ORIGINAL ARTICLE

An Opioid Screening Instrument: Long-Term Evaluation of the Utility of the Pain Medication Questionnaire

Cara P. Holmes, PhD; Robert J. Gatchel, PhD; Laura L. Adams, PhD; Anna W. Stowell, PhD; Alyson Hatten, MS; Carl Noe, MD; Leland Lou, MD

The Eugene McDermott Center for Pain Management, The University of Texas Southwestern Medical Center at Dallas, Dallas, Texas, U.S.A.

■ **Abstract:** The Pain Medication Questionnaire (PMQ) was designed to assess the risk for opioid medication misuse in chronic pain patients. A preliminary study showed a positive relationship between higher PMQ scores and concurrent measures of substance abuse, psychopathology, and physical/life-functioning. Using a larger sample size, the present study sought to replicate these findings, and to expand upon them by examining the relationship between PMQ scores and various treatment outcomes. The PMQ was administered to 271 newly evaluated chronic pain patients who were subsequently re-evaluated immediately post-treatment, as well as six months following discharge. Subgroups were then formed according to the lowest (L-PMQ), middle (M-PMQ), and highest (H-PMQ) one-third of PMQ total scores. It was found that the H-PMQ group was 2.6 times more likely to have a known substance-abuse problem, 3.2 times more likely to request early refills of prescription medication, and 2.3 times more likely to drop out of treatment, as compared to the L-PMQ group. They also had diminished biopsychosocial functioning. In addition, at six months following discharge, patients who completed the program experienced a significant decrease in PMQ scores over time relative to those patients who were unsuccessfully discharged from the program or who dropped out. This study represents the second stage in the development of a psychometrically sound screening tool for measuring risk for opioid medication misuse among chronic pain patients, and findings suggest the long-term utility of the PMQ in identifying patients who are more likely to complete and benefit from a pain management program. ■

Key Words: chronic pain, interdisciplinary treatment, opioid misuse, Pain Medication Questionnaire, treatment outcomes

Address correspondence and reprint requests to: Robert J. Gatchel, PhD, ABPP, Department of Psychology, College of Science, University of Texas at Arlington, 313 Life Science Building, Arlington, TX 76019-0528, U.S.A. E-mail: gatchel@uta.edu.

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INTRODUCTION

Pain represents a pervasive public health problem in the United States, affecting more than 50 million Americans and costing society more than $70 billion annually in direct healthcare costs and lost productivity.[1] Opioid medications represent an important treatment option in pain management, especially for chronic conditions that are intractable to more conservative interventions, or for which surgery is not a viable option. While opioid medications are widely considered the standard of care for treating acute and cancer pain, many physicians are reluctant to utilize opioids for chronic pain patients, citing uncertainties regarding long-term effectiveness

and concerns of fostering addiction. Even though survey studies have indicated that long-term opioid therapy provides significant pain relief for some chronic pain patients, there are few controlled studies at this time to definitively support the efficacy of opioids as a monotherapy in the treatment of chronic nonmalignant pain.[2,3]

Some physicians are reluctant to prescribe opioids in the treatment of chronic pain due to concerns about long-term appropriateness, perceived abuse potential, as well as regulatory scrutiny. Others may be hesitant due to the nature of some chronic pain conditions (i.e., no known cause or identifiable organic contribution). Compounding this opioid prescription conundrum was the earlier lack of a specific operational definition of opioid addiction in patients with pain. While the Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition (DSM-IV)[4] is traditionally considered the standard for assessing substance disorders, many experts assert that DSM-IV criteria are not fully appropriate for assessing opioid dependence because the phenomena of tolerance and physical dependence are normal and expected consequences of long-term opioid treatment and do not specifically indicate misuse.[2,5] In an effort to lessen the confusion regarding addiction within the pain treatment context, three national organizations (American Academy of Pain Medicine, American Society of Addiction Medicine, and American Pain Society) have authored a consensus definition, describing opioid addiction as a primary, chronic, neurobiological disease, with genetic, psychosocial, and environmental factors influencing its development and manifestations. This definition includes several categories of behavior, including impaired control over drug use, compulsive use, continued use despite harm, and craving.[6]

Despite this consensus definition, clear and specific criteria for assessing opioid misuse and abuse in chronic pain patients have remained elusive. Thus, many investigators have attempted to enumerate specific behavioral and attitudinal correlates that, based on clinical judgment, are suggestive of opioid misuse.[5,7] These efforts include Portenoy's outline of aberrant drug-related behaviors that are assumed to be "probably more predictive" of addiction, such as forging prescriptions, obtaining prescriptions drugs from nonmedical sources, repeatedly escalating dosages, and repeatedly losing prescriptions.[7] Savage proposed the notion of "Looking for the Four Cs" when assessing opioid addiction, including: (1) adverse Consequences/harm due to use; (2) impaired Control over use; (3) Compulsive use; and (4) preoccupation with use due to Craving.[5] Savage cautions that single instances of these behaviors need not raise the assumption of addiction; however, an ongoing pattern of these behaviors suggests a stronger cause for concern and signals the need for careful evaluation.[5] Both Savage and Portenoy also highlight that opioid misuse correlates extend beyond medication-related behaviors, including failure to improve functioning with adequate pain relief, as well as persistent dysfunctions in the areas of mood, sleep patterns, relationships, and work. Thus, a thorough assessment of potential opioid misuse must include examination of these areas as well.

