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Implementing Single-Item Screening for Drug Use in a Veterans Health Administration Outpatient Setting

Dominic Hodgkin, Ph.D.^a, Wenwu Gao, MD, Ph.D.^b, Elizabeth L. Merrick, Ph.D., MSW^a, Charles E. Drebing, Ph.D.^b, Mary Jo Larson, Ph.D.^a, Constance M. Horgan, Sc.D.^a, Monica Sharma, MD^c, Nancy M. Petry, Ph.D.^d, and Richard Saitz, MD, MPH^{e,f}

^aInstitute for Behavioral Health, Schneider Institutes for Health Policy, Heller School for Social Policy and Management, Brandeis University, 415 South St, Waltham, Massachusetts 02453-2728, USA

^bPsychology Service, Bedford Department of Veterans Affairs Medical Center, 200 Springs Road, Bedford, MA 01730, USA

^cPrimary Care Service, Bedford Department of Veterans Affairs Medical Center, 200 Springs Road, Bedford, MA 01730, USA

^dUniversity of Connecticut School of Medicine, 263 Farmington Avenue, Farmington, CT 06030-3944, USA

^eDepartment of Community Health Sciences, Boston University School of Public Health, 801 Massachusetts Avenue, 4th Floor, Boston, Massachusetts 02118, USA

^fClinical Addiction Research and Education (CARE) Unit, Section of General Internal Medicine, Department of Medicine, Boston Medical Center and Boston University School of Medicine, 801 Massachusetts Ave. 2nd floor, Boston, MA, 02118, USA

Abstract

Background—Unhealthy drug use is a concern in many settings, including military and veteran populations. In 2013, the Veterans Health Administration (VHA) medical center in Bedford, Massachusetts, started requiring routine screening for unhealthy drug use in outpatient primary care and mental health settings, using a validated single question.

Methods—This study used descriptive and multivariable analyses of VHA electronic records for patients eligible for the screening program (N=16,118). The study assessed first-year rates and predictors of screening and of positive screens, both for drug use and for unhealthy alcohol use, for which screening was already required.

Corresponding author: Dominic Hodgkin. Heller School for Social Policy and Management, Brandeis University, 415 South St, Waltham, Massachusetts 02453-2728, USA. hodgkin@brandeis.edu. Telephone: (781) 736-8551.

Author contributions

Drs. Merrick, Hodgkin, Horgan, Larson and Drebing designed the study with input from all the other authors. Drs. Gao and Drebing oversaw data collection and analytic file preparation, and with Dr. Sharma, they provided understanding of the study setting and VA context. Drs. Merrick, Hodgkin and Drebing developed the initial analytic plan and Drs. Hodgkin, Gao, Drebing and Larson oversaw its refinement and execution. Drs. Petry, Larson and Saitz provided consultation especially on screening and clinical measures. All authors participated in interpretation of the results. Dr. Hodgkin prepared the initial draft manuscript which was then critically reviewed, edited and approved by all authors.

Results—During the first year, 70% of patients were screened for unhealthy drug use, and 84% were screened for unhealthy alcohol use. In multivariable analyses, screening for drug use was more likely for patients who had 8 or more days with VHA visits or were aged 40 or over. Patients with a prior drug use disorder diagnosis were much less likely to be screened. Three percent of patients screened for unhealthy drug use had a positive screen, and 14% of those screened for unhealthy alcohol use had a positive screen. Strong predictors of a positive drug use screen included a prior-year diagnosis of drug use disorder, any mental health clinic visits, younger age or being unmarried.

Conclusions—The drug screening initiative was relatively successful in its first-year implementation, having screened 70% of eligible subjects. However, it failed to screen many of those most likely to screen positive, thereby missing many opportunities to address unhealthy drug use. Future refinements should include better training clinicians in how to ask sensitive questions and how to address positive screens.

Keywords

drug use; alcohol; screening; veterans

Introduction^a

Unhealthy drug use is a term that refers to the spectrum from drug use associated with health risks through to drug use disorders.¹ In this context, drugs can be illegal or legal substances or medications used without a prescription or beyond recommended or prescribed use.^{1–3} Unhealthy drug use is not limited to individuals who meet the criteria for a diagnosis of drug use disorder. In addition to its effects on health, drug use may compromise care for other health conditions if clinicians do not know about it, in contexts where that knowledge is relevant to treatment decisions.⁴ In the US, veterans are one population known to have drug use patterns that deserve attention. In one national survey, 8.4% of male veterans reported past-year illicit drug use, and 3.0% reported past-year prescription drug misuse, with both rates being considerably higher among younger age groups.⁵

