the 303 subjects who arrived and gave consent to participate, 3 (1%) were unable to complete the interview. The data of 14 subjects (5%) were lost due to an electronic error, leaving 286 subjects whose data were analyzed (73% of those eligible). After completion of the interview subjects were asked to undergo oral fluid testing for common drugs of abuse, to which 240 (84%) consented. Of these, 217 were asked about a recent prescription for opiates or benzodiazepines.

Subject Characteristics

Of the 286 subjects, 54% were women, and the median age was 49 (range 21–86) (Table 1). The majority of subjects (63%) identified themselves as Black or African-American, with Whites (17%) and Hispanics (16%) comprising most of the remainder. Most (78%) had completed high school, but only 14% had completed college. The prevalence of self-reported current (past-year) drug use was 35% (with 32% reporting at least one problem relating to use), and among those who consented to oral fluid testing 40% either self reported drug use or had a positive test (38% with problem use). The prevalence of current drug abuse or dependence was 13%. The lifetime prevalence of alcohol use disorders (44%) and drug use disorders (47%) was high.

Test Characteristics

The single-question screen was 100% sensitive (95% CI 90.6% to 100%) and 73.5% specific (95% CI 67.7% to 78.6%) for the detection of a current drug use disorder (Table 2). It was slightly less sensitive (92.9%, 95% CI 86.1% to 96.5%) and was more specific (94.1%, 95% CI 89.8% to 96.7%) for the detection of current drug use (though confidence intervals overlapped). If oral fluid test results were taken into account, the sensitivity for detecting current drug use was lower (84.7%, 95% CI 75.6% to 90.8%). The longer DAST-10 screen was also 100% sensitive (95% CI 90.6% to100.0%) for the detection of a current drug use disorder and was 77% specific (95% CI 71.5% to 81.9%); overall its test characteristics were similar to those of the single-question screen (Table 3). Subject education and primary language affected point estimates of the sensitivity and specificity of the single-item screen very little, though for some groups with small sample sizes there was insufficient power to exclude large differences (Table 4). The single-item screen may be less specific for the detection of a current drug use disorder in men and in Hispanic patients.

COMMENT

A single-question screen was sensitive and specific for the detection of drug use and drug use disorders in a sample of primary care patients. Its test characteristics were similar to those of a longer screening tool in this sample, as well as in other studies reported in the literature[4].

Drug use is prevalent in primary care[1]. While national guidelines do not currently recommend universal screening for drug use in primary care, recent evidence supports the effectiveness of brief intervention in this setting and screening, brief intervention and referral to treatment (SBIRT) initiatives are widespread[3, 17]. In addition to identifying patients who might benefit from brief physician counseling, drug use screening is likely worthwhile in many clinical circumstances, such as identifying potential medication interactions and prescribing risks (as when clinicians ask patients to report prescription and over-the-counter medication use and alternative medicines as part of routine care).

Time constraints in the primary care setting have been cited as a reason for failure to provide screening and prevention in general (according to one estimate, providing all recommended

preventive services to an average primary care panel would require 7.4 hours out of each work day)18. Successful screening and brief intervention programs therefore require a means of quickly selecting, from among all primary care patients, those most likely to benefit from further assessment and intervention. Single-question screening tests for unhealthy alcohol use have been validated and one such test is currently recommended by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) in its most recent clinician's guide6. To our knowledge, no other single-question screening test for drug use has been validated in any setting. Such a screening test could facilitate the early identification and brief intervention, as well as the avoidance of prescription errors and associated risks.

A number of drug use screening instruments have been proposed for use in general medical settings, ranging from two questions to over 705, 19. Some of these are modified versions of alcohol screening tests and some ask simultaneously about both alcohol and drugs (so-called conjoint screens). Conjoint screens may be more acceptable to some patients than direct questioning about drug use, but also require more clarification of a positive screen, and some of the questions, adapted from alcohol screening tests, may be less applicable to drug use (e.g. the "eye-opener" question from the CAGE-AID)20. A brief, two- item conjoint screen (TICS) has been validated, representing a screening strategy of equivalent brevity to asking a single question about drug use and a single question about alcohol. The TICS was 79% sensitive and 78% specific for either an alcohol or drug use disorder. The sensitivity for a drug use disorder was similar, but specificity was not reported19. Two longer, but still brief, conjoint screens, the CAGE-AID and RAFFT have been tested in adults, with similar test characteristics20, 21. These conjoint tests target drug disorders but do not specifically identify drug use.

