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Patient versus provider reports of aberrant medication-taking behavior among opioid-treated chronic pain patients who report misusing opioid medication

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Abstract

During long-term opioid therapy for chronic, non-cancer pain, monitoring medication adherence of patients with a history of *aberrant opioid medication-taking behaviors* (AMTB) is an essential practice. There is limited research, however, into the concordance among existing monitoring tools of self-report, physician report and bio-fluid screening. The current study examined associations among patient and provider assessments of AMTB and urine drug screening using data from a randomized trial of a cognitive-behavioral intervention designed to improve medication adherence and pain-related outcomes among 110 opioid-treated, chronic pain patients who screened positive for AMTB and were enrolled in a pain program. Providers completed the Aberrant Behavior Checklist (ABC) and patients completed the Current Opioid Misuse Measure (COMM) and the Chemical Coping Inventory (CCI). In multivariate analyses, ABC scores were compared to

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Contributors

Drs. Marsch and Rosenblum in consultation with Drs. Turk and Portenoy designed the parent RCT study; and Drs. Nikulina, Guarino, and Rosenblum designed the analytic plan for this aberrant behavior study. Dr. Moore and later Dr. Guarino served as project directors during the study period. Mrs. Sykes collected the patient and physician data. Dr. Nikulina conducted the data analysis for this aberrant behavior study. Dr. Nikulina wrote the first draft, Drs. Guarino, Rosenblum and Acosta provided ongoing revisions, and all authors contributed to the interpretation of the data and contributed to the manuscript.

Conflicts of interest statement

Dennis C. Turk has consulted for the following companies in the past 3 years: Pfizer, Nektar, Develco, Ironwood, Novartis, Mallinckrodt, Orexo, and Xydnia. There are no other potential conflicts of interest.

COMM and CCI scores, while controlling for demographics and established risk factors for AMTB, such as pain severity. Based on clinical cutoffs, 84% of patients reported *clinically significant* levels of AMTB and providers rated 36% of patients at elevated levels. Provider reports of AMTB were not correlated with COMM or CCI scores. However, the ABC ratings of experienced providers (nurse practitioners/attending physicians) were higher than those of less experienced providers (fellows) and were correlated with CCI scores and risk factors for AMTB. Associations between patient- and provider-reported AMTB and urine drug screening results were low and largely non-significant. In conclusion, concordance between patient and provider reports of AMTB among chronic pain patients prescribed opioid medication varied by provider level of training.

Keywords

chronic non-cancer pain; opioids; aberrant medication-taking behavior; patient provider concordance; bio-fluid screening

Opioids are frequently used to manage chronic pain unrelated to advanced disease (generically termed chronic non-cancer pain). However, this practice is controversial due to limited evidence of long-term efficacy and the potential for adverse events [36][2]. Recent guidelines emphasize the importance of an initial assessment and ongoing monitoring of drug-related behaviors [6,30] that may be generically labeled *aberrant opioid medication-taking behaviors* (AMTB). AMTB may reflect one or more specific classifications, such as addiction, pseudo-addiction, self-medication of comorbid psychological problems, or diversion of medication for profit [23,24,43,45]. These conditions, once identified, may justify discontinuation of treatment or specific changes in prescribing intended to improve adherence.

The population of chronic pain patients treated with long-term opioid therapy and the various measures that have been used to assess AMTB are heterogeneous and reported rates of occurrence of AMTB vary from 20% to 75% [9,30]. The relatively high rate of AMTB justifies some type of universal and individualized monitoring strategies that commensurate with the risk of AMTB [17]. Identified risk factors include past history of substance use disorder [5,11,25], current psychiatric symptomatology [5,11,25,26,28,33,37], younger age [5,37], poor coping, high pain severity, and high levels of pain interference with life functions [12,13].