Screening patients in clinical settings for unhealthy drug use may be helpful in two respects. First, it alerts clinicians to a patient behavior (drug use) that could affect care provision. For example, clinical guidelines recommend against prescribing beta-blockers for patients with cocaine-associated chest pain.⁶ Second, screening identifies patients who may benefit from further counseling or follow-up for their drug use. One potentially useful approach to unhealthy drug use is screening and brief intervention (SBI), which has been used and studied extensively for unhealthy alcohol use. SBI has been shown to reduce alcohol consumption in some populations and settings.^{7,8} Since 2004, the VHA has required physicians to screen all patients annually for unhealthy alcohol use with the Alcohol Use Disorders Identification Test - Consumption (AUDIT-C). Facility-level performance on this measure (among others) affects the salaries of top managers at VHA medical centers.⁹

^aAbbreviations: AUDIT-C, Alcohol Use Disorders Identification Test – Consumption; DUD, drug use disorder; EHR, electronic health records; PP, predicted probability; SBI, screening and brief intervention; SUD, substance use disorders; VHA, Veterans Health Administration.

There is also interest in SBI for unhealthy drug use, but fewer studies exist and they have mixed findings, providing only limited evidence of efficacy.^{10–13} The National Institute on Drug Abuse and other Federal and state agencies have developed and disseminated guidance on SBI for drug use in general medical settings,¹⁴ and there has been growing research interest in how best to implement it.¹⁵ As with alcohol SBI, dissemination and implementation into practice have been slow, probably even slower for drug SBI.

More recently, brief screening tools for unhealthy drug use have been developed and validated,^{16–19} but their sensitivity is limited, and they have not yet had much time to diffuse widely. Few health systems actively encourage clinicians to screen for drug use,²⁰ and even when systems encourage it, clinicians may experience discomfort asking patients about and documenting potentially illegal behavior, or may lack knowledge of how to use the results.²¹

Until recently, screening for drug use was not required as part of any VHA health system initiative. In March, 2013, the VHA Medical Center in Bedford began piloting an SBI process for drug use, requiring that clinicians in its primary care and outpatient mental health services complete an annual brief screening of all patients. This paper evaluates the response to the screening requirement in its first year, examining the proportion of patients screened and among those screened, the proportion screening positive. We also examine how many of the patients with positive screens had no recorded diagnosis of drug use disorder (DUD) in the prior year, as one way to assess how many patients with drug use were newly identified using screening. Finally, we also report rates of screening for unhealthy alcohol use, as a comparator.

Methods

Study setting

The Bedford VHA Medical Center provides a full range of medical and behavioral health services including residential care through its hospital and multiple clinics in Bedford and primary care both at Bedford and at community-based outpatient clinics in nearby towns. The Primary Care Service employs 32 clinicians, but some are part-time, so the full time equivalent workforce is 20 to 22 (15 of them physicians). Primary Care includes fully integrated first-line mental health and SUD services which assist in screening and referral for mental health conditions.

The VHA is well known for its relatively integrated system, including electronic health records (EHR) that can facilitate enhanced service delivery, data collection and study participant tracking. Clinicians are currently required to conduct annual screening for several health conditions including unhealthy alcohol use. The rate and results of screenings are tracked through the EHR, and clinicians' screening rates are published at each site and nationally on a monthly basis. For some conditions, positive screening results trigger a required treatment or referral response, and those actions are also tracked and summarized at a national and local level. While clinicians at Bedford VHA would often ask patients about drug use as part of taking patient histories and physical exams, prior to this screening initiative they were not using a standardized screening instrument embedded in the EHR.

Implementation of Screening

An annual single-item screen for drug use was implemented for all veterans being seen in primary care or outpatient mental health clinics, except those currently in substance use treatment. The goal was to identify patients with unhealthy drug use, so that their use could be addressed. The screen consisted of a single question: “How many times in the past year have you used an illegal drug or used a prescription medication for non-medical reasons?” This screening test was previously developed and validated in a study of primary care patients.¹⁹ A response of 1 or greater is considered positive. If asked to clarify the meaning of “non-medical reasons”, the explanation was “for instance because of the experience or feeling it caused”. Although Massachusetts legalized marijuana for medical (but not for recreational) purposes in 2012, this change was still being implemented during the study period, with no dispensaries open yet. The entire Primary Care staff were trained regarding SUD treatment, screening and referral shortly before the screening tool was implemented. Mental health clinic staff did not receive this training. (See Appendix.) There were no financial incentives for performance on this measure, in contrast to alcohol screening which is a national VHA performance measure.