The DAST (not validated in a primary care sample until this present paper), DUDIT (only validated in criminal justice and detoxification settings) and ASSIST, three screening questionnaires that ask about drug use specifically, have better test characteristics than the shorter conjoint screening tests and address part of the spectrum of clinical interest beyond drug diagnoses to include use and problems, but their length (between 10 and 28 questions for the DAST and over 70 questions for the ASSIST) and the need for scoring represent significant barriers to their use as screens in the primary care setting4, 5, 22. As a screening test (as opposed to an assessment of severity or a diagnostic tool) the single-question screen performed almost as well as the longer DAST-10 in the sample that we studied. Longer screening tools may however have promise as electronic record systems with decision support become more widespread (and as evidence for the validity of the ASSIST accumulates), potentially as a follow up assessment after a positive single-question screen, or even as a written pre-visit questionnaire. In summary, in terms of brevity, ease of scoring, and validity for detecting the spectrum of drug-use conditions of interest in primary care, and therefore, likely greater widespread implementation, the single-question screen appears to have favorable characteristics.

In order for a screening test for drug use to be useful it must be applicable to the broad range of people seen in primary care. The diversity of our subject sample allowed us to examine the effect of gender, ethnicity, primary language and education on the accuracy of the single-question screen. While variations were seen in the sensitivity and specificity of the test across these groups, the differences were small.

Our study has several limitations. A higher than expected proportion of subjects reported substance use disorders, likely reflecting the fact that they were recruited from an urban safety-net hospital located in a community where the prevalence of such problems is high. While this potentially limits the generalizability of our results, it is this type of high risk

population that is typically targeted for screening and brief intervention (as previously mentioned, universal screening of all adults is not currently recommended whereas targeted screening is recommended)23. Nevertheless, further study of the screening question in other settings (as well as in other language and in written and computer based versions) is warranted. Subjects were also assured anonymity, a condition which improves the accuracy of the reference standard interview but which may also serve to over-estimate the accuracy of the screening test itself. This is consistent, however, with the methodology of most other studies of screening tests for substance use disorders, thus allowing comparability of our findings with those of other studies.

The single-question screen accurately identified primary care patients who use drugs. Some patients who screen positive will have severe drug use disorders requiring referral to substance abuse treatment, while those who use drugs but have not experienced severe health or interpersonal problems might benefit from brief intervention by the primary care provider. The lack of an efficient way to distinguish these two groups is a challenge that must be addressed when implementing screening for drug use. The DAST and the ASSIST, in providing scores, provide a measure of severity. Even though they may be too long for universal screening in many settings, they might be done as assessments after a single-item screening question is answered in the affirmative. But this approach has not been tested or validated.

The single-question screen accurately identified a broad spectrum of drug use in this sample of primary care patients. The sensitivity and specificity of this single question was comparable to that reported for longer instruments in other studies. These findings support the use of this brief screen when identification of drug use is desired in primary care settings, which should, in turn, facilitate the implementation of screening and brief intervention programs in this setting.

Acknowledgments

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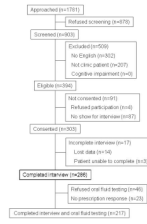
Figure 1.
Recruitment of Subjects

