Regular article

# Prescription Opioid Misuse Index: A brief questionnaire to assess misuse

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## Abstract

The Prescription Opioid Misuse Index (POMI) was developed and used in a larger study designed to assess correlates of OxyContin abuse in pain patients prescribed OxyContin, patients treated for OxyContin addiction, and individuals incarcerated for OxyContin-related charges. The POMI was administered to 40 subjects with addiction problems and 34 pain patients who had received OxyContin for pain. Receiver operating characteristic curve analysis indicated that endorsing two or more of six items reliably classified a person as at risk for misuse of their medication. When comparing drug abuse/dependence in subjects classified as misusers or users, significantly more misusers received a diagnosis for alcohol ($p < .01$), illicit drugs ($p < .05$), and other prescription medications ($p < .05$) and reported greater lifetime use of alcohol ($p < .002$) and illicit drugs ($p < .01$). No between-group differences were found regarding psychiatric problems. The POMI appears to be a sensitive and specific instrument for identifying patients who misuse opioid medications. © 2008 Elsevier Inc. All rights reserved.

*Keywords:* Screening instrument; Prescription drug abuse; Opioids; Pain

## 1. Introduction

Numerous epidemiological surveys in the last several years have demonstrated an increase in the prevalence of narcotic addiction and nonmedical use of prescription opioids in the United States (Colliver, Kroutil, Dai, & Gfroerer, 2006; Drug Abuse Warning Network [DAWN], 2007; National Institute on Drug Abuse, 2006; Substance Abuse and Mental Health Services Administration [SAMHSA], 2006a, 2006b). The 2005 National Survey on Drug Use and Health (NSDUH) reported that approximately 1.5 million persons older than 12 years were dependent on or abused narcotics during the previous year, and more than 11 million individuals engaged in the nonmedical use of prescription pain relievers in the previous year (SAMHSA, 2006a, 2006b). Between 2002 and 2005, rates of initial nonmedical opioid use were stable; however, the annual average of first time nonmedical use was approximately 2.3 million people (NSDUH, 2007). Data from treatment surveys also indicate an increase in problems associated with the abuse and/or nonmedical use of opioids. According to the 2005 Treatment Episode Data Set, there was a four-fold increase in admissions for treatment of nonheroin opioids from 1% in 1995 to 4% in 2005. (SAMHSA, 2006a, 2006b). Significant increases in emergency room visits with mentions of opioid drugs have also been reported over the last decade (SAMHSA, 2003). Most recently, DAWN estimates indicate that one third of nonmedical-use visits involve opioid analgesics (DAWN, 2007).

With the growing concern on the dramatic increase in the abuse and nonmedical use of prescription narcotics and subsequent health problems, it is important to develop methods of detection of those at risk for misuse of prescription narcotics (Compton & Volkow, 2006; Zacny et al., 2003). The development of a screening instrument for opioid misuse that can be used quickly and effectively in a

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clinical setting has been a challenge for the field. An early attempt to develop and evaluate such an instrument was accomplished by Compton, Darakjian, and Miotto (1998), who found that scores on a 42-item Prescription Drug Use Questionnaire (PDUQ) were significantly different for a group meeting the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*) criteria for abuse or dependence as compared with those not meeting *DSM-IV* criteria. They also reported that three factors taken in unison—the tendency to increase analgesic dose or frequency, preference for a mode of administration, and patient considering himself/herself addicted—distinguished substance-abusing and substance-dependent patients from the nonaddicted patients. This interview, however, is designed to be administered by a trained mental health professional and takes time to administer. These limitations make it impractical for health care practitioners to use this instrument with most of their patient population.

Using a large sample of chronic pain patients consisting of 100 with substance abuse and 400 without substance abuse histories, Manchikanti, Singh, Damron, Beyer, and Pampati (2003) examined a comprehensive 27-item assessment instrument that evaluated several domains including focus on and excessive need of opiates, nonphysiological behavior, substance abuse, nonfunctional status, legal status, and psychological status. Results of their study suggested that 8 of the 12 domains studied were useful in identifying misuse and that three factors correctly identified 90% of the cases: excessive opiate needs, lying to obtain the medication, and doctor shopping.

More recently, Butler, Budman, Fernandez, and Jamison (2004) developed a self-administered 24-item questionnaire (Screener and Opioid Assessment for Patients with Pain [SOAPP]) to identify characteristics of chronic pain patients to predict future misuse. The final 14-item instrument has demonstrated good reliability and validity when compared with aberrant drug use behavior as determined by either a high score on the PDUQ, positive drug screening, or clinician ratings of a drug problem.