The VHA facility added the drug screening item to its EHR clinical reminder system and, parallel to alcohol screening, the system includes a field for recording the drug screening result (positive/negative, not the count of times drugs were used). Again, similar to the alcohol screening, the clinician is prompted to complete drug screening on an annual basis; once completed it does not appear in the EHR as an open item task until 12 months after the last screening date. (For screenshots, see Appendix.) At the clinician’s discretion, the screen can be completed more often than once a year. When the patient reports no drug use in the past year, a negative screen result is recorded and no further action is required. When there is a positive patient response, the clinician is prompted to further discuss and offer brief advice including possible feedback about medical impact. Then the clinician selects the box to indicate whether no action was taken, or whether the veteran was offered (a) a referral to specialty SUD department, (b) a referral to integrated care team, or (c) a follow-up visit in primary care regarding substance use. If any referral was offered, the clinician notes whether the patient accepted it. If the clinician checks “No action taken”, they may choose the prepopulated response option, “Veteran currently in specialty substance abuse treatment”, or may enter a different reason. Clinicians were told by their employer (Bedford VHA) that the screening was required, and knew that failure to screen would be observable in patient records by administrators or other clinicians.

Study sample

Patients’ data were included in this retrospective study if they had visited either primary care or mental health clinics at the Bedford VHA facility during the first year of drug screening operation (“Year 1”: 4/1/2013 to 3/31/2014). Patients who were active duty military were excluded. The resulting analytic sample included 16,118 patients. The Brandeis University Institutional Review Board reviewed and approved the study protocol. Informed consent was not required for this portion of the study.

Data

Data on patient characteristics, utilization and screening results were derived from the VHA EHR files, including from the year before implementation.

Measures

Outcome variables

The outcomes of interest were whether patients were screened for drug use during Year 1, and if so, whether they screened positive. In addition, for comparative purposes, we examined whether patients were screened for unhealthy alcohol use, and if so, whether positive. A positive drug screen was defined as a response greater than zero to the single screening question described above. A positive alcohol screen was defined as a score on the AUDIT-C of 4 or more for men, or 3 or more for women. These cutoffs have been validated in prior research,²² but are lower than the cutoff of 5 that the VHA uses for its clinical reminders to require and incentivize screening follow-up. (The VHA uses a higher cutoff to reduce the burden of false positives.²³) We use these cutoffs as indication of any unhealthy drinking, even if it might not trigger a system reminder.

Sociodemographic variables

Patient characteristics available in the VHA EHR data included sex, age, marital status, race, Hispanic ethnicity, and state of residence. Utilization data were used to create the following indicators: a) one or more mental health clinic visits ; b) one or more ICD-9 diagnoses of drug use disorders (abuse or dependence) in the year before the first visit where they were eligible for screening; and c) one or more diagnoses of alcohol use disorders (abuse or dependence), same period. Finally, a variable was created to count the number of days on which the patient visited the VHA facility, during Year 1.

Analyses

Simple Pearson chi-squared tests were used to evaluate the association between various patient characteristics and drug screening and alcohol screening, and between those characteristics and positive screens. For variables with more than two levels, the chi-squared tests compare each level with all others combined (e.g. widowed versus all other marital categories combined). In addition, patient-level multivariable logistic regression models were estimated separately for drugs and for alcohol to identify predictors of having a screen completed, and of a positive result. The regression results are reported as predicted probabilities with their associated marginal effects. For example, the marginal effect of being aged 80+ on being screened was computed as the mean probability of being screened if the entire sample was aged 80+, minus the mean probability if the entire sample was aged 18-39 (the reference category), while holding all other variables at actual values. These are also known as average partial effects.²⁴ The standard errors of the marginal effects were computed using the delta method.²⁵

Results

Sample characteristics

The study sample was predominantly male (95%), white (82%) and older age groups (71% aged 60 or older). (Table 1). A substantial proportion had visits to mental health clinics in the prior year (40%). Nine percent of patients had a prior-year diagnosis of alcohol use disorders and 5 percent had a prior-year drug use disorder diagnosis.

Proportion screened

More than two-thirds (70%) of patients were screened for drug use (Table 2), lower than the 84% screened for unhealthy alcohol use. Bivariate associations between patient characteristics and screening appear in Table 2. The proportion of eligible patients screened was highest in months 2 through 4 (36%, 37%, 34% respectively), and thereafter stayed in the range of 27% to 32%. (Data not shown.) Drug screening was less likely for patients with a diagnosis of drug use disorder in the prior year, being conducted for 7% of patients with an opioid use disorder, 33% of those with a marijuana use disorder, and 16% of those with a diagnosis of another drug. (Data not shown.)

Screening results

Three percent of patients screened for drug use screened positive. Among those screened for unhealthy alcohol use, 14% screened positive. Bivariate associations between patient characteristics and screening results are shown in Table 2. The positive drug screen rate was higher among patients with a positive alcohol screen (5%) and among those with an AUDIT score of 5 or more (10%). (Data not shown.)