AMTB is very diverse and some behaviors may be difficult to detect, interpret and address [13,20,21,29]. Clinical monitoring of AMTB depends on both patient self-report and the observations of health care providers, often supplemented by bio-fluid drug screening [14,15]. None of these approaches to adherence monitoring is fully reliable. Patient self-report of opioid medication misuse is widely considered to be an important indicator of AMTB, because typically patients are not motivated to fabricate aberrant use when it does not exist [13]. However, patients may deny AMTB for fear of treatment termination or reduction in opioid medication [2,15,37]. Provider observations may identify only relatively severe AMTB. Drug screening is unable to detect some types of behaviors (e.g., taking

medication to treat non-pain symptoms), has a brief window of detection for many drugs [14,15] and may be prohibitively costly.

To address the difficulty of AMTB detection in a segment of the chronic pain population [11,13,32,42] the use of multiple concurrent measures may be preferred [3,13]. There is, however, yet limited information about how various types of observations—self-report, provider report, and bio-fluid screening—relate to one another [21,29,35] and studies that provide this information, particularly in a high-risk subpopulation with chronic pain, would be valuable. A randomized trial of an intervention to improve adherence and pain outcomes among opioid-treated chronic pain patients with documented prior AMTB provided data for a secondary analysis of these associations. The primary aims of this analysis were to 1) examine differences in the rates of detection of AMTB among patient self-report, provider report and urine drug screening in a group of chronic pain patients who screened positive for AMTB and 2) determine the relationships between risk factors (demographic, psychiatric and substance use characteristics, pain severity and the interference of pain with life functions) and patient and provider reports of AMTB.

Methods

Procedures and Participants

Data for this study were drawn from the baseline assessment in a randomized controlled trial of a web-based self-management intervention for opioid-treated chronic pain patients who demonstrated AMTB (NCT01498510). All of the procedures were approved by pertinent Institutional Review Boards.

Participants (≥ 18 years) were recruited from a large tertiary pain clinic in New York City by posting fliers in the clinic, approaching patients in the clinic's waiting room, and requesting referrals from pain clinicians. Eligible patients were receiving opioid therapy at the clinic and had experienced moderate-severe pain for at least three months, as assessed by a "worst" pain in the past week score of ≥ 5 on the 11-point Brief Pain Inventory (BPI; [7]). Patients were excluded if they had primary headache or cancer pain; were scheduled to have major surgery during the next six months; were planning to move out of the area within the next three months; had insufficient ability to understand and provide informed consent; or lacked sufficient ability to use English to participate in the consent process, the web-based intervention, or the assessments.

Potential participants meeting the above criteria were screened over the telephone using the Current Opioid Misuse Measure (COMM) ([4]; described below) and invited for the baseline assessment if they endorsed at least four AMTB in the past six months. Participants provided written informed consent and were compensated \$50 for the baseline assessment and \$40 for the follow-up assessment.

Measures

Sociodemographics—Participants' provided information about demographics, living arrangements, employment, and sources of income.

Current Opioid Misuse Measure (COMM; [4]) is a 17-item patient self-report measure of aberrant opioid-taking behavior in the past 30 days. The instrument has been shown to have good internal consistency, sensitivity, and specificity in identifying those with a DSM-IV-TR prescription drug use disorder [28] and in classifying patients engaging in misuse [3,4].

The Aberrant Behavior Checklist (ABC; [44]) is completed by providers and includes 20 items related to observations of a patient's aberrant opioid-related behavior in the past three months. As the ABC was not designed to assess behaviors less suggestive of addiction, the study also included a checklist of such behaviors ($N = 7$), adapted from Fine and Portenoy (2007), as part of a modified ABC measure (mABC). Examples of these yes/no items include aggressive complaining, requesting specific drugs, and unsanctioned drug escalation once or twice. Although the mABC has not been previously validated, its consistency (Chronbach's alpha) in the current sample was .84. The mABC was completed by providers on average 33 days ($SD=24.95$) after patients completed the COMM. mABC scores were log transformed to correct for high positive skew ($z_{skew} = 6.31$) in subsequent analyses.

