

BRIEF REPORT

Screening for Psychotherapeutic Medication Misuse in Primary Care Patients: Comparing Two Instruments

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Introduction: Prescription psychotherapeutic medication misuse is a growing problem in the United States, but no method exists to routinely screen for this in primary care. Our study sought to (1) describe the prevalence of prescription psychotherapeutic medication misuse in primary care and the characteristics of patients who misuse and (2) compare 2 screening instruments modified to identify prescription medication misuse in primary care.

Methods: Primary care patients from underserved, urban clinics within a health system completed anonymous computer-directed health screens that included standard questions about prescription medication misuse. They were also administered the 4-item Cut down, Annoyed, Guilty, and Eye-opener questionnaire modified to focus on prescription medications (RxCAGE) and a 6-item Prescription Opioid Misuse Index (POMI-e) expanded to include other prescription medications.

Results: Of 2,339 respondents, 15.3% were positive for at least 2 items on the RxCAGE and 18.6% were positive for at least 2 items on the POMI-e. Using our computer-directed health screen as a comparison, we found that POMI-e had a higher area under the curve (0.63). A positive POMI-e was associated with being male, white and unemployed, having depression and anxiety, and currently using illicit substances, smoking, and misusing alcohol.

Conclusions: Rates of prescription medication misuse were substantial with both RxCAGE and POMI-e showing promise as screening instruments. Future studies are needed to test prescription medication misuse screening tools in broader populations and pilot interventions for those screening positive. (J Am Board Fam Med 2019;32:272–278.)

Keywords: Drug Abuse, Prevalence, Primary Health Care, Psychotropic Drugs, Substance Abuse Detection

In 2016, an estimated 115 million Americans or 42.8% of the adult population used prescription psychotherapeutic drugs in the past year. Of those, an estimated 18.6 million or 16.2% misused prescription psychotherapeutic drugs.^{1–3} Misuse is defined by the National Survey on Drug Use and

Health (NSDUH) as medication use in any way not directed by a prescribing clinician, including using another's prescription, greater amounts, more often, or longer than directed.⁴ Current attention has focused heavily on the growing opioid epidemic.^{2,5–7} As prescription opioid misuse continues to grow each year, overdose deaths from prescription opioids, the most commonly misused prescription drug, have almost quadrupled in the past decade and are paralleled by a similar increase in emergency department visits, falls, and fractures.⁸ Furthermore, the misuse of prescription opioids is a significant risk factor for future or concurrent heroin use.^{9,10}

In addition to prescription opioid misuse, misuse of tranquilizers (defined as benzodiazepines and muscle relaxants), stimulants (such as amphet-

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amines), and sedatives is growing, albeit largely unrecognized.^{11–16} Although it is well known that tranquilizers, stimulants, and sedatives can have substantial negative effects that include fatal overdose in some cases, they have not been well-studied to date.^{13,16,17}

Although recognizing prescription opioid misuse as a problem in the patients they are serving,¹⁸ primary care clinicians continue contributing to the growing problems with misuse by writing 45% of all opioid prescriptions¹⁹ and substantial proportions of benzodiazepines and other psychotherapeutic drugs.^{20,21} A few studies have documented the prevalence of prescription psychotherapeutic medication misuse in general primary care or community pharmacy settings, but studies to date have not documented the characteristics of patients who are likely to misuse prescription psychotherapeutic drugs and the prevalence of misuse in predominantly underserved primary care practices.^{22,23} Our study aimed to (1) describe the characteristics of primary care patients who misuse prescription psychotherapeutic agents and (2) compare rates of misuse obtained from 2 standardized screening tools modified to focus on prescription medication misuse.