Multivariable analyses

The multivariable predictors of being screened are shown in Table 3. The strongest predictors of being screened for drug use included having had 8-15 days with VHA visits (predicted probability (PP)=87.7%) or 16 or more days (PP=80.7%), both compared to 63.7% if the patient had 1-8 days. Older age also made screening more likely (e.g., PP=74.7% for patients aged 80 or over, compared to 63.4% for patients aged 18-39). The strongest negative predictors of being screened for drug use included a prior-year drug use disorder diagnosis (PP=32.0%, compared to 71.8% if none), and having any mental health clinic visits (PP=56.9%, compared to 77.0% if none).

The predictors of being screened for unhealthy alcohol use were qualitatively similar except that prior-year alcohol and drug use disorder diagnoses no longer showed significant associations. Unlike drug screening, veterans who were widowed or divorced/separated were more likely to be screened for unhealthy alcohol use (PP=86.4% and 84.7% respectively) than those who were never married (PP=81.4%). Hispanic veterans were more likely than others to be screened for drug use (PP=75.1% compared to 69.4%) but not for unhealthy alcohol use.

Among those screened for drug use, the strongest positive predictors of a positive screen were a prior diagnosis of drug use disorder (PP=15.0% compared to 2.5% if none, a sixfold

difference) and any mental health clinic visits (PP=4.3% compared to 1.7% if none) (Table 4). The strongest negative predictors were being aged 80 or over (PP=0.1%), aged 60-79 (PP=1.8%) or aged 40-59 (PP=2.5%), all compared to a predicted probability of 6.5% for those aged 18-39.

A positive alcohol screen was more likely if the patient had a prior-year diagnosis of alcohol use disorder (PP=35.5% compared to PP=12.1% if none). Patients with a prior-year diagnosis of drug use disorder were less likely to have a positive alcohol screen result (PP=12.0%, compared to 14.7% if none). As with drug use screening, a positive screen for alcohol use was less likely for older age groups. Patients with any mental health clinic visits were less likely to screen positive for unhealthy alcohol use (PP=12.5%, compared to 15.6% if none). Thus, having any mental health clinic visits predicts a negative alcohol screen but a positive drug screen. Similarly, having a prior-year diagnosis of drug use disorder predicts a negative alcohol screen but a positive drug screen.

Discussion

Receipt of Screening

This study found that in the first year after the Bedford VHA facility introduced routine screening for unhealthy drug use, 70% of patients who visited primary care or mental health clinics were screened using a standardized screener, compared to none previously. This proportion was well short of the universal target, and lower than the 84% achieved for the VHA's national, long-established and incentivized alcohol screening program. On the other hand, it represents rapid adoption of screening for drug use, in the absence of any performance incentive. By comparison, one year after the national VHA mandated screening for unhealthy alcohol use in 1996, the national proportion screened was only 40%.⁹ In addition, the 70% proportion is quite similar to drug use screening found in two studies in community clinics. Chan et al reported that 74% of patients were screened for drug and alcohol use using a standardized five-item instrument (Global Appraisal of Individual Needs— Short Screener, or GAIN-SS), in a large sample of adults with a mental disorder visiting participating community health clinics.²⁶ Also, in a nationwide survey of practicing physicians, 68% reported that they regularly ask new outpatients about drug use, although they may not have been using validated tools.²⁷

It is striking that there was substantial variation in receipt of both alcohol screening and drug screening across demographic and clinical characteristics, and that clinicians were more likely to screen for drug use among patient subgroups least likely to have a positive screen. For example, veterans aged 80 or older were 11 percentage points more likely to receive drug screening than were under-40 year olds, but these older veterans were 6 percentage points less likely to screen positive than the younger cohort. Likewise, married veterans were more likely to be screened for drug use than the never-married, and less likely to screen positive. Similar findings for both age and marital status were reported in Desai's study of alcohol screening at VHA facilities.²⁸ Black and 'other nonWhite' patients were less likely than others to be screened for drugs, contrary to what one might expect from prior research on stigma and discrimination.²⁹ Similarly, patients with any mental health clinic visits and those with diagnosed drug use disorders were less likely than others to be screened. Some

may have been excluded because they were currently in SUD treatment. It is plausible that clinicians had prior information on these patients and believed that screening would not add new information; however, this defeats one benefit of a screening program which is to provide documentation for all clinicians of current drug use status. In particular, the screening clinician learns the number of times the patient reports using in the past year, a potential marker of problem severity, although this number is not entered into the record, just whether positive/negative. More generally, the selectiveness of the screening means that screen-positive rates may be skewed. For example, given that younger patients were less likely to be screened, the ones selected for screening may have been those whose conditions were most apparent to clinicians, or most severe, potentially inflating the screen-positive rate for that group.

Selective implementation is also observed for alcohol screening, but this appears to be mainly occurring for patients seen at mental health clinics. Ninety-eight percent of patients with any primary care visits received alcohol screening, as one would expect given the VHA's national performance incentive to screen all primary care patients for unhealthy alcohol use. For drug screening, where no incentive is offered, the variation may be less unexpected. The pattern observed suggests an inefficient informal targeting of screening; resources focused on patients who were predictably less likely to screen positive. Future research which includes qualitative interviews with clinicians may reveal more about these variations.