Webster and Webster (2005) validated a brief office-based screening tool, the Opioid Risk Tool (ORT), to predict the probability of a patient displaying aberrant behavior when prescribed opioids for chronic pain. This self-administered screen requires less than 10 minutes of the patient's time and is composed of five risk factors, which were derived from a search of the literature and the author's clinical experience: family and personal history of substance abuse, age, history of preadolescent sexual abuse, and specific mental disorders. Scores from the ORT predicted aberrant behaviors during the 12-month monitoring period among patients prescribed opioids for chronic pain with a high degree of sensitivity and specificity. Most frequent aberrant behaviors recorded via chart review included obtaining prescription opioids from alternative providers, using more than prescribed, using additional opioids than those prescribed, and failing to keep appointments.

The goal of the present investigation was to assess a brief interview focused specifically on prescription use behaviors rather than general predictive factors associated with substance abuse (i.e., family history of substance abuse, others' concern regarding potential drug abuse problem, previous substance abuse treatment, etc.). The investigators of this study standardized questions frequently used in their clinical practice to assess potential misuse of prescription medications. The eight-item interview, Prescription Opioid Misuse Index (POMI), also included a question regarding adequate pain relief to confirm that any increase in prescription use reported was not due to inadequate pain control. This question was included to elucidate behaviors characteristic of those individuals displaying pseudo-addiction (American Academy of Pain Medicine [AAPM], American Pain Society [APS], & American Society of Addiction Medicine [ASAM], 2001). Pseudo-addiction occurs in a patient with unrelieved pain who becomes focused on obtaining medications and displays behaviors that may otherwise seem inappropriately "drug seeking." Sometimes, illicit drug use and deception may occur in efforts to obtain relief. Unlike the patient with addiction, these behaviors resolve when pain is effectively treated. The POMI was administered to subjects with known addiction problems and pain patients and compared with *DSM-IV* diagnoses obtained through a structured interview. Other potential correlates of misuse were also assessed including alcohol and illicit drug abuse/dependence and psychiatric histories.

## 2. Materials and methods

### 2.1. Subjects

Of the 137 subjects recruited from community substance abuse treatment programs, regional jails, pain clinics, and private internal medicine practices in southwestern Virginia for a study investigating correlates of OxyContin addiction (see Wunsch, 2007), 74 had been prescribed OxyContin for pain and served as subjects in this study. A total of 40 subjects were known opioid abusers (from addiction treatment programs and those incarcerated), and 34 were pain patients. All subjects signed consent forms approved by the Western Institutional Review board (WIRB), and study procedures were consistent with WIRB standards.

### 2.3. Procedures

Substance abuse and dependence diagnoses were determined via the *DSM-IV* checklist (modified from Hudziak et al., 1993). This structured interview queried for use of alcohol, amphetamine, cannabis, cocaine, hallucinogens, inhalants, nicotine, opiates, phencyclidine, and sedatives/benzodiazepines in the previous year. A modified version of the Addiction Severity Index 5th

Edition (ASI; McLellan et al., 1985) was also administered to evaluate medical, employment, alcohol, drugs, legal, family/social, and psychiatric problems. Finally, to assess behaviors commonly associated with the misuse of prescription medications, an eight-item inventory was developed by the investigators (POMI). The POMI included questions regarding dose, frequency of use, the need for early refills, a doctor expressing concern of misuse, feeling high from the medication, taking medication due to stress, obtaining prescriptions from multiple physicians, and pain control (see Appendix A for a copy of the POMI). Interviews were conducted by experienced researchers who hold advanced degrees and are experienced in clinical research. Subjects recruited from community treatment programs and pain clinics were compensated for participation ($50 gift certificate), but due to state regulations, the incarcerated subjects did not receive compensation.