Table 1

Subject Characteristics

Characteristic	Subjects consenting to oral fluid testing (n = 240)	Total (n = 286)
Sex		
Female	135 (56.2%)	155 (54.2%)
Age		
Mean ± SD	49.3 ± 12.8	49.0 ± 12.3
Median (Range)	49.0 (21.0–86.0)	49.0 (21.0–86.0)
Education		
Some high school	68 (28.4%)	81 (28.3%)
High school graduate	86 (35.8%)	107 (37.4%)
Some college	50 (20.8%)	59 (20.6%)
College graduate	26 (10.8%)	28 (9.8%)
Post-graduate education	10 (4.2%)	11 (3.9%)
Race		
American Indian/Alaskan Native	5 (2.1%)	8 (2.8%)
Asian	5 (2.1%)	7 (2.4%)
Black or African American	153 (63.8%)	179 (62.6%)
Native Hawaiian/Pacific Islander	2 (0.8%)	3 (1.1%)
White	42 (17.4%)	49 (17.1%)
Unknown	33 (13.8%)	40 (14.0%)
Hispanic or Latino ethnicity	38 (15.8%)	46 (16.1%)
English is first language	185 (77.1%)	223 (78.0%)
Alcohol Use		
Hazardous consumption amounts [*]	71 (29.6%)	88 (30.8%)
Any lifetime alcohol use disorder (abuse or dependence) [†]	106 (44.2%)	126 (44.1%)
Drug Use		
Current use (self-reported) [‡]	86 (35.8%)	99 (34.6%)
Current use without drug related problems [§]	6 (2.5%)	7 (2.4%)
Problem use (current use and drug problem or drug use disorder)	80 (33.3%)	92 (32.2%)
Current use (either self report or a positive oral fluid test) [‡]	97 (40.4%)	110 (38.5%)
Current use without drug related problems [§]	6 (2.5%)	7 (2.4%)
Problem use (current use and drug problem or drug use disorder)	91 (37.9%)	103 (36.1%)
Did not self-report current use	11 (4.6%)	11 (3.8%)
Current (12 month) drug abuse [†]	3 (1.2%)	3 (1.0%)

Characteristic	Subjects consenting to oral fluid testing (n = 240)	Total (n = 286)
Current drug dependence[†]	27 (11.2%)	34 (11.9%)
Any lifetime drug related problem[‖]	118 (49.2%)	137 (47.9%)
Any lifetime drug use disorder (either abuse or dependence) [†]	116 (48.3%)	133 (46.5%)
Oral Fluid Testing		
Any positive test	44 (18.3%)	44 (15.4%)
Cocaine	25 (10.4%)	25 (8.7%)
Methamphetamine	0 (0.0%)	0 (0.0%)
THC	8 (3.3%)	8 (2.8%)
Illicit drug (cocaine, methamphetamine or THC)	33 (13.8%)	33 (11.5%)
Opiates		
Reported no prescription	5 (2.1%)	5 (1.7%)
Reported prescription	5 (2.1%)	5 (1.7%)
Missing prescription response	2 (0.8%)	2 (0.7%)
Benzodiazepines		
Reported no prescription	4 (1.7%)	4 (1.4%)
Reported prescription	4 (1.7%)	4 (1.4%)
Missing prescription response	1 (0.4%)	1 (0.3%)

Current=past year (12 months)

[*] For men, an average > 14 drinks per week over the past 30 days, or > 4 drinks on any one day during the past 30 days (for women, >7 drinks per week, or >3 drinks per occasion), determined using a calendar-based reporting method.

[†] Lifetime and current alcohol and drug use disorders as determined by responses to the CIDI.

[‡] As part of the CIDI interview subjects are asked about their use, during the past 12 months, of illicit drugs or of prescription drugs for non-medical reasons.

[§] Subjects were considered to have drug related problems if they were past-year drug users and responded positively to any of the 15 Short Inventory of Problems- Drug Use (SIP-DU) questions.

[‖] A positive response to any of the questions from the SIP-DU questionnaire.

THC=tetrahydrocannabinol

Table 2

Sensitivity, Specificity and Likelihood Ratios for the Detection of Drug Use: Single Screening Question

For detection of:	Sensitivity (95% CI)	Specificity (95% CI)	Positive LR[*] (95% CI)	Negative LR[†] (95% CI)	AUC
Current use (self-reported, n=286)	92.9% (86.1%, 96.5%)	94.1% (89.8%, 96.7%)	15.8 (8.9, 28.1)	0.08 (0.04, 0.2)	0.93
With drug problem or drug use disorder[‡]	93.5% (86.5%, 97.0%)	91.2% (86.4%, 94.5%)	10.7 (6.8, 16.8)	0.07 (0.03, 0.2)	0.90
Current use (either self-report or a positive oral fluid test, n=217)	84.7% (75.6%, 90.8%)	96.2% (91.4%, 98.4%)	22.4 (9.4, 53.1)	0.2 (0.1, 0.3)	0.92
With drug problem or drug use disorder[§]	84.8% (75.3%, 91.1%)	92.8% (87.2%, 96.0%)	11.7 (6.4, 21.4)	0.2 (0.1, 0.3)	0.89
Current drug use disorder (n=286)	100.0% (90.6%, 100.0%)	73.5% (67.7%, 78.6%)	3.8 (3.1, 4.6)	----	----

LR=likelihood ratio

AUC=area under the receiver operating curve

Current = past year (12 months)

[*] Calculated as the probability of an individual <u>with</u> the condition having a positive test divided by the probability of an individual <u>without</u> the condition having a positive test.