In a busy medical clinic, clinicians may defer screening of patients whom they expect to screen positive, if they feel ill-equipped to respond to a positive screen. This may have contributed to the 'mis-targeting' of screening toward older patients. Alternatively, clinicians may feel more familiar with older patients and thus felt less discomfort or fear of offending them, in raising the drug use topic. It may be that additional efforts are required in order to make providers more comfortable with both asking the screener and discussing the results. One study reported that medical residents increased their rates of asking patients about current illicit drug use after they were given a 2.5-day training on screening for unhealthy alcohol use and illicit drug use.³⁰

Screen-positive prevalence

The 3% screen-positive rate for drug use is comparable to one prior study,³¹ but appears low compared to some other studies of veterans. In Hoggatt et al's analysis of national survey data, 8.4% of male veterans reported past-year illicit drug use, and 3.0% reported past-year prescription drug misuse, with even higher rates for both among females (who are mostly younger).⁵ A survey of female veterans with a two-item screener found 5% reporting past-year drug use.³² Interviews in medical settings typically yield lower reports of illicit drug use than anonymous surveys. Further, the relatively low screen-positive rate in the present study also reflects the older age of the clinic population. The pattern of selective screening also influenced the observed rate. Specifically, 6% of the sample had a drug use disorder diagnosis in the year before their first visit (Table 1). Had they all been screened, and had everyone screened positive at a rate of 37.4% (as was observed among those with prior-year

DUD who were screened), the overall screen-positive rate would have been 5% instead of 3%.

Despite the low screen-positive rate for drug use, the screening identified 266 patients reporting unhealthy drug use among those with no drug use disorder diagnosis in the prior year. This result would be beneficial if the newly identified patients received interventions for their drug use, or if clinician awareness of their drug use resulted in better care for their other health conditions. Such benefits could become substantially larger in future if the screening expands to include more veterans, especially if a way is found to include younger veterans. In future research on this screening program we will address follow-up care.

Since the program did not achieve universal screening as planned and there was a low proportion of positive screens, one could ask whether it was a good use of resources, especially if it took clinician time away from other tasks. One response would be to abandon universal screening, and instead target the screening at groups more likely to screen positive. In 2008, the US Preventive Services Task Force concluded that there was insufficient evidence to assess the balance of benefits and harms of screening adolescents, adults, and pregnant women for illicit drug use.³³ Alternatively, the VHA could try to make drug screening truly universal by identifying and addressing the barriers. This could include better training clinicians in how to ask sensitive questions and how to deal with positive screens. It may help to inform clinicians that they are unlikely to predict well who will screen positive. Our study does not directly address the trade-offs between universal and targeted screening, but contributes important information about possible barriers and informal targeting that can inform future screening efforts. Efforts to improve recognition of drug use and address it need to consider clinician, patient, and system-level issues.

Limitations

This study is subject to several limitations. First, the design is cross-sectional, limiting the ability to draw causal inferences from the associations observed. Second, the study was limited to one VHA facility, limiting the generalizability of its findings. Third, the large number of statistical tests could have resulted in some findings attaining apparent statistical significance due to chance. Finally, as noted, the screening results were based on clinician reports about patients' responses to questions; some clinicians may not have actually asked the question but provided an affirmative response to screening. However, we do not think that clinicians had a reason to misrepresent their drug screening efforts, particularly given the absence of a formal performance measure or incentive.

Conclusions

In its first year, the drug screening initiative was relatively successful, screening 70% of eligible subjects. This screening rate was achieved even in the absence of a performance measure and with only brief clinician training. Only 3% screened positive, but among that group, 43% had no prior-year drug use disorder diagnosis. However, the initiative failed to screen many of those most likely to screen positive, and thereby missed many opportunities to address unhealthy drug use. If policymakers want to make broader use of universal

screening for unhealthy drug use, it will be necessary to develop a clearer understanding of the barriers to its full implementation.²³

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APPENDIX

Training

The entire Primary Care staff was trained in an initial 1-hour didactic educational session, with a 30-minute booster session 12 weeks later, just before the screening tool was implemented. The training included material on the prevalence of SUD and education about SBI. Case material was presented, as well as simple scripts for introducing the screen, and responding to a positive and negative screen. The training was conducted by one of the investigators, assisted by the staff trainer for the Primary Care Service. The booster session involved a brief review of all of the content from the initial session followed by a discussion of the screening and follow-up procedures, and the rationale for the procedure.

The specialty mental health staff was not given training on drug SBI as part of the initiative. Some may have been previously trained on drug SBI as part of their professional training.