## 2.3. Statistical analyses

To test for reliability, Cronbach's alpha (.848) was calculated using all eight questions of the POMI (1 = yes, 2 = no for each item except Item 4, which was reverse scored). Two subjects left one response blank. This was handled by substituting the mean of each one's seven remaining responses for the missing response (mean replacement method). Cronbach's alpha was virtually the same when the two subjects having one missing response were eliminated from the data. A principal component analysis was run to test how each item related with the entire test, Items 1 to 3 and 6 to 8 had correlation coefficients with the total test ranging from .663 to .769. The correlation of Item 4 with the total test was .048, and that of Item 5 was 0.359. Cronbach's alpha for the

Table 1
Sensitivity and specificity of the POMI (n = 74)

| POMI cutoff [a] | Sensitivity [b] | Specificity [c] | 1−specificity [d] | Sensitivity + specificity [e] |
|---|---|---|---|---|
| 0 | 1.000 | 0 | 1.000 | 1.000 |
| 1 | 0.852 | 0.692 | 0.308 | 1.544 |
| 2 | 0.820 | 0.923 | 0.077 | 1.743 |
| 3 | 0.754 | 0.923 | 0.077 | 1.677 |
| 4 | 0.623 | 1.000 | 0.000 | 1.623 |
| 5 | 0.541 | 1.000 | 0.000 | 1.541 |
| 6 | 0.361 | 1.000 | 0.000 | 1.361 |

[a] The cutoff POMI indicates that a test at or above that level would be a positive test (believed to have misused). A test reading below that level would indicate no prescription misuse.
[b] Sensitivity is the percentage of positive tests (using a cutoff value) when the DSM-IV classified as abuse/dependence.
[c] Specificity is the percentage of negative tests (using a cutoff value) when the DSM-IV classified as no abuse/dependence.
[d] 1−specificity is the percentage of false-positive tests using a cutoff value (e.g., percentage of no abuse/dependence on DSM-IV classified as misusers on the POMI).
[e] Sensitivity + specificity was calculated to identify the optimal POMI cutoff with the highest combined sensitivity and specificity.

Table 2
POMI misuse risk scores by DSM-IV opiate diagnoses for subjects known to have an addiction problem compared to pain patients prescribed OxyContin

| Misuse risk score | Addiction (n = 40) | | Pain (n = 34) | |
|---|---|---|---|---|
| | Opiate diagnosis | No opiate diagnosis | Opiate diagnosis | No opiate diagnosis |
| 0 | 0 | 0 | 9 | 9 |
| 1 | 0 | 0 | 2 | 3 |
| 2 | 2 | 0 | 2 | 0 |
| 3 | 4 | 0 | 4 | 1 |
| 4 | 4 | 0 | 1 | 0 |
| 5 | 9 | 0 | 2 | 0 |
| 6 | 21 | 0 | 1 | 0 |

test with each of the items removed was highest (.883) with Item 4 removed and second highest (.857) with Item 5 removed. Removing each of the other items lowered Cronbach's alpha. As a result, Items 4 and 5 of the POMI were eliminated from the total score. Receiver operating characteristic curve (ROC) analysis was used to compare POMI risk scores and DSM-IV-derived opiate diagnoses to determine the optimum POMI cutoff score. Sensitivity and specificity were calculated for each possible score (range = 0-6). On the basis of the analyses, those scoring 2 or more were assigned to the misuse group (sensitivity = 0.820, specificity = 0.923, total = 1.743). Differences between the two study groups (abuse and pain) and the use and misuse groups were evaluated using the chi-square tests for categorical data and t tests for continuous variables.

## 3. Results

There were no group differences regarding gender, ethnicity, or education when abuse and pain groups were compared. Most of the subjects in both groups were Caucasian (abuse 92%, pain 97%) with a high school education (abuse $M = 12.6$ years, pain $M = 13$ years). Although there were more females in the pain group (56%) than in the abuse group (35%), statistical significance was not found. Significant group differences were found for age and marital status. Those in the abuse group were significantly younger ($M = 33.8$ years) than those in the pain group ($M = 43.9$ years, $p < .0001$) and were also less likely to be married (abuse 30%, pain 53%, $p < .01$).

ROC analysis, comparing POMI risk score and DSM-IV opiate diagnosis, yielded an area under the curve of 0.887 ($p < .0001$). On the basis of sensitivity and specificity, it was determined that the optimal POMI cutoff score indicating risk for misuse was 2 (sensitivity = 0.820 and specificity = 0.923; see Table 1).