In 2003, a Task Force of the College on Problems of Drug Dependence authored a position paper citing "the need to strike a balance between risk management strategies to prevent and deter prescription opioid abuse and the need for physicians and patients to have appropriate access to opioid pharmaceuticals for the treatment of pain" (p. 215).[8] Toward this end, the task force highlighted the necessity of comprehensive assessment of opioid use and risk of opioid misuse/abuse in pain patients. As a consequence, investigators have begun to develop and validate relevant criteria and screening instruments for assessing the risk for opioid misuse in chronic pain patients.[9,10] Adams and colleagues[11] responded with the development of the Pain Medication Questionnaire (PMQ), a brief, 26-item self-report screening instrument for opioid misuse, the focus of the present study (included as Appendix to this article). Prior to this, Compton and colleagues[10] developed a 42-item, interview-based screening questionnaire—the Prescription Drug Use Questionnaire (PDUQ)—for use with chronic pain patients suspected of being addicted to opioid analgesics. Concurrent to the PMQ's development, Butler and colleagues[12] began development of the Screener and Opioid Assessment for Patients with Pain (SOAPP), which has shown promise in a preliminary validation study to predict risk for problematic behaviors involving opioid medications. Additional coverage of early initiatives to assess opioid abuse can be found in the work of Robinson et al.[13]

The PMQ was designed for use in a busy clinic environment, in order to identify patients in need of more in-depth assessment of risk for opioid misuse, and to assist physicians in their decisions concerning which patients might be appropriate for opioid treatment.[11] Rather than categorically diagnose the presence or absence of opioid addiction, the PMQ was designed to identify patients on a range of potential risk, based on the extent to which they self-report certain related behaviors. Items

were constructed to reflect suspected behavioral and attitudinal correlates of opioid misuse, based on relevant literature[7–9,12] and on input from pain management specialists from several disciplines (e.g., anesthesiologists, nurses, psychiatrists, psychologists). Items were structured in the form of statements, to which patients would indicate their degree of agreement or behavioral conformity on a 5-point Likert scale. Examples of items include: "At times, I need to borrow pain medication from friends or family to get relief"; "At times, I run out of pain medication early and have to call my doctor for refills"; and "Family members seem to think that I may be too dependent on my pain medication."

Adams and colleagues[11] published the complete instrument, along with preliminary data concerning the PMQ's psychometric properties (see the article for full review.) In sum, this initial study showed promise for the PMQ as an instrument for assessing risk of opioid misuse in chronic pain patients, while pointing to several important areas of further investigation and refinement. To examine construct and concurrent validity, PMQ scores were compared to measures of substance abuse, physical and psychological functioning, and physicians' assessments of patients' risk for opioid misuse. As expected, higher PMQ scores were found to be associated with some indices of substance abuse (e.g., CAGE[†], self-report, physician assessment), poorer life-functioning (e.g., work status, physical impairment), and higher levels of psychosocial distress (e.g., as measured by the Beck Depression Inventory [BDI] and Minnesota Multiphasic Personality Inventory [MMPI]-2). However, all data in this initial study were collected only at the baseline evaluation of patients' entry into a pain management center, which allowed for no examination of the PMQ's validity in predicting longer-term outcomes for patients in the way of opioid misuse, treatment compliance, and overall functioning.

There were two main goals of the present study. *Study Goal 1* was to replicate findings of the initial validation study by examining the relationship of intake PMQ scores to measures of psychosocial and physical functioning, as well as indices of substance abuse. This study expanded upon previous efforts with a larger sample size and through the use of a tangible measure of potential opioid medication misuse: requests for early medication refills. *Study Goal 2* was to assess the relationship between PMQ scores and treatment outcomes, including treatment adherence and maintenance of improved psychosocial and physical functioning, at post-treatment measurement intervals.

With regard to these goals, it was hypothesized that higher PMQ scores would be associated with poorer psychosocial and physical functioning, as well as with indices of substance abuse. It also was hypothesized that higher PMQ scores would be associated with poorer treatment adherence and with poorer psychosocial and physical functioning in the longer term.

METHODS

Subjects

The core subject group was a convenience sample of 271 patients who were newly evaluated for treatment in the interdisciplinary pain management program at The Eugene McDermott Center for Pain Management (at The University of Texas Southwestern Medical Center at Dallas), during the time period of October 2001 through May 2003. The Center's interdisciplinary treatment program includes medical, psychological, psychiatric, and physical therapy components. Of the 271 patients in the study sample, 64.7% ($n = 178$) were female, and 35.3% ($n = 97$) were male. The mean age was 50.97 years (SD = 13.84), ranging from 17 to 70 years. The largest racial group was white (85.8%), while African-Americans represented the next largest group (9.5%). Hispanic, Asian, and other races altogether composed only 4.7%. Most of the subjects were married (63.3%), although a significant proportion was single (12.7%), separated/divorced (17.8%), or widowed (6.2%). At initial evaluation, 68% of the overall sample was taking prescribed opioid medications. More than 27% of the sample was receiving disability income, and approximately 13% revealed pending litigation related to their pain condition at the time of initial assessment. The mean length of pain for the sample was found to be 77.4 months (almost 6.5 years), with wide variability (SD = 96.2).

A heterogeneous mix of pain diagnoses was represented in the sample, with many patients receiving multiple diagnoses. The most frequently represented diagnoses were lumbar (51.3%) and cervical (25.8%) spine-related pain, and myofascial/fibromyalgia (33.5%). Some additional pain diagnoses included lower extremity (24.7%), neuralgia/neuritis (18.2%), upper extremity (16.0%), headache (10.9%), thoracic (9.5%), and abdominal (6.9%) pain. A more complete listing is presented in Table 1.

[†]Cut down, Annoyed, Guilt, and Eye-operer

Table 1. Incidence of Pain Diagnoses in Study Sample*

Pain Diagnoses	(% of Total Sample, $N = 271$)
Lumbar	51.3
Cervical	25.8
Thoracic	9.5
Myofascial/fibromyalgia	33.5
Headache	10.9
Facial/TMJ	2.9
Abdominal	6.9
Pelvic	1.9
Upper extremity	16.1
Lower extremity	24.8
Osteoarthritis	4.7
Neuralgia/neuritis	18.6
Reflex sympathetic dystrophy	1.6
Polyneuropathy in diabetes	1.1

*Some patients had more than one diagnosis.
TMJ, tempromandibular joint.