Variable definitions

Diagnoses. Presence of a drug abuse diagnosis was defined using the following ICD-9 codes 304.0, 304.1, 304.2, 304.3, 304.4, 304.5, 304.6, 304.7, 304.8, 304.9, 305.2, 305.3, 305.4, 305.5, 305.6, 305.7, 305.8. The codes used to define an alcohol disorder diagnosis were: 303, 303.0, 303.9, 305.0.

Mental health clinic visits. These were identified based on VHA stop codes 534 and 539.

Number of days on which the patient visited the VHA facility. This was computed by summing outpatient visits.

Screenshots of physician reminder

Rx/Drug Abuse Screen (PC/MH Only)

COVERSHEET IN CPRS

Clinical Reminders Due Date
Rx/Drug Abuse Screen(PC/MH Only) DUE NOW

Clinical Maintenance: Rx/Drug Abuse Screen(PC/MH Only) DUE NOW

--STATUS-- --DUE DATE-- --LAST DONE--
DUE NOW DUE NOW unknown

Frequency: Due every 1 year for all ages.
All Veterans not currently in substance abuse treatment are to be screened annually for use of illegal drugs or use of prescription drugs for non-medical purposes. Reminder to be completed by Primary Care or Integrated MH/PC providers only.

Using NEW NOTE: Select Reminder

▼ Templates

▼ Reminders

Due

Rx/Drug Abuse Screen(PC/MH Only)

AAA Screening (SD)

Rx/Drug Abuse Screen (PC/MH Only)

Clinical Reminder to Screen for Use of Illegal/Prescription Drugs for non-medical purposes.

Screener Note
Response: If the screener item response =0, it's a negative screen. No further response is required and the reminder is "turned-off" for 12 months. If the response is =1 or greater, it is a positive screen. Note: The referral can be for further assessment, not necessarily treatment.

Screener Question
How many times in the past year have you used an illegal drug or used a prescription medication for non-medical reasons?

☒ Veteran States drug use this past year. Negative screen with no further response required. Click Finish to close this reminder.

☐ Veteran states using illegal drugs/prescriptions one or more times during past year.

This will complete the reminder for one year.

Clear Clinical Note Visit Info < Back Next > Finish Cancel

Rx/Drug Abuse Screen(PC/MH Only):
How many times in the past year have you used an illegal drug or used a prescription medication for non-medical reasons?
Veteran denies use of illegal/prescription drugs this past year; negative screen indicated.

Rx/Drug Abuse Screen (PC/MH Only)

☒ Veteran states using illegal drugs/prescriptions one or more times during past year.
Select appropriate option(s)
Further discussion/brief advice including possible medical impact. (Required) *

Reminder will not close without text in this box

☒ Veteran offered a referral to specialty substance abuse treatment

☐ Patient accepts referral

☐ Patient refuses referral

☒ Veteran offered referral to integrated care

If YES, then:

☐ Patient accepts referral

☐ Patient refuses referral

☒ Veteran Offered follow-up visit in primary care

If YES, then:

☐ Patient accepts follow-up visit

☐ Patient refuses follow-up visit

☒ No Action Taken

If No action taken: Select or fill in response
Indicate reason by selecting or enter response

* Veteran currently in a specialty substance abuse treatment

Clear Clinical Note Visit Info < Back Next > Finish Cancel

SELECT APPROPRIATE SELECTION
-Selecting check box reveals choices
-select refuse or accept
-Referrals can be to more than one service
- No Action selection requires selection from drop down box or fill in the blank.

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Table 1

Description of study sample VHA Medical Center, Bedford, Massachusetts, April 2013-March 2014

	N	%
Total	16,118	100.0
Sex:		
Female	825	5.1
Male	15,293	94.9
Age:		
18-39	1,882	11.7
40-59	2,713	16.8
60-79	6,758	41.9
80+	4,765	29.6
Race		
White	13,154	81.6
Black or African-American	667	4.1
Asian	55	0.3
Multiple race	296	1.8
Other	1,946	12.1
Hispanic ethnicity		
Non-Hispanic	14,209	88.2
Hispanic	347	2.2
Not known	1,562	9.7
Marital Status		
Married	8,168	50.7
Never married	2,731	16.9
Divorced/separated	3,584	22.2
Unknown	97	0.6
Widowed	1,538	9.5
State of residence		
Massachusetts	14,103	87.5
New Hampshire	964	6.0
Florida	298	1.8
Other	753	4.7
Any prior-year diagnosis of substance use disorder:		
Alcohol use disorder	1,868	9.3
Drug use disorder	941	4.9
Opioids ^a	333	1.9
Marijuana ^a	197	1.1
Other drug ^a	637	3.7

	N	%
Mental health clinic visits (Year 1)		
Yes	6,417	39.8
No	9,701	60.2
Total days with visits:		
1-7	11,738	72.8
8-15	1,893	11.7
16 or more	2,487	15.4

^aNot mutually exclusive.