POMI scores for the abuse and pain groups with and without an opioid diagnosis are presented in Table 2. Using the POMI cutoff score of two, 100% of the subjects in the abuse group were correctly classified as misusers, and 32% in the pain group were classified as misusers. One pain
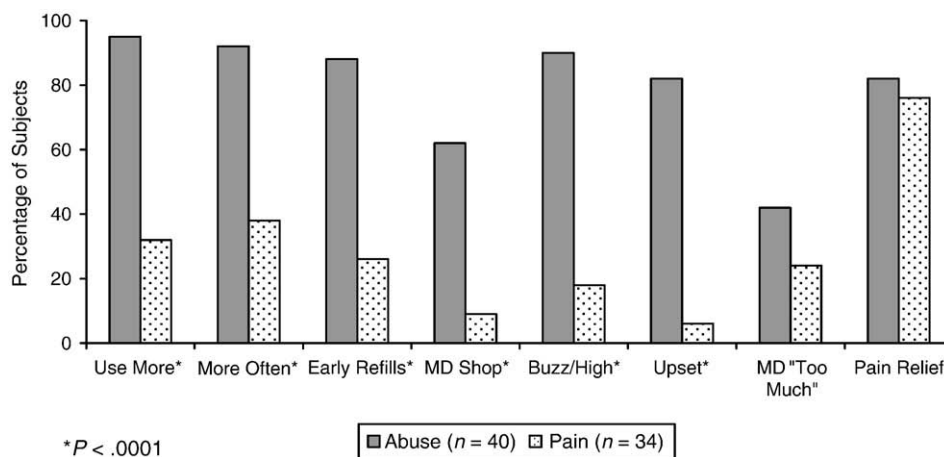
Fig. 1. Percentage of abuse and pain subjects endorsing each item of the POMI.

patient who did not have a diagnosis for opiate abuse or dependence received a POMI score of 3. The percentage of subjects endorsing each item on the POMI is presented for abuse and pain groups in Fig. 1. Significant group differences were observed for all POMI items with the exception of adequate pain relief and a doctor expressing concern regarding prescription use. Although most of the subjects in both groups reported adequate pain relief from prescribed OxyContin (abuse 82%, pain 76%), most of the abuse subjects endorsed six of the seven risk behaviors assessed by the POMI, and approximately 25% to 35% of the pain patients responded affirmatively to four of the seven items.

Abuse/Dependence diagnoses comparing subjects classified as users and misusers (based on a POMI score of 2 or more) are presented in Fig. 2. Significantly more misusers received a diagnosis for alcohol ($p < .01$), cannabis ($p < .05$), cocaine ($p < .05$), and sedative/benzodiazepine ($p < .05$) abuse or dependence as compared with users. Similarly, misusers reported significantly greater lifetime use of alcohol ($p < .002$), cannabis ($p < .01$), and cocaine ($p < .01$) than

users (see Fig. 3). Subjects in both groups had substantial previous experience with opioids prior to prescription of OxyContin; however, misusers had used significantly more opioids ($M = 4.9$) than users ($M = 3.9$, $p < .03$), and at least twice as many misusers had previously used heroin, oxycodone, meperidine, codeine, morphine, hydrocodone, pentazocine, propoxyphene, and hydromorphone as compared with users.

Significant group differences were not observed between users and misusers regarding reports of psychiatric problems on the ASI. Rates for depression and anxiety exceeded 68% for both groups, and although not significantly different, reports of suicide ideation (use 30%, misuse 49%) and suicide attempts (use 22%, misuse 29%) were higher for the misuse group as compared with the use group. Reported use of medications for psychiatric problems was 70% and 63% by the use and misuse groups, respectively, and mean number of psychiatric problem days in the previous month was 5.9 and 10.5 for the use and misuse group, respectively. Significant group differences were found for family history of drug use (use 45%, misuse 72%, $p < .04$) but not for
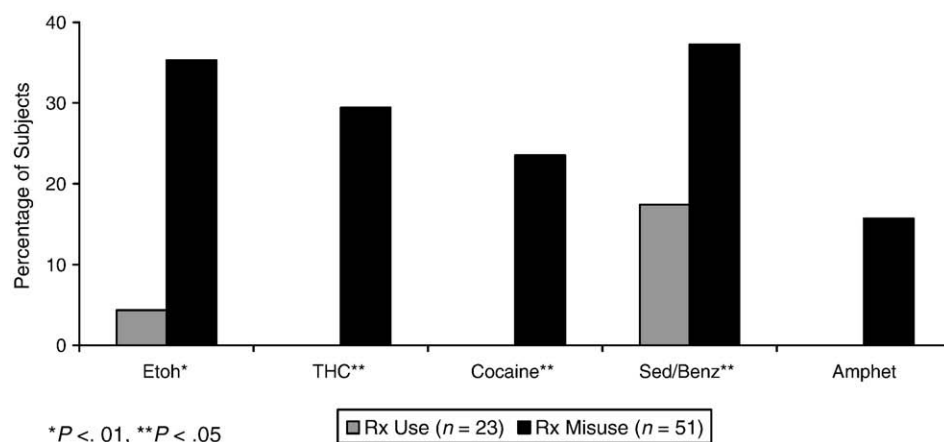