Procedure

General Data-Collection Procedures. Patients were evaluated at the Pain Center solely upon the referral from another treating physician because of a recalcitrant pain problem. Prior to their first appointment, patients completed a packet of paperwork that included treatment consent forms and questionnaires regarding their medical history, medication usage, pain level, and functional abilities. The PMQ was also included in this packet. A pain management physician completed the initial medical evaluation, rendering a physical diagnosis and establishing a treatment plan for pain management procedures including pain medication. If the physician believed that the patient was a suitable candidate for interdisciplinary treatment because of significant biopsychosocial issues, the patient was referred for behavioral medicine and physical therapy evaluations. Patients who were not deemed appropriate for interdisciplinary treatment were monitored, per usual clinic practice, by their pain management physician only, and were not considered part of this study. When the interdisciplinary treatment patients scheduled a behavioral medicine evaluation, each received a packet of related paperwork, including an explanation of the behavioral medicine program, a consent form for psychosocial assessment and treatment, and several psychosocial measures. Following evaluation by a licensed psychologist, historical data were integrated with psychosocial testing results, to formulate psychological diagnoses and individualized treatment plans, which included a designated number of individual behavioral medicine sessions, psychoeducational group sessions, and psychiatric medication consultation, if warranted. A single educational group was available for patients and their family members as well.

Results from the initial assessments comprised the "pre-treatment" data. Patients were discharged from the interdisciplinary treatment program when they finished all of their recommended behavioral medicine, group therapy, and physical therapy sessions. At that time, patients received a packet of questionnaires for "post-treatment" evaluation, which included a subset of the instruments administered at pretreatment. Some patients were discharged early from the treatment program, and "post-treatment" data, therefore, were not collected for them. Common reasons for early discharge included: the patient's sustained noncompliance with one or more of the treatment disciplines; insufficient insurance coverage and patient's decision to seek in-network care; geographic relocation; or intervening medical or psychiatric issues that precluded continued benefit from the treatment program. Due to these many potential obstacles, the drop-out rate from the interdisciplinary program such as this was, as expected, high. Out of the original sample of 271 interdisciplinary patients, only about one-quarter of the sample (70 patients) completed the program and provided post-treatment data.

To assess differences in longer-term outcomes between program "completers" and "non-completers," a subset of both groups was contacted by mail six months following discharge from the program and was asked to complete a packet of follow-up questionnaires, as well as a subset of the original measures administered at pretreatment and post-treatment. Patients were paid a nominal fee for their participation.

Instruments and Outcome Measures

Beck Depression Inventory (BDI).[14] The BDI is a 21-item self-report inventory designed to assess the severity of depressive symptomatology. Each item is scored from 0 to 3, with a potential range of scores from 0 to 63. A total score of 0–9 is considered normal; 10–15 is mild depression; 16–19 represents mild to moderate depression; 20–29 reflects moderate to severe depression; and 30+ indicates severe depression. Research using the BDI has established good psychometric properties, including internal consistency reliability coefficients exceeding 0.73 in nonpsychiatric samples. Correlations of 0.73 and above with the Hamilton Rating Scale for Depression suggest adequate validity.[15]

Confidential Pain Questionnaire. The Confidential Pain Questionnaire is a self-report questionnaire that requests patient information such as demographic information, date and details of injury/pain condition, previous treatments for pain condition including any surgeries, employment status, educational level, workers' compensation or personal injury litigation involvement, healthcare utilization, and other chronic health problems.

Medical Outcomes Survey 36-Item Short Form Health Survey (SF-36).[16] The SF-36 is a 36-item questionnaire that assesses health-related quality of life, both physical and mental, and is widely used for routine monitoring and assessment of healthcare treatment outcomes. It yields eight scales, as well as two standardized summary scales, the Mental Component Scale (MCS) and the Physical Component Scale (PCS), which correspond to patients' overall sense of physical and mental well-being, respectively. The availability of population-based normative data makes the SF-36 useful for comparative purposes as well. Numerous studies have reported high test–retest reliability coefficients, and examination of internal consistency has yielded Cronbach's alphas exceeding 0.70, and usually above 0.80.[17]

Million Visual Analog Scale (MVAS).[18] The MVAS is an analog scale comprising 15 self-report questions assessing perceived pain and disability. Subjects indicate their response to each question by marking a point on a 10-cm line, representing a range of possible answers from 0 to 10, and the total score is the sum of all responses (with a maximum total score of 150). A total score of 0–39 indicates "mildly disabling" pain; 40–84 indicates "moderately disabling pain;" and 85+ indicates "severely disabling pain." The MVAS has particular utility when the self-report of pain exceeds what would be expected given physical findings, and might suggest the existence of a psychosocial component in the patient's disability.[19]

Oswestry Disability Questionnaire (OSW).[20] The OSW is composed of 10 questions that assess limitations of various activities of daily living secondary to pain. Each item is scored on a 0–5-point scale, with a potential range of total scores from 0 to 50. The OSW has demonstrated adequate reliability and validity.[21,22]

Physician Risk Assessment (PRA).[11] The PRA was developed as a means of quantifying the physicians' independent assessments of patient risk for opioid misuse. Originally developed and used in the initial validation of the PMQ,[11] the PRA asks the attending pain management physician to rate the patient on a set of six dimensions of potential risk for opioid misuse, based on behavioral observations and/or information gathered during the initial medical evaluation. Ratings are reported on a 5-point Likert scale reflecting increasing degrees of risk, yielding a maximum possible score of 24.

Visual Analog Scale (VAS). The VAS is used to rate the patient's degree of pain on a scale from 0 (no pain) to 10 (worst possible pain). The scale consists of a 10-cm horizontal line hashed at 2-point intervals. Patients are asked to mark an "X" on the line to represent their current level of pain. Many studies support the use of the VAS with chronic pain patients, and the VAS has demonstrated good psychometric properties.[23,24]

Design and Analyses

The current prospective study design utilized data collected on an ongoing basis from program participants at intake, discharge, and six-months postdischarge. For most analyses, patients were divided into "high," "middle," and "low" scoring groups on the PMQ. As the PMQ has been shown to be normally distributed,[25] all patients falling at or below the 33.3 percentiles composed the "low" PMQ scoring group or L-PMQ (PMQ scores ≤20.5, $n = 93$). Patients falling between the 33.3 and 66.7 percentiles were classified as the "moderate" scoring group or M-PMQ (PMQ scores >20.5–≤30.0, $n = 98$). Finally, patients falling above the 66.7 percentiles composed the "high" scoring group or H-PMQ (PMQ scores >30.0, $n = 84$).