Table 2
Proportion screened and proportion positive among those screened, by patient characteristics

	Percent of patients screened for:		Among those screened, percent positive:	
	Drug use	Alcohol use	Drug screen	Alcohol screen
All patients	69.5	83.7	3.0	14.4
Sex				
Female	61.2	73.3	2.8	17.4 *
Male	70.0	84.3	3.0	14.3 *
Age				
18-39	54.5	63.1	10.2	21.3
40-59	53.6	70.1	7.7	21.1
60-79	74.6	87.2	2.4	14.8
80+	77.3	94.6	0.1	9.3
Race				
White	70.9	84.7	3.1	14.6
Black or African-American	49.8	64.5	6.6	17.4
Asian	74.5	85.5	2.4	12.8
Multiple race	65.5	72.6	6.7	14.0
Other	67.5	85.4 *	1.3	12.5
Hispanic ethnicity				
Non-Hispanic	70.1	83.9	3.2	14.5
Hispanic	66.3	74.1	4.8	17.1
Not known	64.6	84.3	0.9	13.1
Marital Status				
Married	75.4	89.4	1.3	12.6
Never married	58.8	70.0	7.3	18.2
Divorced/separated	62.5	77.8	5.9	18.8
Unknown	58.8 *	74.2 *	7.0	23.6 *
Widowed	74.3	91.9	0.6	9.5
State of residence				

	Percent of patients screened for:			Among those screened, percent positive:		
	Drug use		Alcohol use	Drug screen		Alcohol screen
Massachusetts	71.0	***	85.5	***	2.8	**
New Hampshire	66.4	*	77.0	***	3.6	16.8
Florida	59.1	***	78.2	**	4.5	18.5
Other	49.4	***	60.7	***	6.7	19.0
Prior-year alcohol use disorder diagnosis						
Yes	47.1	***	73.5	***	9.0	***
No	72.4	***	85.0	***	2.5	***
Prior-year drug use disorder diagnosis						
Yes	21.0	***	69.4	***	37.4	***
No	72.5	***	84.6	***	2.4	***
Settings patient visited (Year 1)						
Primary care, not mental health clinic	78.2	***	97.3	***	1.2	***
Mental health clinic, not primary care	21.2	***	0.0	***	14.1	n/a
Both	76.3	***	98.9	***	5.8	***
Total days with visits:						
1-7	69.6		84.7	***	2.1	***
8-15	82.0	***	86.7	**	4.7	***
16 or more	59.6	***	76.6	***	6.3	***
Sample size	16,118		16,118		11,203	13,491

Note:

*** denotes difference from all other levels of variable is significant at $p < .0001$,

** at $p < .01$,

* at $p < .05$.

Adjusted predicted probabilities of being screened

Table 3

	Screened for unhealthy drug use				Screened for unhealthy alcohol use			
	PP	Marginal effect	SE	p-value	PP	Marginal effect	SE	p-value
Male (ref)	69.5%				83.7%			
Female	68.8%	-0.7%	1.5%	0.629	84.2%	0.5%	0.9%	0.561
Age group:								
18-39 (ref)	63.4%				78.4%			
40-59	69.1%	5.7%	1.2%	<.0001	85.0%	6.6%	0.7%	<.0001
60-79	74.5%	11.1%	1.1%	<.0001	87.4%	9.0%	0.7%	<.0001
80+	74.7%	11.3%	1.3%	<.0001	91.1%	12.7%	0.8%	<.0001
Race								
White (ref)	70.7%				84.6%			
Black	60.7%	-10.1%	1.8%	<.0001	78.9%	-5.7%	1.1%	<.0001
Other Non White	64.4%	-6.3%	1.0%	<.0001	79.3%	-5.3%	0.8%	<.0001
Hispanic ethnicity								
Non-Hispanic (ref)	69.4%				83.6%			
Hispanic	75.1%	5.7%	2.0%	0.005	85.8%	2.2%	1.3%	0.095
Marital Status								
Never married (ref)	67.7%				81.4%			
Married	71.4%	3.7%	1.0%	<0.0005	86.1%	4.7%	0.7%	<.0001
Widowed	70.1%	2.4%	1.5%	0.101	86.4%	4.9%	1.1%	<.0001
Divorced/separated	69.4%	1.7%	1.1%	0.113	84.7%	3.3%	0.6%	<.0001
Unknown	64.4%	-3.3%	4.4%	0.459	81.1%	-0.3%	3.1%	0.913
State of residence								
Massachusetts (ref)	70.4%				84.6%			
New Hampshire	66.8%	-3.5%	1.5%	0.015	79.1%	-5.5%	1.1%	<.0001
Florida	61.4%	-8.9%	2.6%	0.001	80.9%	-3.8%	1.8%	0.034
Other	58.9%	-11.5%	1.7%	<.0001	76.1%	-8.5%	1.1%	<.0001