The Chemical Coping Inventory (CCI; [23]) asks opioid-treated pain patients to indicate the extent to which they agree with 15 statements describing non-prescribed use of medications to cope with emotional stress. Internal consistency was high in the current sample ($alpha = .86$).

The Symptom Checklist -10 (SCL-10) assessed psychological distress in the past 30 days [10].

The Multidimensional Pain Inventory (MPI) [22] is a widely used, validated, self-report instrument that evaluates the impact of diverse chronic pain syndromes [16,40]. The Pain Severity subscale (3 items) assesses pain severity and suffering within the past week. The Pain Interference subscale (9 items) assesses the interference of pain with daily and social activities, work, and family relationships.

The Pain Catastrophizing Scale (PCS) assesses three domains of catastrophizing (i.e., exaggerated negative orientation to pain) – helplessness, rumination, and magnification [39].

The Neuropsychiatric Interview (MINI) [38] was used to assess presence or absence of DSM-IV-TR [1] lifetime substance use (abuse or dependence) disorder.

Urine Drug Screening—A research interviewer collected urine samples from participants at baseline. This sampling occurred an average of 14 days ($SD = 20.00$) after patients completed the COMM and 19 ($SD = 17.93$) days before the mABC was completed by providers. The screening employed for the study was a point-of-collection rapid testing approach that assessed the presence of: cocaine, opiates, tetrahydrocannabinol (THC), amphetamines, methamphetamine, benzodiazepines, propoxyphene, oxycodone, methadone, and barbiturates (iCup 10-panel test cup, Alere Toxicology Services, Portsmouth, VA). The validity of each sample was confirmed by checking specimen temperature and pH, and oxidant and creatinine levels.. The urine drug screening results were not made available to providers, although providers could conduct their own screening as needed. (This was generally done if signs of potential misuse were observed.)

Statistical Analyses

The primary analyses evaluated the differences in detection of AMTB using patient-reported data (COMM score and CCI score), provider-reported data (ABC and mABC), and urine drug screening results. Secondary analyses evaluated the associations between each of these variables and covariates. Bivariate associations between scores on the COMM, mABC, and CCI, and sociodemographic characteristics and risk factors were assessed with Pearson correlations, t-tests, and one-way analyses of variance with post-hoc t-tests. Providers were grouped based on their level of training and experience (attending physicians/nurse practitioners versus physician fellows) to assess whether the associations between ABC and COMM/CCI scores differed significantly by provider level of experience. Interaction terms were created by multiplying zero-centered level of experience, respectively, by zero-centered COMM and by CCI scores [8]. In two separate models (one for the CCI interaction and one for the COMM interaction), mABC scores were regressed onto the main effects of level of training, CCI and COMM scores, and the interaction terms. Finally, mABC, COMM, and CCI scores were regressed onto bivariate predictors with p -values $< .10$ in multivariate ordinary least squares stepwise backwards regressions to assess which variables were most important in predicting provider and patient report of ATMB. As a precaution to help insure that nesting of patients within providers was not impacting the mABC findings, regression analyses were rerun in multilevel models predicting mABC scores. Data were analyzed using SPSS, v22.

Results

Sample characteristics

Table 1 presents the sociodemographic characteristics of the sample ($N=110$). On average, patients rated the severity of their “worst pain during the past week” as 4.67 ($SD = .98$; *range*: 2–6), their pain interference as 4.74 ($SD = 1.01$; *range*: 2.2–6), pain catastrophizing as 27.25 ($SD = 12.19$ *range*: 1–51), and psychological distress as 1.14 ($SD = .70$; *range*: 0–3).