Methods

Participants and Data Collection

We conducted a cross-sectional survey of patients in underserved, urban primary care clinics within a university-based health system. Clinics were located both adjacent to the hospital or at satellite, community sites. Patients were recruited in clinic waiting areas for an anonymous survey focused on health behaviors. Patients between the ages of 18 and 70 years who could understand English were eligible for the study. Interested participants were escorted to a private area adjacent to the clinic waiting room either before or after their scheduled medical appointments. After providing verbal consent, participants completed the 15-minute Health Cheq survey on a tablet computer, guided by a 3-D avatar (Peedy the Parrot) who read each question aloud and kept participants engaged in the process.^{24,25} This was followed by a brief research assistant-administered survey. Patients received \$10 for their participation in the study. Data were collected between July 2012 and December 2013. This study was approved by the Virginia Commonwealth University Institutional Review Board.

Outcome Measures

Health Cheq collected information on patient demographics, general health behaviors, general medical concerns, mental health, and psychosocial issues. It also included 4 questions about prescription drug misuse in the past month: (1) taking more pills than prescribed, (2) taking pills more often than prescribed, (3) using medicine prescribed for someone else, or (4) getting the same medicine from more than 1 doctor. These questions were considered standard at the time and were based on the NSDUH questionnaire. Health Cheq also collected the standard Cut down, Annoyed, Guilty, and Eye-opener (CAGE) questionnaire for alcohol if male²⁶ or the Tolerance, Annoyance, Cut down, and Eye-opener (TACE) questionnaire if female,²⁷ as well as the CAGE Adapted to Include Drugs (CAGE-AID) for all illicit drugs.²⁸ Research assistants then screened patients in person using 2 prescription drug misuse screening instruments: (1) prescription medication CAGE (RxCAGE), a 4-item screener, using CAGE alcohol use disorder items modified to focus on prescription drugs²⁶ and (b) Prescription Opioid Misuse Index (POMI-e), expanded from the original focus on prescription opioid misuse to include all prescription drugs.²⁹

Data Analysis

Using SPSS v22, item frequencies and scale scores for the 2 screening instruments were calculated. Sensitivity and specificity were calculated, along with a receiver operating characteristic curve analysis to calculate area under the curve (AUC), for cutoff scores of 1 and 2 in both RxCAGE and POMI-e. The anonymous Health Cheq questions that were standard care at the time were used for comparison, because they were computer administered. McNemar tests were then used to test for associations between the screening instrument and cutoff score with the highest AUC with demographic, medical, mental health, and substance use characteristics, as identified in Health Cheq.

Results

Respondent Characteristics

A total of 2,339 patients participated in the study (Table 1). The mean age was 46, with 61.7% of respondents who were female and 70.5% identified as African American. A total of 79.4% were unin-

Table 1. Demographics of Respondents to Health Cheq Survey (n = 2,339)

Demographic	n (%)	Mean (SD)
Age (years)		46.13 (11.50)
Ethnicity/Race		
White	567 (24.2)	
Black	1,648 (70.5)	
Other	124 (5.3)	
Sex		
Males	897 (38.3)	
Females	1,442 (61.7)	
Employment		
Full Time	318 (13.6)	
Unemployed	1,035 (44.2)	
Other	969 (41.4)	
Did not answer	17 (0.7)	
Marital Status		
Single	1,021 (43.7)	
In a relationship	388 (16.6)	
Married	391 (16.7)	
Divorced/Separated	439 (18.8)	
Widowed	94 (4)	
Did not answer	6 (0.3)	
Insurance Type		
Private	170 (7.3)	
Medicare	167 (7.1)	
Medicaid	144 (6.2)	
Indigent Care	1,669 (71.4)	
None	182 (7.8)	
Did not answer	7 (0.3)	

SD, standard deviation.

sured with 71.6% of those receiving care through the health system’s indigent care program.

Screening Tools

On the RxCAGE, 37.8% answered yes to at least 1 item and 15.3% answered yes to 2 or more items (Table 2). Feeling the need to cut down on the use of prescription drugs was the most frequently endorsed (22.6%), followed by ever using prescription drugs to get going or calm down (21.2%). On the POMI-e, 36.2% answered yes to at least 1 item and 18.6% to 2 or more items (Table 2). Ever feeling high or getting a buzz after using medication was the most frequently positive in POMI-e (16.7%), followed by using medication more frequently than prescribed (15.7%). When comparing RxCAGE and POMI-e as well as cutoff scores of 1 or higher and 2 or higher, POMI-e with a cutoff

score of 2 or higher had the largest area under the curve (AUC) (0.63, $P < .001$) (Table 3).

