Clinicians’ Attitudes and Beliefs About Opioids Survey (CAOS): Instrument Development and Results of a National Physician Survey

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Abstract: Beliefs surrounding the use of opioids for chronic noncancer pain have vacillated over time. Concerns regarding long-term efficacy and adverse effects of opioids, along with increases in opioid prescribing, have contributed to many political, regulatory, and clinical responses. The present study was designed to 1) develop a reliable and valid measure (Clinicians’ Attitudes about Opioids Scale [CAOS]) to assess current and evolving beliefs regarding opioids and opioid use in patients with chronic pain; and 2) survey these beliefs in a nationally representative sample of providers from multiple medical specialties throughout the United States. We developed the questionnaire in 3 phases: 1) focus groups and content development; 2) pilot testing and subsequent revisions; and 3) formal survey (N = 1,535) and assessment of stability (N = 251). The resulting 38-item measure assessed 5 domains: 1) Impediments and Concerns; 2) Perceived Effectiveness; 3) Schedule II versus III Opioids; 4) Medical Education; and 5) Tamper Resistant Formulations. No significant differences were identified among geographical regions; however, several differences were observed among medical specialties. Orthopedists were most troubled by impediments/concerns from long-term opioid use and had the least confidence in opioid efficacy, whereas Pain Medicine specialists and Physical Medicine and Rehabilitation specialists were the most confident in efficacy.

Perspective: This article presents the psychometric properties of a new measure of clinicians’ beliefs surrounding opioid use for chronic pain. Using this measure, beliefs and behaviors of physicians across medical specialties and geographic regions using a nationally representative sample are presented, updating findings from a similar survey conducted 20 years ago.

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Key words: Opioids, attitudes, beliefs, tamper resistant formulations, prescribing patterns, instrument development.

Pain is the most common symptom prompting patients to consult a physician in the United States.⁸ According to the recent report from the Institute of Medicine, over 100 million adult Americans are estimated to experience chronic pain.¹⁰ Opioids are among the most commonly prescribed drugs for the treatment of moderate-to-severe pain¹⁵ and their use has been rising over the last decade,²⁰ accounting for 235 million prescriptions in 2004 alone.⁸ Paradoxically, prescribers’ concerns related to adverse effects, misuse and abuse, morbidity and mortality, and scrutiny by federal and state regulatory agencies have been escalating.¹,⁴,²³ Cognizant of the growing concerns about morbidity and mortality associated with opioid abuse and misuse, the United States Congress has mandated that the United States Food and Drug Administration develop a comprehensive strategy for monitoring opioid use, morbidity, and mortality. In response, the Food and Drug Administration has developed Risk Evaluation and Mitigation Strategies, including the provision of training for physicians on appropriate prescribing and use of certain opioids,¹⁸ as

Received October 16, 2012; Revised December 27, 2012; Accepted January 22, 2013.
Supported by a grant from Janssen Scientific Affairs, LLC.
H.D.W. is employed at United BioSource Corporation. The other authors declare no conflicts of interest.
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1526-5900/$36.00 © 2013 by the American Pain Society
http://dx.doi.org/10.1016/j.jpain.2013.01.769
well as guidelines for companies that market centrally
acting drugs like opioids. Moreover, several pharmaceuti-
cal companies have developed tamper resistant formu-
lations (TRFs), but the actual influence and effectiveness
of TRFs on provider beliefs and practices is unknown.12-14

The growing public concern, and evolving policies and
legislation, affect prescribers’ attitudes and beliefs con-
cerning opioid use for the treatment of patients with
chronic non-cancer pain (CNCP), which in turn affects
prescribing practices.17 In fact, evidence suggests that
physicians’ attitudes and beliefs about opioids are better
predictors of prescribing practices than any socio demo-
graphic or contextual variables (eg, years of practice).9

A number of surveys have been conducted over the
past 2 decades evaluating physicians’ attitudes and
beliefs surrounding opioid use for CNCP. In 1994, Turk
et al22 conducted a survey of physicians’ practices and
attitudes in regard to prescribing opioids for CNCP, using
a stratified random sample of prescribers in 7 medical
specialties across the United States. The results of that
survey identified significant differences in attitudes and
beliefs across regions of the country and by medical
specialty, such as differences in concerns about adverse
effects of opioids and opioid-prescribing frequency.
Since 1994, several surveys addressing similar issues
have been conducted, but none reported on the
reliability or validity of the survey instrument used, and
all remained limited in their scope. Specifically, investiga-
tions have been constrained to small convenience
samples often in a specific region of the country, rather
than surveying a nationally representative sample of
prescribers.11,16,23 Other investigations have instead
been aimed at a specific medical specialty group,2,5,6
such as general practitioners,9 rather than comparing
attitudes across representative samples of specialties to
uncover potentially important differences that may
influence prescriber practices.