Fig. 2. Percentage of users and misusers meeting *DSM-IV* criteria for current abuse/dependence of alcohol, cannabis, cocaine, sedatives/benzodiazepines, and amphetamines.
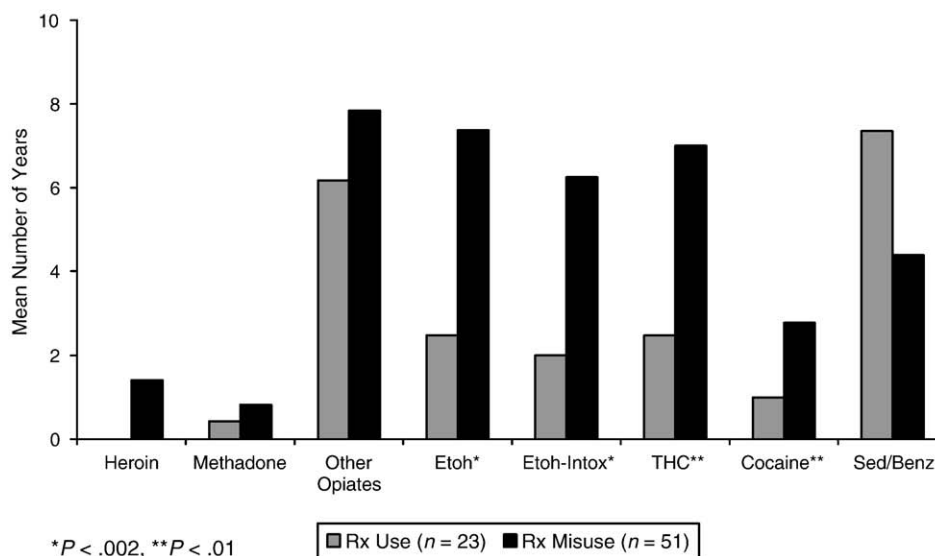
Fig. 3. Mean number of years of lifetime heroin, methadone, other opiates, alcohol, alcohol to intoxication, cannabis, cocaine, and sedative/benzodiazepine use (ASI) for users and misusers.

alcohol use (use 70%, misuse 88%) or psychiatric disorders (use 55%, misuse 61%).

## 4. Discussion

Results from the POMI clearly demonstrate that patients may be classified as those using their prescription appropriately and those who are at risk for misuse using a series of clinically relevant questions. Although eight questions were part of the original instrument, principal component analysis demonstrated the utility of a six-item instrument. An affirmative answer to more than one question correctly classified an individual as an opioid misuser with high sensitivity (0.82) and specificity (0.92) when compared with *DSM-IV* opioid abuse or dependence criteria. This is important because chronic pain patients may meet two of the necessary three diagnostic criteria for dependence due to signs of physical dependence (tolerance and withdrawal) even when using the medication appropriately as prescribed by their physician. In this study, 21 of 34 chronic pain patients (61.7%) met *DSM-IV* criteria for opioid abuse or dependence; however, 11 of 21 (52.3%) who met criteria were not classified as at risk for misuse based on the POMI score. In addition, 100% of those subjects who were known to have addiction problems were correctly classified as at risk for misuse. Thus, the POMI is believed to be a sensitive and specific way of identifying patients who misuse opioid medications.

Subject characteristics of opioid misusers identified in this study are consistent with previous findings suggesting that age and past alcohol and cocaine abuse may be predictors of opioid misuse. From a sample of 196 chronic pain patients, Ives et al. (2006) identified 32% of the group as misusers and reported that misusers were significantly

younger and more than twice as likely to have past alcohol abuse and more than four times more likely to have past cocaine abuse as compared with pain patients not classified as misusers. Other investigators evaluating correlates of opioid misuse have reported similar age differences and drug use histories as well as lack of group differences regarding psychiatric problems (Manchikanti et al., 2003; Potter, Hennessy, Borrow, Greenfield, & Weiss, 2004; Reid et al., 2002). The present data suggest significant rates of depression and anxiety in both abuse and pain groups.