For the purposes of *Study Goal 1*, to replicate findings of the initial PMQ validation study,[11] all analyses were based solely on intake data, including all study subjects ($N = 271$). For *Study Goal 2*, to examine PMQ scores relative to treatment outcomes and functioning at postdischarge, analyses were conducted on the subgroup of subjects ($n = 70$) who completed the interdisciplinary treatment program during the study period. For both of these goals, one-way and repeated-measures ANOVAs were used to compare the L-PMQ, M-PMQ, and H-PMQ groups on continuous variables, while Pearson chi-square analyses were used to compare the three groups on categorical variables. For some chi-square analyses, only H-PMQ and L-PMQ scoring groups were utilized so that odds ratios could be calculated. All analyses were two-tailed, unless otherwise specified.

RESULTS

Basic Descriptive Analysis of the PMQ

The total sample ($N = 271$) yielded a mean PMQ score of 25.49 (SD = 10.16), and a median score of 25.00. The range was 66 points, with a low score of 1.00 and a high score of 67.00 (out of a possible maximum score of 104). Skewness was found to be 0.60, and kurtosis was 1.01, which represents a reasonably close approximation to the normal curve. Measures of skewness and kurtosis falling between −1.0 and +1.0 are generally considered appropriate indicators of a normal distribution.[26] These descriptive findings are consistent with the initial study of the PMQ ($N = 184$), where the mean score was 24.60 (SD = 10.16), and the median was 24.25.[11]

Comparison of PMQ Scoring Groups

One-way ANOVAs and chi-square analyses revealed no significant differences among PMQ scoring groups on the variables of gender, age, race, litigation status, or pain duration (Table 2). Significant differences were found for the variables of marital status, χ^2 (6) = 12.91, $P = 0.04$, and disability status, χ^2 (2) = 10.27, $P < 0.01$. With respect to marital status, a disproportionate number of divorced or separated people (57.1%) fell within the H-PMQ group, as compared to the M-PMQ (22.4%) and L-PMQ (20.4%) groups. By contrast, single people appeared more likely to fall within the L-PMQ group (41.2%), as compared to the M-PMQ (29.4%) and H-PMQ (29.4%) groups. Among those subjects reportedly receiving disability payments, 51.2% fell within the H-PMQ group, while lesser frequencies fell within the M-PMQ (26.8%) and L-PMQ (22.0%) groups. Among subjects reporting no disability payments, only 29.6% fell within the H-PMQ group, while 33.9% fell within the M-PMQ group, and 36.5% fell within the L-PMQ group.

PMQ Scores Relative to Physical and Psychosocial Measures at Pretreatment

Addiction is generally considered a neurobiologically based disease, with genetic, psychosocial, iatrogenic,

Table 2. Demographic Variables

Variable	Total Sample ($N = 271$)	PMQ Scoring Group		
		Low-PMQ	Moderate-PMQ	High-PMQ
Age	Mean (SD)		Mean (SD)*	
Years	51.0 (13.9)	50.7 (15.5)	52.5 (13.7)	49.7 (12.5)
Duration of pain	Mean (SD)	Mean (SD)†		
Months	78.3 (96.7)	60.2 (91.6)	80.9 (85.4)	91.8 (108.3)
Gender	% (*n*)		% (*n*)‡	
Female	64.6 (175)	20.7 (56)	21.4 (58)	22.5 (61)
Male	35.4 (96)	11.4 (31)	10.3 (28)	13.7 (37)
Race	% (*n*)		% (*n*)§	
White	85.6 (232)	28.8 (78)	26.6 (72)	30.3 (82)
African-American	9.6 (26)	2.6 (7)	3.7 (10)	3.3 (9)
Hispanic	3.0 (8)	0.7 (2)	1.1 (3)	1.1 (3)
Asian	0.7 (2)	0.0 (0)	0.0 (0)	0.7 (2)
Other	1.1 (3)	0.0 (0)	0.4 (1)	0.7 (2)
Marital status	% (*n*)		% (*n*)¶	
Married	63.1 (171)	21.0 (57)	21.4 (58)	20.7 (56)
Single	12.5 (34)	5.2 (14)	3.7 (10)	3.7 (10)
Separated/divorced	18.1 (49)	3.7 (10)	4.1 (11)	10.3 (28)
Widowed	6.3 (17)	2.2 (6)	2.6 (7)	1.5 (4)
Disability payments	% (*n*)		% (*n*)††	
Yes	30.3 (82)	6.6 (18)	8.1 (22)	15.5 (42)
No	69.7 (189)	25.5 (69)	23.6 (64)	20.7 (56)
Pending litigation	% (*n*)		% (*n*)‡‡	
Yes	12.5 (34)	5.2 (14)	3.7 (10)	3.7 (10)
No	87.5 (237)	26.9 (73)	28.0 (76)	32.5 (88)

*F (2, 268) = 0.94, $P = 0.39$.
†F (1, 266) = 2.51, $P = 0.08$.
‡χ^2 (2) = 0.54, $P = 0.76$.
§χ^2 (8) = 6.33, $P = 0.61$.
¶χ^2 (6) = 12.91, $P = 0.04$.
††χ^2 (2) = 12.04, $P < 0.01$.
‡‡χ^2 (2) = 1.55, $P = 0.46$.
PMQ, Pain Medication Questionnaire.

and environmental factors as important contributing and reinforcing factors. The current study hypothesized that patients with higher PMQ scores would demonstrate higher levels of physical impairment and psychosocial distress, as compared to lower-scoring patients at pretreatment.

Physical/Functional Measures. The L-PMQ, M-PMQ, and H-PMQ scoring groups were compared on a range of physical/functional measures, including the MVAS, VAS, OSW, and SF-36/PCS. Results of all four one-way ANOVAs (Table 3) demonstrated that the H-PMQ group reported significantly greater ($P \leq 0.01$) physical impairment and distress, as compared to one or more of the lower-scoring PMQ groups. On the MVAS, VAS, and OSW, higher scores suggest poorer functioning. Multiple comparisons, with a Bonferroni correction, revealed that the H-PMQ group had a mean MVAS score (104.69), which was significantly higher than both the M-PMQ (93.56) and the L-PMQ (87.62) groups. Similar analyses of the OSW revealed that the H-PMQ group had a significantly higher mean score (26.03), as compared to both the M-PMQ (21.52) and L-PMQ (20.54) groups. On the VAS, the H-PMQ group had a mean score (8.26) that was significantly higher than that of the L-PMQ group (7.36). On the SF-36/PCS and MCS scales, higher scores reflect better functioning. Multiple comparisons with Bonferroni correction demonstrated that the L-PMQ had a significantly higher PCS score (29.73), as compared to the M-PMQ (26.32) and H-PMQ (25.91) groups.