	Screened for unhealthy drug use				Screened for unhealthy alcohol use			
	PP	Marginal effect	SE	p-value	PP	Marginal effect	SE	p-value
Mental health clinic visits (Year 1)								
None (ref)	77.0%				97.3%			
1 or more	56.9%	-20.0%	1.0%	<.0001	60.1%	-37.2%	0.8%	<.0001
Prior-year alcohol diagnosis								
None (ref)	70.2%				83.5%			
1 or more	64.2%	-6.0%	1.3%	<.0001	84.6%	1.2%	0.7%	0.081
Prior-year drug diagnosis								
None (ref)	71.8%				83.6%			
1 or more	32.0%	-39.8%	1.9%	<.0001	84.4%	0.8%	0.9%	0.368
Total days with any visits:								
1-7 (ref)	63.7%				76.5%			
8-15	87.7%	24.0%	0.7%	<.0001	93.5%	16.9%	0.5%	<.0001
16 or more	80.7%	17.0%	0.8%	<.0001	91.2%	14.7%	0.5%	<.0001
Sample size	16,118				16,118			

Notes: PP=predicted probability; Ref= reference category; SE=standard error.

Predicted probabilities are derived from multivariable logistic regression models. The marginal effect is computed as the difference between PP for current row and PP for reference category (in % points).

Table 4

Adjusted predicted probabilities of screening positive, among those screened

	Screened positive for unhealthy drug use				Screened positive for unhealthy alcohol use			
	PP	Marginal effect	SE	p-value	PP	Marginal effect	SE	p-value
Male (ref)	3.2%				14.4%			
Female	1.5%	-1.7%	0.4%	<.0001	15.6%	1.2%	1.4%	0.410
Age group:								
18-39 (ref)	6.5%				21.5%			
40-59	2.5%	-3.9%	0.8%	<.0001	12.8%	-8.7%	1.0%	<.0001
60-79	1.8%	-4.7%	0.9%	<.0001	11.7%	-9.8%	1.1%	<.0001
80+	0.1%	-6.4%	0.4%	<.0001	8.5%	-12.9%	1.0%	<.0001
Race								
White (ref)	3.0%				14.5%			
Black	3.6%	0.6%	0.7%	0.428	13.1%	-1.4%	1.5%	0.360
Other Non White	2.8%	-0.2%	0.5%	0.626	14.3%	-0.2%	0.9%	0.827
Hispanic ethnicity								
Non-Hispanic (ref)	3.1%				14.4%			
Hispanic	2.1%	-1.0%	0.6%	0.124	13.7%	-0.8%	2.0%	0.699
Marital Status								
Never married (ref)	3.8%				14.4%			
Married	1.9%	-2.0%	0.4%	<.0001	14.2%	-0.2%	0.9%	0.861
Widowed	1.8%	-2.0%	0.7%	0.005	12.6%	-1.8%	1.3%	0.169
Divorced/separated	3.1%	-0.8%	0.4%	0.049	15.7%	1.3%	1.0%	0.200
Unknown	3.8%	0.0%	1.8%	0.996	21.7%	7.3%	4.7%	0.119
State of residence								
Massachusetts (ref)	3.0%				14.2%			
New Hampshire	3.1%	0.1%	0.6%	0.854	15.8%	1.6%	1.3%	0.219
Florida	4.4%	1.4%	1.4%	0.310	17.2%	3.0%	2.4%	0.203
Other	3.8%	0.9%	0.7%	0.239	16.2%	2.0%	1.6%	0.216
Mental health clinic visits (Year 1)								

	Screened positive for unhealthy drug use				Screened positive for unhealthy alcohol use			
	PP	Marginal effect	SE	p-value	PP	Marginal effect	SE	p-value
None (ref)	1.7%				15.6%			
1 or more	4.3%	2.6%	0.4%	<0001	12.5%	-3.1%	0.8%	<.0005
Prior-year alcohol diagnosis								
None (ref)	3.0%				12.1%			
1 or more	3.3%	0.4%	0.4%	0.398	35.5%	23.4%	1.7%	<.0001
Prior-year drug diagnosis								
None (ref)	2.5%				14.7%			
1 or more	15.0%	12.5%	1.8%	<0001	12.0%	-2.6%	1.2%	0.026
Total days with any visits:								
1-7 (ref)	3.4%				15.1%			
8-15	2.8%	-0.6%	0.4%	0.143	12.7%	-2.4%	0.9%	0.012
16 or more	2.4%	-1.0%	0.4%	0.007	12.5%	-2.6%	1.0%	0.011
Sample size (N screened)	11,203				13,491			

Notes: PP=predicted probability; Ref= reference category; SE=standard error.

Predicted probabilities are derived from multivariable logistic regression models. The marginal effect is computed as the difference between PP for current row and PP for reference category (in % points).