Aim 1: Scale Development

The questionnaire was developed in 3 phases, all
approved by the Institutional Review Board of the
University of Washington: Phase 1 consisted of content
development, which included a literature review and fo-
cus groups; Phase 2 consisted of pilot testing of draft ques-
tions and survey refinement; and Phase 3 consisted of the
administration of the physician survey and test of stability.
Informed consent was obtained from all participants.

Phase 1: Content

The objective of Phase 1 was to identify themes, con-
tent, and specific questions for inclusion in the
questionnaire. We reviewed previous surveys on the
topic and interviewed a set of 14 physicians who treat
patients with CNCP, representing primary care (n = 7)
and pain specialists (n = 7) practicing in Seattle, WA. Six
of the 14 were men, and approximately 80% of the
practitioners had more than 5 years of experience
treating CNCP.

Interviews lasted approximately 90 minutes, and
participants were reimbursed $250 for their time in
participation. Interviews were conducted by 2 research
staff members (H.D.W. and another), and immediately
following the interview the research staff members inde-
dependently listed key areas that were highlighted during
the discussions. A third research staff member (D.C.T.) lis-
tened to recordings of the interviews and summarized
key points from each interview. The research team met
collectively to discuss each of the interviews, and identi-
fied the following areas: 1) opioid efficacy (eg, how effec-
tive opioids are for nociceptive pain or mixed pain); 2)
patient selection and beliefs about patients (eg, the fre-
cency that patients misuse/abuse opioids, how closely
patients follow their medication regimen); 3) impediments
to long-term use of opioids including misuse/abuse
issues and side effects (eg, tolerance from taking opioids
for a long period of time, the potential for patients to
abuse opioids); 4) the physicians’ own education (how ap-
propriate physicians’ own training and education was for
pain management and opioid prescribing); 5) beliefs
about prescribing (eg, preference for prescribing or not
prescribing opioids, preferences for Schedule II versus III
opioids); and 6) regulatory pressures (eg, the impact of in-
creased regulatory pressures on prescribing behaviors).
Information gained from these interviews, along with
questions utilized in earlier surveys conducted on physi-
cians’ beliefs and opioid-prescribing practices,2,5,6,22
were used to develop specific questions for each of the
6 domains identified during the interviews. We ensured
a minimum of at least 3 questions within each domain.
A draft of the pilot questionnaire was sent to a subset
of 7 of the 14 physicians who participated in the
interviews to solicit feedback regarding readability and
comprehension of the instructions and items. All
physicians returned the questionnaire with comments
that were incorporated into the pilot draft and were
reimbursed $125 for their time.

Phase 2: Pilot Testing/Questionnaire
Refinement

The goal of Phase 2 was to pilot test the questions
developed in Phase 1. Specific objectives of this phase
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prescription practices were included in the survey. Physicians’ practice type, the percentage of CNCP patients treated in their practice, and opioid-related efficacy, impediments to use, beliefs about patients, beliefs about prescribing, regulatory pressures, and education. The response scale for all content questions was 0 to 10, with 0 being strongly disagree and 10 strongly agree (no central anchor point was indicated). In addition, 13 demographic and descriptive questions concerning physicians’ practice type, the percentage of CNCP patients treated in their practice, and opioid-related prescription practices were included in the survey.

Sample

We conducted Phases 2 and 3 using a large, proprietary, Web-enabled panel of United States physicians that is recruited and maintained by a private company, Toluna, Inc (Wilton, CT). The panel comprises approximately 100,000 American Medical Association (AMA)-verified physicians who have been recruited by means of the internet to join the panel through a “double-opt-in” process, where their targeting information, such as primary specialty, subspecialty, purchasing authority, and involvement in Pharmacy and Therapeutics committees, is stored. The panel is designed to be representative of the U.S. population of physicians by age, race/ethnicity, geographic region, and medical specialty according to the AMA. The company conducts an extensive validation of every panelist to guarantee that all respondents are licensed and AMA-verified physicians prior to extending invitations to participate in a survey. Panel physicians may withdraw membership at any time and are compensated for their participation at a rate Toluna has determined is commensurate with the length of the survey and their specialty.