Associations with Prescription Drug Misuse

The POMI-e was used to characterize associations because it had the largest AUC with a cutoff score of 2 or more (hereafter referred to as a “positive POMI-e”). Multiple demographic characteristics along with medical, mental health, and substance use comorbidities were associated with a positive POMI-e (Table 4). Demographic characteristics associated with a positive POMI-e included being younger, male, white, and unemployed. Although arthritis was the only chronic condition with POMI-e positive and negative group differences (44.8% vs 35.9% respectively, $P = .001$), POMI-e positive patients had a higher number of chronic diseases than POMI-e negative patients (1.62 vs 1.49 respectively, $P = .037$).

Both depression and anxiety independently were associated with a positive POMI-e. Likewise, lifetime cigarette use and current smoking status were associated with a positive POMI-e. Those who had used illicit drugs in the past 30 days as well as those who screened positive in the CAGE-AID were more likely to have a positive POMI-e. Furthermore, positive alcohol TACE for women, CAGE for men, or a positive CAGE-AID were more likely for the positive POMI-e group as compared with the negative POMI-e group (64.1% vs 32.2% respectively, $P < .001$).

Discussion

Substantial rates of prescription psychotherapeutic medication misuse were identified in this urban primary care population. The prevalence of prescription medication misuse was similar for the 2 instruments, but POMI-e had a higher AUC than RxCAGE. Given the high association of prescription drug misuse with mental health and substance use comorbidities, patients identified with prescription drug misuse might merit special attention in primary care. Routine screening for prescription drug misuse might have a substantial impact in reducing misuse if clinicians had evidence-based interventions for those who screened positive.

Future studies to validate and test implementation of the screening tools could have substantial impact on the way clinicians identify patients with prescription psychotherapeutic drug misuse. Fur-

Table 2. Positive Screens from Prescription Drug Misuse Screening Instruments

Research Assistant-Administered Screening Tools		POMI-e (Expanded Prescription Opioid Misuse Index)		Computer-Administered Tool	
Rx-CAGE (CAGE modified to focus on prescription drug misuse)				Prescription misuse items	
Questions	n (%) yes	Questions	n (%) yes	Questions	n (%) yes
Have you ever felt the need to C ut down on your use of prescription drugs?	528 (22.6)	Do you ever use more of your medication, that is, take a higher dose, than is prescribed for you?	350 (15.0)	Taken more pills than the doctor told you to	113 (4.8)
Have you ever felt A nnoyed by remarks by your friends or loved ones made about your use of prescription drugs?	246 (10.5)	Do you ever use your medication more often, that is, shorten the time between dosages, than is prescribed for you?	368 (15.7)	Taken pills more often than the doctor told you	74 (3.2)
Have you ever felt G uilty or remorseful about your use of prescription drugs?	219 (9.4)	Do you ever need early refills for your medication?	274 (11.7)	Used medicine prescribed for someone else	91 (3.9)
Have you E ver used prescription drugs as a way to “get going” or “calm down?”	497 (21.2)	Do you ever feel high or get a buzz after using your medication?	390 (16.7)	Got the same medicine from more than one doctor	18 (0.8)
		Do you ever take your medication because you are upset, using the medication to relieve or cope with problems other than pain?	260 (11.1)		
		Have you ever gone to multiple physicians, including emergency room doctors, seeking more of your medication?	99 (4.2)		
≥1 item(s) positive	884 (37.8)	≥1 item(s) positive	847 (36.2)	≥ 1 item(s) positive	180 (7.7)
≥ 2 items positive	358 (15.3)	≥2 items positive	435 (18.6)	≥ 2 items positive	81 (3.5)

Rx-CAGE, Cut down, Annoyed, Guilty, and Eye-opener questionnaire modified to focus on prescription medications; POMI-e, Prescription Opioid Misuse Index expanded to include all prescription medications.

thermore, successful interventions to treat patients identified with misuse and at risk of medication harm will need to be tested in primary care settings. To be successfully implemented, the development of validated screening tools and evidence-based in-

terventions should be combined with clinician education in prescription drug misuse.