[†] Calculated as the probability of an individual <u>with</u> the condition having a negative test divided by the probability of an individual <u>without</u> the condition having a negative test.

[‡] Self-reported past-year drug use and either a positive response to one of the SIP-DU questions or a current drug use disorder.

[§] Self-reported past-year drug use or a positive oral fluid test and either a positive response to one of the SIP-DU questions or a current drug use disorder (excludes subjects without an oral fluid test).

Table 3

Sensitivity, Specificity and Likelihood Ratios for the Detection of Drug Use: DAST-10 (n=286)

For detection of:	Sensitivity (95% CI)	Specificity (95% CI)	Positive LR* (95% CI)	Negative LR† (95% CI)	AUC
Current use (self-reported, n=286)	82.8% (74.2%, 89.0%)	93.6% (89.1%, 96.3%)	12.9 (7.4, 22.5)	0.2 (0.1, 0.3)	0.89
With drug problem or drug use disorder‡	87.0% (78.6%, 92.4%)	92.8% (88.2%, 95.6%)	12.0 (7.2, 20.1)	0.1 (0.08, 0.2)	0.88
Current use (either self report or a positive oral fluid test, n=217)	80.0% (70.3%, 87.1%)	93.9% (88.5%, 96.9%)	13.2 (6.7, 26.0)	0.2 (0.1, 0.3)	0.89
With drug problem or drug use disorder§	83.5% (73.8%, 90.1%)	92.8% (87.2%, 96.0%)	11.5 (6.3, 21.1)	0.2 (0.1, 0.3)	0.89
Current drug use disorder (n=286)	100.0% (90.6%, 100.0%)	77.1% (71.5%, 81.9%)	4.4 (3.5, 5.5)	-----	-----

LR=likelihood ratio

AUC=area under the receiver operating curve

Current=past year (12 months)

* Calculated as the probability of an individual <u>with</u> the condition having a positive test divided by the probability of an individual <u>without</u> the condition having a positive test.

† Calculated as the probability of an individual <u>with</u> the condition having a negative test divided by the probability of an individual <u>without</u> the condition having a negative test.

‡ Self-reported past-year drug use and either a positive response to one of the SIP-DU questions or a current drug use disorder.

§ Self-reported past-year drug use or a positive oral fluid test and either a positive response to one of the SIP-DU questions or a current drug use disorder (excludes subjects without an oral fluid test).

Table 4

Single-question Screen for the Detection of Current Drug Use Disorders, in Selected Subgroups

	n	Sensitivity (95% CI)	Specificity (95% CI)	AUC
Female	155	100.0% (61.0%, 100.0%)	80.5% (73.4%, 86.1%)	0.93
Male	131	100.0% (89.0%, 100.0%)	63.0% (53.2%, 71.8%)	0.92
Non-Hispanic White	45	100.0% (74.1%, 100.0%)	79.4% (63.2%, 89.6%)	0.94
Non-Hispanic Black	176	100.0% (80.6%, 100.0%)	73.8% (66.4%, 80.0%)	0.92
Hispanic	46	100.0% (70.1%, 100.0%)	59.5% (43.5%, 73.6%)	0.91
English primary language	223	100.0% (89.3%, 100.0%)	72.8% (66.1%, 78.6%)	0.93
English not primary language	63	100.0% (56.6%, 100.0%)	75.9% (63.5%, 85.0%)	0.92
High school graduate	205	100.0% (85.1%, 100.0%)	74.3% (67.5%, 80.1%)	0.91
Not high school graduate	81	100.0% (79.6%, 100.0%)	71.2% (59.4%, 80.7%)	0.95

LR=likelihood ratio

AUC=area under the receiver operating curve

Current=past year (12 months)