Patients’ average score on the COMM was 15.7 ($SD = 7.6$; *range*: 4–39), which is above the established cutoff of nine [4] and indicates a clinically significant level of AMTB. Eighty-four percent of the patients had COMM scores at or above the clinical cutoff. The average score for the CCI was 1.87 ($SD = .48$; *range*: 1–3) in the current sample. No clinical cutoffs have been previously established for the CCI. Patients were rated by providers as displaying an average of 2.33 ($SD = 2.76$; *range*: 0–12) AMTB on the 20-item ABC and 3.12 ($SD = 3.61$; *range*: 0–16) AMTB on the 27-item mABC. According to established clinical cutoffs [44], a rating of three or above on the ABC is indicative of inappropriate opioid use. A significant minority (36% and 44% of the patients on the ABC and the mABC, respectively) were rated at or above the clinical cutoff.

Associations between patient and provider reports of AMTB

The physician-reported mABC (and the shorter ABC) was not significantly correlated with the patient-reported COMM ($r = -.02$, $p = .85$) or CCI ($r = -.07$; $p = .50$). Although most of the associations between nearly identical items on the patient-rated COMM and provider-rated ABC were in the positive direction, none of these correlations was statistically

significant (Table 2). The CCI was significantly correlated with the COMM ($r = .37$; $p < .001$).

Provider experience

Providers ($N = 19$) at the pain practice included physician fellows ($N = 12$; 63%) and both attending physicians ($N = 5$; 26%) and nurse practitioners ($N = 2$; 11%) who were employed full-time by the hospital. All providers were specialists in, or in the case of fellows, being trained in Pain Medicine. Fellows had much less experience in the treatment of pain than either attendings or nurse practitioners. This limited experience was related both to years in practice and to the use of rotating schedules, which limited their relationships with an individual patient to six months. There were no significant differences in patient-reported AMTB (COMM or CCI scores) for patients treated by fellows versus attendings or nurse practitioners. However, more experienced providers rated their patients higher on the mABC than did less experienced providers (3.64 vs. 2.72; $p = .02$). In addition, the mABC scores of more experienced providers had significantly higher concordance with the patient-reported COMM ($r = .22$; $p = .15$) than did the mABC scores of less experienced providers ($r = -.22$; $p = .09$; $\beta = .55$; $p = .03$). A similar pattern was found with the mABC and CCI: higher concordance for more experienced providers ($r = .29$, $p = .049$) and lower concordance for less experienced providers ($r = -.32$; $p = .01$; $\beta = 1.19$; $p < .01$). Similar results were obtained with the original 20-item ABC. Among the five nearly identical COMM and ABC items, three items were significantly correlated for more experienced providers (Table 2), whereas no significant associations were found for less experienced providers.

The relationships between the COMM and the mABC, and the CCI and mABC, did not change as providers followed their patients over time. Fifty three percent of participants ($N = 58$) were followed by the same provider ($N = 14$ providers, 8 fellows and 6 senior practitioners followed patients) from baseline to six months. At six months post-baseline, the mABC scores of both groups of providers were not significantly correlated with either the COMM (experienced providers: $r = -.07$, $p = .71$; less experienced providers: $r = .06$, $p = .80$) or the CCI (experienced providers: $r = .19$, $p = .29$; less experienced providers: $r = .00$, $p = .99$).

Urine drug screening and reports of AMTB

Twenty one percent of patients had a positive drug screen. As shown in Table 3, COMM scores were significantly positively correlated with a positive screen for barbiturates. Among experienced practitioners but not fellows, the ABC and the mABC were significantly positively correlated with positive screens for barbiturates and cocaine. None of the urine drug screening results was significantly correlated with the CCI.

Association between AMTB and sociodemographics, pain characteristics, substance use diagnosis and psychiatric symptomatology

The relationships between the sociodemographic characteristics of age, race, ethnicity, sex, marital status, level of education, employment status and receipt of public assistance, and AMTB as measured by the COMM and the mABC are presented in Table 1.

Lifetime DSM-IV-TR substance use disorder diagnosis was positively correlated with COMM and CCI scores but not with mABC scores (or the scores on the shorter ABC measure) (Table 3). The mABC, as rated by more experienced practitioners, was significantly positively correlated with pain severity, pain interference, pain catastrophizing, and symptoms of psychological distress. The mABC, as rated by less experienced providers, was significantly negatively correlated with pain catastrophizing and psychological distress. Findings were the same for the shorter ABC measure. Both the COMM and the CCI were positively correlated with pain catastrophizing and psychological distress. The COMM also was correlated with pain interference.