Several limitations exist. First, participants were all from urban, underserved primary care clinics, and only English speakers were included, which

Table 3. Sensitivity, Specificity, and ROC curve analyses for Rx-CAGE and POMI-e

Measure	Cut off score (equal or higher than)	Sensitivity* (%)	Specificity* (%)	AUC	95% CI	P value
Rx-CAGE	1	62.8	64.3	0.54	0.52–0.57	.001
	2	35.6	86.4	0.56	0.53–0.60	<.001
POMI-e	1	82.8	67.7	0.58	0.55–0.60	<.001
	2	69.4	85.6	0.63	0.60–0.66	<.001

ROC, receiver operating characteristic; CI, confidential interval; AUC, area under the curve; Rx-CAGE, Cut down, Annoyed, Guilty, and Eye-opener questionnaire modified to focus on prescription medications; POMI-e, Prescription Opioid Misuse Index expanded to include all prescription medications.

*Having 1 or more positive Health Cheq Rx misuse items was used as the comparison.

Table 4. Participant Characteristics of Those at Risk for Prescription Misuse Based on POMI-e Scores of ≥ 2

Characteristics	POMI-e <2 items endorsed (n = 1904)		POMI-e ≥ 2 items endorsed (n = 435)		P value
	n (%)	Mean (SD)	n (%)	Mean (SD)	
Demographic Characteristics					
Age		46.43 (11.72)		44.8 (10.39)	.004
Gender					
Male	694 (36.4)		203 (46.7)		<.001
Female	1210 (63.6)		232 (53.3)		
Race					
White	429 (22.5)		138 (31.7)		<.001
Black	1370 (72.0)		278 (63.9)		
Other	105 (5.5)		19 (4.4)		
Employment*					
Full time	273 (14.5)		45 (10.4)		.015
Unemployed	818 (43.3)		217 (50.0)		
Other	797 (42.2)		172 (39.6)		
Education*					
Less than high school	429 (23.3)		111 (26.1)		.132
High school	694 (37.7)		171 (40.1)		
College/advanced degree/technical training	717 (39.0)		144 (33.8)		
Medical Characteristics					
Chronic Diseases					
Hypertension	1034 (54.3)		225 (51.7)		.330
Heart disease	209 (11.0)		225 (51.7)		.702
Asthma	448 (23.5)		116(26.7)		.170
Chronic obstructive pulmonary disease	211 (11.1)		54 (12.4)		.430
Arthritis	683 (35.9)		195 (44.8)		.001
Migraines	253 (13.3)		71 (16.3)		.098
Any chronic disease	1471 (77.3)		351 (80.7)		.12
Sum number of chronic diseases		1.49 (1.19)		1.62 (1.22)	.037
Past 30 days sleep rating					
Very good	209 (11.0)		18 (4.1)		<.001
Good	514 (27.0)		63 (14.5)		
Fair	699 (36.7)		179 (41.1)		
Poor	482 (25.3)		175 (40.2)		
Overall health rating					
Very good or excellent	447 (23.5)		65 (14.9)		<.001
Good	708 (37.2)		165 (37.9)		
Fair or poor	749 (39.3)		205 (47.1)		
Mental Health Characteristics					
Anxiety	514 (27.0)		212 (48.7)		<.001
Depression	633 (33.2)		242 (55.6)		<.001
Substance Use Characteristics					
Lifetime cigarette use*					
Smoked ≥ 100 cigarettes	806 (42.4)		276 (63.7)		<.001
Smoked <100 cigarettes	410 (21.6)		76 (17.6)		
Never smoked	685 (36.0)		81 (18.7)		