Table 3. Statistical Analyses of Pretreatment Physical/Functional and Psychosocial Measures Relative to PMQ Scoring Groups

Measure	PMQ Group (*n*)	Mean	(SD)	*F*	*P*
MVAS	Low (79)	87.62	(27.13)	12.10	<0.01
	Moderate (81)	93.56	(22.64)		
	High (94)	104.85	(20.89)		
VAS	Low (87)	7.36	(1.91)	6.50	<0.01
	Moderate (86)	7.81	(1.66)		
	High (96)	8.26	(1.51)		
OSW	Low (80)	20.54	(9.09)	11.05	<0.01
	Moderate (79)	21.52	(7.77)		
	High (90)	26.03	(7.67)		
SF-36/PCS	Low (75)	29.73	(10.25)	4.54	0.01
	Moderate (83)	26.32	(7.55)		
	High (86)	25.91	(8.30)		
SF-36/MCS	Low (75)	44.56	(11.14)	4.39	0.01
	Moderate (83)	42.64	(11.58)		
	High (86)	39.33	(11.44)		
BDI	Low (80)	12.80	(8.48)	9.17	<0.01
	Moderate (83)	16.06	(8.93)		
	High (92)	19.00	(10.68)		

BDI, Beck Depression Inventory; MVAS, Million visual analog scale; OSW, Oswestry Disability Questionnaire; MCS, Mental Component Scale; PCS, Physical Component Scale; PMQ, Pain Medication Questionnaire; SF-36, Short Form-36; VAS, visual analog scale.

Psychosocial Measures. The complex phenomenon of opioid abuse is also assumed to involve psychosocial vulnerability, including depression, anxiety, and ineffective coping. While there is little empirical literature on the prevalence of psychiatric disorders in patients with addiction to prescription opioids, patients who abuse illicit opioids have been shown to have significantly higher rates of depression, anxiety, and personality disorders than the general population, in addition to substance-use disorders.[27] For these reasons, the three PMQ scoring groups were compared on two indices of psychosocial functioning: the BDI and the SF-36/MCS. One-way ANOVAs were significant for both instruments ($P \leq 0.01$), indicating lower levels of psychosocial distress and depressive symptomatology among those patients in the L-PMQ group (Table 3). Multiple comparisons with a Bonferroni correction showed that the L-PMQ group had a significantly higher mean MCS score (44.56), indicating better functioning, as compared to the H-PMQ group (39.33). Similarly, the L-PMQ group had a significantly lower mean BDI score (12.8), as compared to the H-PMQ (19.00) group.

PMQ Scores Relative to Indices of Substance Abuse

At the time of the initial assessment, a subgroup of patients ($n = 68$) were identified as individuals with a known history of substance abuse (i.e., alcohol, illegal drugs, prescription misuse). These patients were identified by information derived from one or more of three sources: (1) the patient admitted to a history of substance abuse; (2) the referring physician reported the patient's history of opioid misuse; or (3) the psychologist identified a problem with substance abuse during initial evaluation of the patient. This group (KNO) was then compared to patients with no known history of substance abuse (N-KNO) on total PMQ scores. Due to the relatively small size of the KNO group, a random sample of equal size ($n = 68$) was selected from the larger N-KNO group ($n = 203$). The KNO and N-KNO groups were compared for equality on the dimensions of pain duration, age, and gender. No significant difference was found between the groups on pain duration. An independent *t*-test found a significant difference for age, $t\,(134) = 2.69$, $P < 0.01$, where the KNO group had

a mean age of 47.5 years (SD = 11.5), and the N-KNO group had a mean age of 53.04 (SD = 12.49); however, this mean difference of less than five years was not deemed to present a significant bias for further analyses. Interestingly, a Pearson's chi-square analysis, χ^2 (1) = 13.11, $P < 0.01$, showed a significantly unequal distribution of men and women between the KNO and N-KNO groups. The KNO group comprised 60.3% men and 39.7% women, while the N-KNO group comprised 29.4% men and 70.6% women. When the KNO and N-KNO groups were compared for mean total PMQ scores, an independent *t*-test showed a significant difference, t (134) = –2.59, $P = 0.01$. The KNO group had a mean PMQ score of 28.8 (SD = 11.66), while the N-KNO group had a mean PMQ score of 23.9 (SD = 10.06). Within the KNO group of 68 patients, a smaller subset of patients ($n = 15$) were specifically known to have had a problem with opioid prescription misuse (vs. an alcohol or illegal drug problem). Intriguingly, this subset had a mean PMQ score of 32.83 (SD = 14.8). Further analyses were not conducted on this subset, due to its small size; however, the mean PMQ score for this group suggests a trend worthy of future study.

An adjunct analysis examined the distribution of KNO and N-KNO patients in the L-PMQ and H-PMQ scoring groups. Significant findings from a Pearson's chi-square analysis, χ^2 (1) = 7.103, $P < 0.01$, demonstrated that 65.1% of patients in the KNO group were also in the H-PMQ scoring group, while only 34.9% of the KNO group fell within the L-PMQ scoring group. Conversely, 58.2% of the N-KNO group fell into the L-PMQ scoring group, while 41.8% of N-KNO patients fell into the H-PMQ scoring group. An odds ratio revealed that the H-PMQ scoring group was 2.6 times more likely to have a known background of substance abuse, as compared to the L-PMQ scoring group (95% CI 1.27–5.32).

Using an index of physician-based assessment of risk for opiate misuse, all three PMQ scoring groups (L-PMQ, M-PMQ, and H-PMQ) were examined relative to outcomes on the Physician Risk Assessment (PRA), measured at the intake evaluation. Of the total study sample ($N = 271$), a subset of 199 patients were evaluated with a PRA, with missing data attributed to a hectic clinic schedule and physician oversight. For this analysis, a one-way ANOVA was significant, F (2, 196) = 13.05, $P < 0.001$, and Tukey post hoc tests revealed significant differences in mean PRA scores between the H-PMQ group (M = 6.64, SD = 6.09) and the M-PMQ group (M = 3.52, SD = 4.66), as well as between the H-PMQ group and the L-PMQ group (M = 2.42, SD = 3.57).