Separate stepwise (backwards) regression analyses (Table 4) revealed that higher levels of pain catastrophizing and psychological distress significantly predicted higher COMM and CCI scores. In addition, identifying as an ethnic minority and being male also significantly predicted higher CCI scores. Higher levels of pain severity and psychological distress and patient identification as an ethnic minority significantly predicted mABC scores for more experienced clinicians, whereas only patients being unmarried predicted mABC scores for less experienced clinicians. When mABC regressions were rerun in multilevel models (data not shown), the findings were replicated, with the exception that marital status became a non-significant predictor of mABC among less experienced providers.

Supplementary analysis was also conducted to assess whether four items tapping negative affect and cognition on the COMM accounted for the associations with the CCI, mABC and ABC, psychological distress, pain severity, pain interference, pain catastrophizing and substance use disorder. All correlations that were significant with the full COMM remained significant when the four COMM items were removed, the strength of the correlations essentially remained unchanged, and no new correlations with any additional affect items emerged (data not shown). The four COMM items that were removed were: 1) trouble with thinking clearly or had memory problems; 2) seriously thought about hurting yourself; 3) had trouble controlling your anger, and 4) gotten angry with people.

Discussion

This study evaluated the rates of detection of AMTB across patient self-report, provider report, and urine drug screening in a group of opioid-treated chronic pain patients who screened positive for AMTB, and determined the associations between these measures and various potential risk factors. Based on criteria proposed by Wu et al. (2006) [44] healthcare providers identified AMTB in 36% of these patients, much lower than was identified by self-report (84%) (based on criteria proposed by Butler et al., 2007 [4]). Detection of AMTB with urine drug screening was 21%. In short, the findings indicate low correlations among patient self-report, provider report, and urine drug screening in a sample of opioid-treated chronic pain patients with documented AMTB.

Associations between patient and provider ratings of AMTB differed by provider level of training. The report of experienced providers (attending physicians and nurse practitioners) showed good concordance with patient report of AMTB, as assessed by a measure of chemical coping, but not as assessed with another, more well-established measure of AMTB,

the COMM. Also, the report of both experienced providers and patients aligned with several established risk factors for AMTB [5,11,25,26,28,33,37], including high pain severity, psychological distress, pain catastrophizing, and being male. Conversely and surprisingly, the number of AMTB observed by less experienced providers (fellows) was negatively associated with patient self-report of chemical coping, as well as pain catastrophizing and psychological distress.

Taken together, these findings partially support previous research [11,42] and suggest that the clinical detection of AMTB, by less experienced providers, may be difficult in a segment of the chronic pain population characterized by acknowledged AMTB in the past. The data suggest that physician trainees who have relatively brief relationships with patients because of rotating schedules may be particularly likely to under-detect AMTB and miss opportunities to improve adherence or discontinue therapy. The need for a longer relationship is uncertain, however, given the finding that longer follow-up of the same patients was not found to improve patient and provider concordance. In this segment of the opioid-treated chronic pain population, these data suggest that clinical experience matters, significantly increasing the ability to effectively monitor for AMTB. The poor concordance between patient and provider report of AMTBs in general, however, is disconcerting, as the use of opioids for managing chronic non-cancer pain is widely practiced [2], and providers are responsible for monitoring aberrant behaviors among their patients and for adjusting medical treatment based on their observation and clinical judgment [11,31].

Additionally, correlations of patient and provider report of AMTB with urine drug screening results were low and largely non-significant. (Although study drug screening results were not shared with clinicians, patients were sometimes asked to provide urine samples by their clinician, especially if AMTB was observed.) While patient report of AMTB was associated with a positive barbiturate drug screen and experienced provider report was associated with positive screens for barbiturates and cocaine in bivariate analyses, positive screens for illicit or non-prescribed drugs were not associated with patient or provider report in multivariate analyses.