Other clinical groups have developed screening instruments, and each group has made significant contribution to the literature and identification of the patient at risk for misuse and abuse of prescription opioids (Butler et al., 2004; Compton et al., 1998; Manchikanti et al., 2003). Important shared concepts identified by screening instruments and the POMI include identification of a previous history of substance abuse and patterns of use of medications. However, the strengths of the POMI are the brevity of six clearly defined questions, the ease of administration by nonphysician in a busy pain practice, and the clear criteria that were used in identifying those subjects who meet criteria for dependence using the ASI and *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* subjects. In contrast, the diagnosis of substance abuse was made elsewhere for those 100 subjects who were the comparison group for Manchikanti et al. in the validation of the 8 of 12 previously identified criteria and narrowing to three predictive categories. In addition, some criteria used in this study, such as "bizarre symptoms" or "multiple" or "repeated" behaviors, are not clearly defined by the authors. The 42-item instrument developed by Compton et al., designed to be administered by trained mental health practitioners, provides a good foundation but is lengthy. Butler et al. (2004) built upon an exciting use of concept

mapping with the Screener and SOAPP, but it is lengthy at 14 questions. In addition, the study did not include urine drug screens on all patients and includes concerns about "drug abuse behavior" by nonphysician staff with vague definitions of such behavior.

Finally, in contrast to the ORT screening tool, the POMI queries directly for the aberrant behaviors monitored by Webster and Webster (2005) and also includes the question "Has your pain ever been adequately treated," which addresses the effects of pseudo-addiction as defined by the 2001 Consensus Statement by the AAPM, the APS, and the ASAM (AAPM, APS, & ASAM, 2001). By asking specifically about the adequacy of treatment for pain, the POMI identifies patient behaviors driven by unrelieved pain rather than addiction. Unrelenting pain can lead to behavior misinterpreted as drug seeking, a phenomenon which resolves with effectively treated pain. This is a strength of the POMI, in contrast to other brief screening instruments.

Research focused on identification of patients at risk for prescription abuse must be concise with clearly defined diagnostic criteria for the physician and scientific rigor employed by researchers addressing this issue. We should tread carefully and acknowledge the importance of balancing identification of the patient at risk for misuse, abuse, and dependence upon opioid medications with access to much needed pharmaceuticals for the treatment of chronic pain.

Limitations of this study include the small and homogeneous sample of pain patients (all subjects had received a prescription for OxyContin). Although a comprehensive evaluation of medical acuity and history of pain-related disorders was beyond the scope of this study, subjects who endorsed prescription misuse behaviors reported adequate pain relief from their current treatment regimen. Although it is clear that most subjects had extensive experience with other prescription narcotics, it is uncertain how other medical diagnoses may be associated with an increased risk of opioid misuse as has been demonstrated in other studies (Miller & Greenfeld, 2004).

Finally, the investigators of this study selected a structured interview for diagnostic purposes to eliminate the potential confounding of differential diagnostic expertise of clinicians from the various recruitment sites. Although this advantage was thought to be important, it should be noted that the diagnostic instrument used does not differentiate physical dependence due to chronic use of opioids and misuse of opioid medication.

Given the study parameters discussed above, generalizability of the findings is limited; however, the present preliminary findings suggest that the POMI may be used to identify patients at risk for misuse of prescription opioids. Additional studies of different and more diverse pain populations are needed to confirm that this brief instrument is efficacious in discriminating persons who appropriately use pain medications from those at risk for abuse.

## Appendix A. Prescription Opioid Misuse Index

1. Do you ever use MORE of your medication, that is, take a higher dosage, than is prescribed for you?    Yes  No
2. Do you ever use your medication MORE OFTEN, that is, shorten the time between dosages, than is prescribed for you?    Yes  No
3. Do you ever need early refills for your pain medication?    Yes  No
∗4. Have you ever gotten enough pain medication to bring your pain to a tolerable level (as prescribed)?    Yes  No
∗5. Has a doctor ever told you that you were using too much pain medication?    Yes  No
6. Do you ever feel high or get a buzz after using your pain medication?    Yes  No
7. Do you ever take your pain medication because you are upset, using the medication to relieve or cope with problems other than pain?    Yes  No
8. Have you ever gone to multiple physicians including emergency room doctors, seeking more of your pain medication?    Yes  No

*Note.* Questions noted by "∗" were subsequently eliminated as a result of the principal component analysis.

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