Another analysis examined PMQ scores relative to patients' requests for early refill of pain medications, a tangible behavior that is thought to suggest overuse and potential misuse of pain medication. During the study period, 60 patients in the study sample made one or more requests for early refills on their pain medications (the YES group). For an equal-size comparison group, a random sample of patients (the NO group) was drawn from the total subset of people ($n = 215$) who made no requests for early refills of pain medication. No significant differences were found between these groups on age, pain duration, and proportions of gender. An independent *t*-test found a significant difference in mean PMQ scores between the two groups, t (118) = –2.644, $P < 0.01$, where the YES group had a higher mean of 28.78 (SD = 9.46), and the NO group had a mean of 24.33 (SD = 8.93).

As an adjunct analysis, a Pearson's chi-square examined the distribution of early refill requests between L-PMQ and H-PMQ groups, finding a significant relationship between PMQ group and early refill requests, χ^2 (1) = 5.69, $P = 0.02$. More specifically, only 33.3% of the L-PMQ group made early refill requests, compared with 61.5% of the H-PMQ group. An odds ratio found that the H-PMQ group was *3.2 times* more likely to request an early prescription refill, as compared to the L-PMQ group (95% CI 1.21–8.44).

PMQ Scores Relative to Treatment Outcomes

Reduction in PMQ Scores. Of the 271 patients who participated in the interdisciplinary pain management program, 39 patients completed the PMQ at both pretreatment and post-treatment intervals. A paired samples *t*-test revealed a significant decrease in mean PMQ score from pre- to post-treatment, t (38) = 3.43, $P < 0.001$. Mean PMQ scores decreased from 22.71 (9.10) at pretreatment to 17.82 (8.64) at post-treatment. Based on the presumed risk divisions for opioid misuse, this finding indicates that mean PMQ scores decreased from the "moderate" risk range (PMQ scores >20.5–≤30.0) to the "low" risk range (PMQ scores ≤20.5) with successful completion of an interdisciplinary pain management program.

A repeated-measures ANOVA also was conducted to examine the relationship between PMQ scoring group (L-PMQ, M-PMQ, and H-PMQ) and change in PMQ

Table 4 . Pain Medication Questionnaire (PMQ): Repeated-Measures Analysis of Variance for Treatment Completers From Pretreatment to Post-Treatment ($n = 39$)

PMQ Group (*n*)	Pretreatment Mean PMQ (SD)	Post-Treatment Mean PMQ (SD)	*F*	*P*
Low-PMQ (18)	15.36 (3.85)	13.61 (6.43)	24.91	<0.001
Moderate-PMQ (12)	24.50 (2.52)	20.29 (7.74)		
High-PMQ (9)	35.00 (7.56)	22.94 (10.31)		
Group effect			26.58	<0.001
Group–Time interaction			4.92	0.01

score over time. Significant effects were found for Group, $F\ (2,\ 36) = 26.58$, $P \leq 0.001$, and Time (pretreatment to post-treatment), $F\ (1,\ 36) = 19.81$, $P \leq 0.001$. In addition, there was a significant Group–Time interaction effect, $F\ (2, 36) = 4.92$, $P = 0.01$. Mean PMQ scores for each of the three groups at pre- and post-treatment are presented in Table 4. As illustrated, mean PMQ scores significantly decreased over the course of treatment for each of the three PMQ groups. As predicted, the H-PMQ group experienced a greater decrease in scores relative to the other two groups. In the H-PMQ group, the mean PMQ score was 35.00 (SD = 7.56) at pretreatment, and decreased to 22.94 (SD = 10.31) by post-treatment. Essentially, patients falling in the H-PMQ scoring group at pretreatment moved, on average, to the lower end of the M-PMQ scoring range with successful treatment completion.

Treatment Noncompletion. This study proposed that patients with higher PMQ scores would likely be less compliant with their overall treatment plan. Pain Center patients who demonstrate persistent noncompliance with any of the treatment disciplines are terminated from treatment. In addition, some patients dropped out of treatment for a variety of reasons unrelated to noncompliance, such as intervening medical conditions, insurance restrictions, travel restrictions, or geographic relocation. It was assumed that these reasons for treatment noncompletion would not have a consistent relationship with PMQ scores. Therefore, only two categories of treatment completion were evaluated: "Completer" (COM, $n = 70$), comprising those who completed all phases of treatment, or were discharged early for good results; and "Terminated/Noncompliance" (T/NC, $n = 96$), comprising of those who were discharged from the treatment program due to noncompliance with one or more aspects of treatment. A 2×2 Pearson's chi-square analysis was conducted to examine the relationship between just the H-PMQ and L-PMQ scoring groups and these COM and T/NC treatment completion groups. The reasoning for this comparison was that those who terminated from treatment for benign reasons (e.g., those unrelated to compliance) were not expected to fall into any particular PMQ scoring group. Moreover, it was not expected that patients in the M-PMQ scoring group would show a clear trend of treatment completion, as might be expected in the L-PMQ and H-PMQ scoring groups. Results from this analysis were significant, $\chi^2\ (1) = 4.16$, $P = 0.03$. An odds ratio revealed that those in the H-PMQ scoring group were 2.3 times more likely to terminate from treatment for noncompliance (95% CI 1.03–5.02) as compared to the L-PMQ scoring group.