This limited concordance in the rates of detection of AMTB raises important questions about the strategies employed in practice. The limitations of patient self-report and provider report are widely appreciated by clinicians, and bio-fluid drug screening has been widely used, and often recommended [34], as an important adjunctive means of monitoring misuse. The current data underscore its limitations, however. Drug monitoring cannot detect common aberrant behaviors, such as unsanctioned dose escalations, taking opioid medications to alleviate psychological distress, or augmenting a prescribed opioid regimen with illicitly obtained opioids of the same type. Even in the sample of patients with documented AMTB studied, relatively few had a positive screen for illicit drug use.

The current findings lend support to the view that an approach that uses multiple sources of information may be best suited for adherence monitoring, at least for a high-risk patient population. Triangulation of patient, provider and toxicology monitoring, may provide the most comprehensive assessment of AMTB [3,19], and, as this study suggests, relying on a single source may be problematic. The data also support the need for clinician education

pertaining to the importance of monitoring and the types of strategies that may be used to detect AMTB [41]. These data also point to the potential importance of a patient-centered care model that encourages providers to examine the patient's experience of illness and risk factors for medication misuse [27]. Patients' AMTB are frequently associated with the identified risk factors of pain interference, pain catastrophizing and psychological distress [5,11,25], and more experienced providers in the present sample may have attended to these factors in their assessment of aberrant behaviors. In contrast, results suggest that physician trainees do not assess drug-related behavior in the same way, potentially because they were unaware of the presence of these risk factors in their patients (possibly because patients may not explicitly disclose them) or because they were not guided by this knowledge when assessing their patients' AMTB.

Limitations

These data originate from patients undergoing treatment at a tertiary pain management program who volunteered for a randomized trial. These patients are likely to have more complex and clinically challenging pain syndromes than chronic pain patients seen in primary care and other, less specialized healthcare settings. Patients were also selected for the study on the basis of self-reported AMTB, which was an inclusion criterion. Therefore, while the findings derived from this sample may be suggestive of broader concerns, without further research, they cannot be generalized to the larger population of opioid-treated patients with chronic pain. In addition, absence of a significant association between provider and patient reports at six month follow-up should be treated with particular caution because of a lower sample size (i.e., fewer than half of the patients were still seen by their index provider). Similarly, because there were only a small number of patients with positive illicit drug screens – and total sample size was relatively low – it may have been difficult to detect a significant relationship between drug screening results and patient and provider reports of aberrant behavior.

Self-report measures were used to assess substance use disorder diagnosis, chemical coping, pain characteristics, and psychological distress. Correlations with a self-report measure of AMTB are likely to be higher with these assessments because the same method of data collection was used. Nonetheless, the comparison of self-report measures with pain treatment providers' perceptions and urine drug screening results was the goal of the current study. Future studies could build on the current work by utilizing multiple methods to assess misuse (behavioral observation, other report, diary methods, examination of physician's notes, etc.) to rule-out measurement bias. Additionally, the CCI is a relatively new measure of AMTB and its reliability and validity have not been thoroughly established in the literature. The fact that the COMM was administered over the phone for eligibility screening could be considered a limitation as the COMM has not specifically been validated for telephone administration.

Finally, past research has documented the importance of considering gender in assessing psychological factors and AMTB [18] In the current study, males were more likely to engage in chemical coping than females, however a thorough assessment of gender as

moderating the association between psychological risk and AMTB was not feasible. Future research should further examine gender differences.

Conclusion

In the current study of opioid-treated chronic pain patients with documented AMTB, a high prevalence of AMTB was reported by patients (84%) and a moderate prevalence by physicians (36%); however, there was low concordance in the detection of AMTB across patient self-report, provider report, and urine drug screening. The reports of experienced providers, unlike those of physician trainees, aligned with patient reports of chemical coping and with some established risk factors, such as pain catastrophizing and psychological distress. Less experienced providers, in particular, may not be reliably observing and assessing AMTB among chronic pain patients. There is a need to further study the discordance between patients' and providers' perceptions and to develop alternative assessments that may help providers to more accurately monitor AMTB and additional training tools to help less experienced clinicians better identify and manage these patients.