Continued

Table 4. Continued

Characteristics	POMI-e <2 items endorsed (n = 1904)		POMI-e ≥2 items endorsed (n = 435)		P value
	n (%)	Mean (SD)	n (%)	Mean (SD)	
Current smoker	757 (39.8)		280 (64.4)		<.001
Illicit drug use					
Past 30 days illicit drug use	157 (8.2)		121 (27.8)		<.001
CAGE-AID positive (≥1 positive)	117 (6.1)		110 (25.3)		<.001
Alcohol use					
≥ 2 TACE + with women or ≥1 CAGE + with men	226 (25.5)		132 (51.6)		<.001
Positive for illicit drugs (as measured by CAGE-AID) or alcohol (as measured by ≥2 TACE for women or ≥1 CAGE for men)	285 (32.2)		164 (64.1)		<.001

CAGE, Cut down, Annoyed, Guilty, and Eye-opener; CAGE-AID, CAGE Adapted to Include Drugs; TACE, Tolerance, Annoyance, Cut down, and Eye-opener; SD, standard deviation; POMI-e, Prescription Opioid Misuse Index expanded to include all prescription medications.

*Nonresponders to these survey questions were not included in the analysis.

may limit the generalizability to the general population. This may be mitigated by the large sample size. Second, those who have more difficulty with using a computer-administered screening tool or have poor literacy may not have answered the questions or declined participation in the study. Third, there may be a response bias because a research assistant administered instruments with patients knowing that results would not be shared with their clinician. Patients may respond differently if these screening tools were administered in person by their clinicians.

Conclusions

Both RxCAGE and POMI-e show promise as screening tools for prescription psychotherapeutic medication misuse and warrant further study. Developing and implementing validated screening tools for prescription psychotherapeutic medication misuse may help primary care clinicians identify and care for patients with prescription drug misuse and reduce the morbidity, societal impacts, and costs of the current prescription drug misuse epidemic.

To see this article online, please go to: <http://jabfm.org/content/32/2/272.full>.

References

1. Substance Abuse and Mental Health Services Administration. Results from the 2016 National Survey on Drug Use and Health: detailed tables. [https://www.samhsa.gov/data/sites/default/files/NSDUH-](https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.pdf)

[DetTabs-2016/NSDUH-DetTabs-2016.pdf](https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2016/NSDUH-DetTabs-2016.pdf). Published 2017. Accessed May 29, 2018.

2. Han B, Compton WM, Blanco C, Crane E, Lee J, Jones CM. Prescription opioid use, misuse, and use disorders in U.S. adults: 2015 National Survey on Drug Use and Health. *Ann Intern Med* 2017;167:293–301.
3. Han B, Compton WM, Jones CM, Cai R. Nonmedical prescription opioid use and use disorders among adults aged 18 through 64 years in the United States, 2003–2013. *JAMA* 2015;314:1468–78.
4. Jordan BK, Karg RS, Batts KR, Epstein JF, Wiesen C. A clinical validation of the National Survey on Drug Use and Health assessment of substance use disorders. *Addict Behav* 2008;33:782–98.
5. Office of the Surgeon General. Facing addiction in America: the surgeon general’s report on alcohol, drugs, and health. Washington, D.C.: U.S. Department of Health and Human Services; 2016.
6. Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain—United States, 2016. *JAMA* 2016;315:1624–45.
7. Quinones S. Dreamland: the true tale of America’s opiate epidemic. New York, NY: Bloomsbury Press; 2016.
8. Substance Abuse and Mental Health Services Administration. Prescription drug misuse and abuse. <http://www.samhsa.gov/prescription-drug-misuse-abuse>. Published 2017. Accessed June 4, 2018.
9. Jones CM. Heroin use and heroin use risk behaviors among nonmedical users of prescription opioid pain relievers - United States, 2002–2004 and 2008–2010. *Drug Alcohol Depend* 2013;132:95–100.
10. Cicero TJ, Ellis MS, Surratt HL, Kurtz SP. The changing face of heroin use in the United States: a