Of the 271 study patients, 70 subjects successfully completed the treatment program within the time frame of the current study. Of these treatment completers, a subset of 32 patients were contacted at six months postdischarge for follow-up data collection (the remainder were unreachable for six-month follow-up). A subset of completers was discharged during the final five months of the study period and, thus, were not eligible for follow-up at six months postdischarge. In addition, another sample of 35 treatment noncompleters was contacted six months from the time they were discharged from the program. Independent samples *t*-tests revealed no significant differences in age or pain duration of patients between the completers and noncompleters at pretreatment. In addition, chi-square analyses revealed no significant differences between the two groups in gender, ethnicity, or marital status at pretreatment, ruling out potential sources of selection bias. A repeated-measures ANOVA was then conducted to examine differences in PMQ scores between completers and noncompleters at six-month follow-up. Mean PMQ scores for completers and noncompleters at pretreatment and post-treatment are presented in Table 5. There was a significant effect for Time on PMQ score, $F\ (1,\ 37) = 9.45$, $P < 0.01$. Although there was no significant effect for Group ($P = 0.09$), there was a significant Group–Time interaction, $F\ (1) = 3.87$, $P = 0.03$,

Table 5. Pain Medication Questionnaire (PMQ): Repeated-Measures ANOVA for Pretreatment and Six-Month Follow-Up by Group and Time

PMQ Group	Time	Mean (SD)	*F*	*P*
Completer ($n = 21$)	Pretreatment	24.23 (11.41)		
	Six-Months	17.70 (8.20)		
Noncompleter ($n = 18$)	Pretreatment	25.94 (11.97)		
	Six-Months	24.53 (9.72)		
Group effect			1.77	0.10
Time effect			9.45	<0.01
Group–Time interaction			3.87	0.03

indicating that completers experienced a significantly greater decrease in PMQ scores over time, relative to noncompleters.

In order to examine the effect of treatment noncompletion on treatment outcomes at six-month follow-up, a series of repeated-measures ANOVAs were conducted for the main physical and psychosocial variables. A significant effect for Group was found on: the BDI, $F\ (1,53) = 4.14$, $P < 0.05$; the VAS, $F\ (1,60) = 3.33$, $P < 0.05$; the PCS, $F\ (1,52) = 1.59$, $P < 0.05$; and the MCS, $F\ (1,52) = 2.67$, $P < 0.05$. The treatment completers demonstrated significantly better outcomes six months after the conclusion of treatment on these measures of depression, pain, and physical and emotional functioning. No significant Group effect was found for the MVAS ($P = 0.10$) or the Oswestry ($P = 0.14$). A significant effect for Time was found for all of the aforementioned outcome measures. The only significant Group–Time interaction effect was demonstrated by the PMQ, as described above.

Treatment Outcomes: Post-Treatment and Six Months Post-Treatment

To evaluate treatment efficacy for patients who completed the interdisciplinary pain management program, paired samples *t*-tests were conducted for each measure to compare pretreatment and post-treatment scores. A significant improvement was noted for most measures, including: the Oswestry, $t\ (28) = 2.95$, $P < 0.01$; the VAS, $t\ (31) = 3.97$, $P < 0.01$; the MVAS, $t\ (28) = 3.14$, $P < 0.01$; and the MCS, $t\ (109) = -2.44$, $P \leq 0.01$. Although both the BDI and PCS scores improved over time, the differences were nonsignificant. Thus, successful completion of treatment was associated with improved physical and psychosocial functioning.

Given the significant pretreatment differences among PMQ groups on all six of the core outcome measures, one-way ANCOVAs, with pretreatment scores as covariates, were conducted to determine whether there were differences among PMQ groups in the reduction of physical and psychosocial distress (as assessed by the six outcome measures) immediately following treatment completion. Analyses indicated no significant differences in improvement on these measures among PMQ groups. Similarly, at six months post-treatment, one-way ANOVAs, with pretreatment scores as covariates, were conducted to determine whether there were differences among PMQ groups in improvement in the BDI, MCS, PCS, VAS, MVAS, and OSW scores. Again, no significant difference was found among the three PMQ groups.

DISCUSSION

The present study represents the second stage in a formal attempt to develop a psychometrically sound, brief self-report screening tool for assessing risk for opioid medication misuse among chronic pain patients, following the initial study of Adams and colleagues.[11] The current study sought to replicate earlier findings and to examine the long-term utility of this instrument by examining the relationship between PMQ scores and treatment outcomes. Basically, in the core sample of 271 patients, the "modal" subject was a married, white woman, roughly 51 years old, with a chronic pain condition (most commonly low back pain or myofascial/fibromyalgia) of approximately 6.5 years. Among the variables of gender, race, marital status, treatment group, disability payment status, and litigation status, only marital status and disability payment status demonstrated significant distributional differences among the High, Moderate and Low PMQ scoring groups. This suggests that the demographic variables are basically similar across PMQ groups and, thus, the current findings are likely generalizable to a heterogeneous range of chronic pain patients.

Of the significant demographic variables, patients receiving disability payments were 3.3 times more likely to fall in the H-PMQ group than in the L-PMQ group, which supports the notion that patients with high levels of disability may be at an increased risk for opioid misuse.[8,27] Results from the analysis of marital status relative to PMQ score were also significant. The H-PMQ group had a higher proportion of separated/divorced patients, and fewer single and widowed patients, as compared to the L-PMQ group. One potential explanation is that divorced patients may be more

likely to fall into the higher-risk group due to a lack of social support, relative to married patients.

Perhaps the most compelling finding of the present study was that PMQ scores significantly decreased over time with the completion of the interdisciplinary pain management program. Each of the three PMQ groups experienced a significant decrease in mean PMQ scores, with the high-risk group experiencing the largest relative decline in risk for opioid misuse. Thus, "completers" reported fewer of the aberrant attitudes and behaviors thought to be related to opioid misuse upon conclusion of their treatment regimens. Further, in the examination of treatment noncompletion relative to risk for opioid misuse, there was a significant Group (completers, noncompleters) and Time (pretreatment, six-month follow-up) interaction effect, indicating that completers experienced a significantly greater decrease in PMQ score over time relative to non-completers.