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Table 1

Bivariate associations of sociodemographic characteristics with COMM, mABC and CCI scores. (N =110)

		COMM (N = 110)	mABC (N= 108)	CCI (N= 109)
	<i>M (SD)</i>	<i>r</i>		
Age	51.4 (10.9)	-.12	-.02	-.13
	<i>N (%)</i>	<i>M (SD)</i>		
Sex				
Female	70 (63.6)	15.40 (6.87)	2.79 (3.33)	1.80 (.46)
Male	40 (36.4)	16.13 (8.74)	3.74 (4.05)	1.99 (.51)
Hispanic				
Yes	22 (20.2)	18.05 (8.22)	3.27 (3.36)	1.93 (.51)
No	87 (79.8)	15.01 (7.36)	3.12 (3.70)	1.86 (.48)
On Public Assistance				
Yes	54 (49.1)	16.24 (7.39)	2.60 (3.47)	1.91 (.44)
No	56 (50.9)	15.11 (7.77)	3.61 (3.76)	1.83 (.53)
Employment status				
Employed	24 (21.8)	16.54 (7.36)	2.92 (2.15)	1.83 (.49)
Unemployed	86 (78.2)	15.42 (7.67)	3.18 (3.94)	1.88 (.49)
Race				
African American	38 (34.5)	15.24 (7.44)	3.83 (.64)	2.00 (.52) ^b
White	49 (45.0)	15.33 (7.14)	3.56 (.51)	1.73 (.44) ^a
Other	22 (20.2)	17.45 (8.81)	3.54 (.75)	2.01 (.42) ^b
Marital Status				
Married/Common law	20 (18.2)	17.65 (6.48)	2.80 (3.40)	1.79 (.47)
Widowed/Divorced/Separated	43 (39.1)	14.70 (7.33)	3.10 (3.51)	1.85 (.55)
Never Married	47 (42.7)	15.70 (8.18)	3.28 (3.85)	1.92 (.43)
Level of education				
Less than HS	21 (19.3)	18.86 (9.21)	4.35 (4.92)	2.09 (.43) ^a
HS or equivalent	47 (43.1)	15.15 (6.71)	2.54 (2.99)	1.90 (.47) ^b
College of above	41 (37.6)	14.63 (7.45)	3.24 (3.45)	1.72 (.50) ^b
Providers				
Attendings/nurse practitioners (7)	47 (45.5)	16.21 (8.22)	3.64 (3.50) ^a	1.84 (.53)
Fellows (12)	61 (56.5)	15.16 (8.22)	2.72 (3.67) ^b	1.88 (.46)

Note: Different superscripts (i.e., ^a, ^b) indicate a significant difference between the means based on t-tests and One-Way ANOVAS; *p* values were less than .05. HS= high school

Table 2

Correlations between similar items on the COMM and ABC.

COMM Item	ABC Item	All Providers	Attendings/nurse practitioners	Fellows
		<i>r</i>		
In the past 30 days, how often have you had to take more of your medication than prescribed? (#14)	Patient used more medications than prescribed. (#3)	-.02	.03	-.17
In the past 30 days, how often have you needed to take medication belonging to someone else? (#9)	Patient has taken someone else's prescription opioid medication. (#13)	.18	.54***	-.08
In the past 30 days, how often have you used your pain medicine for symptoms other than for pain (e.g., help you sleep, improve your mood or relieve stress)? (#16)	Patient used opioid medication to treat other symptoms. (#15)	.04	.54***	.12
In the past 30 days, how often have others been worried about how you're handling your medication? (#11)	Significant others expressed concern over patient's use of opioid meds. (#16)	.15	.20	.11
In the past 30 days, how often have you had to go to someone other than your prescribing physician to get sufficient pain relief from medication? (i.e. another doctor, the ER, friends, street sources) (#3)	Combined items 7, 8, 13: <ul style="list-style-type: none"> • Patient received opioid medication from more than one provider (#7) • Patient obtained opioid meds from non-medical sources (#8) • Patient has taken someone else's prescription (#3) 	.11	.44**	-.08
COMM	mABC	-.02	.22	-.22
CCI	mABC	-.07	.29*	-.32*