- retrospective analysis of the past 50 years. *JAMA Psychiatry* 2014;71:821–6.
11. Hughes A, Williams M, Lipari R, Bose J, Copello E, Kroutil L. Prescription drug use and misuse in the United States: results from the 2015 National Survey on Drug Use and Health. Substance Abuse and Mental Health Services Administration; 2016.
 12. Mack KA, Zhang K, Paulozzi L, Jones C. Prescription practices involving opioid analgesics among Americans with Medicaid, 2010. *J Health Care Poor Underserved* 2015;26:182–98.
 13. Maree RD, Marcum ZA, Saghabi E, Weiner DK, Karp JF. A systematic review of opioid and benzodiazepine misuse in older adults. *Am J Geriatr Psychiatry* 2016;24:949–63.
 14. Murphy Y, Wilson E, Goldner EM, Fischer B. Benzodiazepine use, misuse, and harm at the population level in Canada: a comprehensive narrative review of data and developments since 1995. *Clin Drug Investig* 2016;36:519–30.
 15. Panes A, Lassalle R, Bernard M-A, Dureaud-Pournin C, Pariente A, Fourrier-Reglat A. Misuse of benzodiazepines in the French population: A cohort study in the Échantillon Généraliste de Bénéficiaires between 2007 and 2012. *Revue Épidémiol Santé Publique* 64:S132–S133, 2016.
 16. Bachhuber MA, Hennessy S, Cunningham CO, Starrels JL. Increasing benzodiazepine prescriptions and overdose mortality in the United States, 1996–2013. *Am J Public Health* 2016;106:686–8.
 17. Khanra S. Benzodiazepine misuse: when shall we wake up? *Asian J Psychiatr* 2017;29:134–5.
 18. Hwang CS, Turner LW, Kruszewski SP, Kolodny A, Alexander GC. Primary care physicians' knowledge and attitudes regarding prescription opioid abuse and diversion. *Clin J Pain* 2016;32:279–84.
 19. Levy B, Paulozzi L, Mack KA, Jones CM. Trends in opioid analgesic-prescribing rates by specialty, U.S., 2007–2012. *Am J Prev Med* 2015;49:409–13.
 20. Kroll DS, Nieva HR, Barsky AJ, Linder JA. Benzodiazepines are prescribed more frequently to patients already at risk for benzodiazepine-related adverse events in primary care. *J Gen Intern Med* 2016;31:1027–34.
 21. Park TW, Saitz R, Nelson KP, Xuan Z, Liebschutz JM, Lasser KE. The association between benzodiazepine prescription and aberrant drug-related behaviors in primary care patients receiving opioids for chronic pain. *Subst Abuse* 2016;37:516–20.
 22. Cochran G, Rubinstein J, Bacci JL, Ylioja T, Tarter R. Screening community pharmacy patients for risk of prescription opioid misuse. *J Addict Med* 2015;9:411–6.
 23. Bradley KA, Lapham GT, Caldeiro R, Marx L. Single-item screens for prescription and illicit drug misuse largely identifies primary care patients with unrecognized drug use. *J Patient-Centered Res Rev* 2:132, 2015.
 24. Ondersma SJ, Chase L, Svikis DS, Schuster CR. Computer-based brief intervention for perinatal drug use. *J Subst Abuse Treat* 2005;28:305–12.
 25. Breland AB, Almond L, Kienzle J, Ondersma SJ, Hart A Jr., Weaver M, Dillon P, Svikis D. Targeting tobacco in a community-based addiction recovery cohort: Results from a computerized, brief, randomized intervention trial. *Contemp Clin Trials* 2014;38:113–20.
 26. Ewing JA. Detecting alcoholism. The CAGE questionnaire. *JAMA* 1984;252:1905–7.
 27. Stevenson JS, Masters JA. Predictors of alcohol misuse and abuse in older women. *J Nurs Scholarsh* 2005;37:329–35.
 28. Brown RL, Rounds LA. Conjoint screening questionnaires for alcohol and other drug abuse: criterion validity in a primary care practice. *Wis Med J* 1995;94:135–40.
 29. Knisely JS, Wunsch MJ, Cropsey KL, Campbell ED. Prescription Opioid Misuse Index: a brief questionnaire to assess misuse. *J Subst Abuse Treat* 2008;35:380–6.