Participation in interdisciplinary treatment appears to have provided patients with improved functioning and additional means by which to cope with their pain condition. This is one of the major goals of an effective interdisciplinary pain management program—changing pain behaviors and maladaptive coping strategies, which might include misuse of pain medication. Indeed, the PMQ consists of questions that relate to behaviors and thoughts amenable to change (e.g., "I believe I am receiving enough medication to relieve my pain;" "I wouldn't mind quitting my current pain medication and trying a new one, if my doctor recommends it."). Effective pain management strives to prompt patients to become less focused on medication-related issues. This is a critical point because, as research has indicated, opioid medications are not effective for all patients. Many critics of the use of opioids in the treatment of chronic, nonmalignant pain fear that the increasing popularity of opioids will overshadow the benefits of comprehensive, rehabilitative pain management programs. Interdisciplinary treatment programs have previously demonstrated multiple improved outcomes, including return-to-work, reduced pain levels, improved mood, and decreased healthcare utilization. The current findings indicate that participation in an interdisciplinary pain management program is associated with a decreased risk for opioid misuse as well. In the treatment of chronic nonmalignant pain, opioid therapy should be considered complementary to other restorative and rehabilitative approaches. With improved pain relief, the emphasis should be on maximizing physical and psychosocial functioning.

Finally, another important finding of the present study related to the relationship of PMQ scores to indices of substance abuse. For example, higher PMQ scores were associated with more frequent requests for early refills of pain medication. While this particular behavior in itself does not indicate a problem, it is part of an overall clinical picture that should be considered in evaluating risk for opioid misuse. More importantly, higher PMQ scores were also associated with a known substance-abuse history (i.e., abuse of alcohol, illegal drugs, or prescription medications). While the mean PMQ score for this group ($M = 28.8$, $SD = 11.66$; $n = 68$) was only approximately 5 points higher than that of an equal-size comparison group without a known substance-abuse history ($M = 23.9$, $SD = 10.06$), the difference was still significant. Moreover, when the known misusers of opioid medications were parceled out, they showed a much higher mean PMQ ($M = 32.83$, $SD = 14.8$; $n = 15$). While interpretations are somewhat limited by the relatively small sample size, these data point to potential trends that warrant further investigation, as well as to tentative cutoff points for scores of patients at "high risk" for opiate misuse.

While more research is needed, the present findings provide further evidence of the clinical utility of the PMQ and justify its clinical use and further validation. Further study of this measure will need to focus on identifying the stronger- and weaker-performing items on the PMQ, with possible re-validation of a shorter version of the instrument. Additionally, this instrument's predictive validity must be further examined through a longer-term study (e.g., one-year follow-up) that provides a larger sample size and allows for identification of problematic opioid use over time. Finally, more specific ranges of scores that correspond with increasing levels of risk for opiate misuse need to be further validated. These research efforts are under way, and we expect they will provide an even more refined instrument that is easy to use and can assist decision making in the prescription of opioid medications and the monitoring of their use within a clinical environment. In the interim, though, the current PMQ provides a valid method to initially screen those patients who have a proclivity to misuse pain reduction medications.

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Appendix

PMQ PAIN MEDICATION QUESTIONNAIRE© *NAME:* _____

In order to develop the best treatment plan for you, we want to understand your thoughts, needs and experiences related to pain medication. Please read each statement below and indicate how much it applies to you by marking your response with an "X" anywhere on the line below it.

(1) I believe I am receiving enough medication to relieve my pain.

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(2) My doctor spends enough time talking to me about my pain medication during appointments.

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(3) I believe I would feel better with a higher dosage of my pain medication.

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(4) In the past, I have had some difficulty getting the medication I need from my doctor(s).

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(5) I wouldn't mind quitting my current pain medication and trying a new one, if my doctor recommends it.

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(6) I have clear preferences about the type of pain medication I need.

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(7) Family members seem to think that I may be too dependent on my pain medication.

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(8) It is important to me to try ways of managing my pain in addition to the medication *(such as relaxation, biofeedback, physical therapy, TENS unit,* etc.*)*

|_____|_____|_____|_____|

Disagree Somewhat Disagree Neutral Somewhat Agree Agree

(Please continue on the next page)

(9) At times, I take pain medication when I feel anxious and sad, or when I need help sleeping.

Never *Occasionally* *Sometimes* *Often* *Always*

(10) At times, I drink alcohol to help control my pain.

Never *Occasionally* *Sometimes* *Often* *Always*

(11) My pain medication makes it hard for me to think clearly sometimes.

Never *Occasionally* *Sometimes* *Often* *Always*

(12) I find it necessary to go to the emergency room to get treatment for my pain.

Never *Occasionally* *Sometimes* *Often* *Always*

(13) My pain medication makes me nauseated and constipated sometimes.

Never *Occasionally* *Sometimes* *Often* *Always*

(14) At times, I need to borrow pain medication from friends or family to get relief.

Never *Occasionally* *Sometimes* *Often* *Always*

(15) I get pain medication from more than one doctor in order to have enough medication for my pain.

Never *Occasionally* *Sometimes* *Often* *Always*

(16) At times, I think I may be too dependent on my pain medication.

Never *Occasionally* *Sometimes* *Often* *Always*

(17) To help me out, family members have obtained pain medications for me from their own doctors.

Never *Occasionally* *Sometimes* *Often* *Always*

(18) At times, I need to take pain medication more often than it is prescribed in order to relieve my pain.

Never *Occasionally* *Sometimes* *Often* *Always*

(Please continue on the next page)

(19) I save any unused pain medication I have in case I need it later.

Never *Occasionally* *Sometimes* *Often* *Always*

(20) I find it helpful to call my doctor or clinic to talk about how my pain medication is working.

Never *Occasionally* *Sometimes* *Often* *Always*

(21) At times, I run out of pain medication early and have to call my doctor for refills.

Never *Occasionally* *Sometimes* *Often* *Always*

(22) I find it useful to take additional medications *(such as sedatives)* to help my pain medication work better.

Never *Occasionally* *Sometimes* *Often* *Always*

(23) How many painful conditions *(injured body parts or illnesses)* do you have?

1 painful conditions *2 painful conditions* *3 painful conditions* *4 painful conditions* *5+ painful conditions*

(24) How many times in the past *year* have you asked your doctor to increase your prescribed dosage of pain medication in order to get relief?

Never *1 time* *2 times* *3 times* *4+ times*

(25) How many times in the past *year* have you run out of pain medication early and had to request an early refill?

Never *1 time* *2 times* *3 times* *4+ times*

(26) How many times in the past *year* have you accidentally misplaced your prescription for pain medication and had to ask for another?

Never *1 time* *2 times* *3 times* *4+ times*

(Stop)