Note:

* $p < .05$;** $p < .01$;*** $p < .001$

Table 3

Correlations between urine drug screening results, substance use disorder diagnosis, pain characteristics, psychological symptoms and COMM, ABC and CCI scores.

Urine Drug Screening	N (%) positive	COMM	CCI	r		
		COMM	CCI	mABC All Providers	mABC Attendings/nurse practitioners	mABC Fellows
Methadone	2 (2.0)	-.13	.06	.10	N/A	.17
Amphetamines	2 (2.1)	.06	.03	-.05	.07	-.15
Opiates	0 (0)	N/A	N/A	N/A	N/A	N/A
Oxycodone	0 (0)	N/A	N/A	N/A	N/A	N/A
Propoxyphene	1 (1.0)	-.08	-.02	.07	N/A	.12
Benzodiazepines	6 (5.9)	-.16	-.01	.11	.14	.12
Barbiturates	2 (2.1)	.35***	.05	.06	.33**	-.14
Methamphetamine	3 (3.2)	-.14	-.02	.02	.11	-.02
Cocaine	6 (6.3)	.14	.15	.23***	.37**	.15
Tetrahydrocannabinol	10 (10.5)	.12	.01	.20	.21	.15
Any positive screen	22 (21.4)	.03	.01	.15	.30*	.05
Substance Use Disorder Dx						
Substance Use Disorder Dx	61 (55)	.22*	.28**	-.02	-.15	.02
Pain Characteristics						
Pain Severity	4.67 (.98)	.15	.03	.10	.41**	-.17
Pain Interference	4.74 (1.01)	.25**	.02	.05	.31*	-.12
Pain Catastrophizing	27.25 (12.19)	.49***	.53***	.02	.31*	-.26*
Psychological Distress	1.14 (.70)	.42***	.46***	.02	.32*	-.27*

Note: Valid % based on percentage of positive screens after missing data has been removed. Positive screens for prescribed medications do not indicate AMTB and were excluded from the drug screening results.

* $p < .05$;

** $p < .01$;

*** $p < .001$;

Dx = diagnosis; N/A = Not applicable

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Table 4

Stepwise regression analyses predicting COMM, CCI and mABC scores.

COMM		CCI		mABC Attending/nurse practitioner		mABC Fellow	
Predictor	Beta	Predictor	Beta	Predictor	Beta	Predictor	Beta
Pain Catastrophizing	.45***	Female	-.16*	Age	.25	Not married	.25*
Psychological Distress	.21*	Non-white	.22**	Non-white	.33*	Psychological distress	-.23
		Pain Catastrophizing	.34***	Pain Severity	.41**		
		Psychological Distress	.29**	Psychological Distress	.29*		
Adjusted R ²	.32***		.37***		.27**		.11*

Note:

* $p < .05$;

** $p < .01$;

*** $p < .001$;

Predictors for each model were selected based on bivariate associations with $p < .10$ and entered into stepwise backwards regressions. All models also included demographics of age, race, gender; In addition to demographics, CCI predictors included substance use disorder diagnosis, pain catastrophizing and psychological distress; COMM predictors included ethnicity, positive urine screen, substance use disorder, pain catastrophizing, pain interference and psychological distress; mABC attending/nurse practitioner predictors included positive urine screen, pain severity, pain interference, pain catastrophizing and psychological distress; mABC Fellow predictors included marital status, pain catastrophizing and psychological distress. Final models are shown.