All physicians on the Toluna panel in the following specialties were eligible to participate in our survey: Anesthesiologists (Anesth), Family Practitioners (FP), Neurologists (Neur), Orthopedists (Ortho), Pain Medicine (PM) specialists, Internists (Intern), Physical Medicine and Rehabilitation specialists (PM&R), Psychiatrists (Psych), Rheumatologists (Rheum), and Surgeons (Surg). Panel members received notification of the survey through email (our goal was 250); however, a total of 251 responded prior to termination of recruitment. Thus, we included all 251 when assessing the stability of the developed measure. Respondents were stratified by region of the country and specialty as indicated by the AMA distribution. The number of physicians who responded after receiving an invitation for participation in the survey varied based on specialty: Anesth (65%), Intern (52%), PM (51%), Ortho (50%), FP (49%), Surg (46%), Neur (45%), Psych (45%), PM&R (32%), and Rheum (20%). The majority of the sample was male (n = 205, 82%), between the ages of 30 and 44 years (n = 135, 54%), and had been in practice between 5 and 14 years (n = 136, 54%).

Evaluation of the item distributions of the 57 content questions indicated no evidence for restricted range, which demonstrated appropriate variation regarding physicians’ beliefs and practices for all items queried. Of the 57 items, 22 were normally distributed and 35 items were left skewed. Cronbach’s alpha was calculated for the 57 items and demonstrated appropriate variation regarding physicians’ beliefs and practices for all items queried. Of the 57 items, 22 were normally distributed and 35 items were left skewed. Cronbach’s alpha was calculated for the 57 items and demonstrated appropriate variation regarding physicians’ beliefs and practices for all items queried.

Analyses

The purpose of the pilot phase was to evaluate the distributions, internal consistency, and relationship among questions identified in Phase 1 in order to inform revisions of the instrument. Internal consistency was high (Cronbach’s alpha = .81), suggesting that the

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questions measured a core underlying construct: beliefs, practices, and concerns regarding opioid use for CNCP.

Intercorrelations among prespecified groups were evaluated in an effort to develop an understanding of item relationships and to inform the addition and deletion of items. Items in 3 (Perceived Effectiveness, Impediments and Concerns, and Medical Education) of the 6 groups were moderately-highly correlated, and each set of items had a minimum of 3 questions, so no additional questions were proposed to be added within these 3 areas. In the “Perceived Efficacy” set, there was 1 item that did not correlate even moderately with any of the other variables in the set. What differentiated this item from the other nine items was use of the language “Failure of Opioids” relative to “Efficacy of Opioids.” We hypothesized that this item might be more closely related to “Negative Opinions” about opioids and developed the following statements to add to the survey in Phase 3 to expand this set: 1) “My negative experience with using opioids for CNCP has led me to change my prescribing practices”; 2) “Long-term use of opioids is unwarranted for many of my CNCP patients”; 3) “Long-term opioids are over-prescribed for patients with CNCP.” We deleted 6 additional items (1 in the “efficacy,” 3 in “impediments to use,” 1 in “beliefs about patients,” and 1 in “regulatory pressure” domains) that were redundant, not relevant to other items, and/or not viewed as contributing significantly beyond other questionnaire items. The items in the “Regulatory Pressure,” “Beliefs about Prescribing,” and “Beliefs about Patients” domains were retained to evaluate how they would perform in the broader study.

Phase 3: Survey and Assessment of Stability

The objective of the third phase was to recruit a large-scale nationwide sample of physicians to complete the final questionnaire and to examine preliminary psychometric properties including the underlying factor structure and test-retest reliability (stability). Based on results from Phase 2, the final Clinicians’ Attitudes about Opioids Scale (CAOS) questionnaire consisted of 54 content questions and 13 demographic and descriptive questions concerning physicians’ practice type, percentage of CNCP patients, and their opioid-related prescription practices.

Sample

A sample of 1,535 physicians stratified by region of the country and specialty as indicated by the AMA distribution responded to the survey. The survey was projected to take 15 minutes to complete, and physician panelists were compensated between $50 and $75 for their time, based on their specialty. The survey was conducted September 23–26 of 2010. To assess test-retest reliability, a random sample of 251 of the physicians who completed the initial survey was contacted to complete the same survey a second time (Time 2) to allow for assessment of stability of the questionnaire. This sample was obtained within 4 days. Physicians completing the survey the second time were compensated an additional $50–$75 for their participation.

Analyses

The following sets of analyses were conducted with the collected data: 1) demographic and descriptive characteristics of participating physicians; 2) means, standard deviations, and distributions of survey items; 3) total scale internal consistency; 4) principal components analysis (PCA); and 5) test-retest reliability. For sets 1 and 2 above, frequencies and percentages were calculated for categorical variables, and means and standard deviations for continuous variables. An oblique rotation was used for the PCA. Eigenvalues >1.0 were considered for inclusion in the final model, and scree plots were also evaluated for natural breaking points in the variance accounted for by the solution. Cronbach’s alpha was calculated to assess internal consistency, and Pearson r correlations on these scores between Time 1 and Time 2 were used to assess test-retest reliability.

Results Phase 3

A total of 1,535 responses were acquired with an overall response rate (number of physicians invited to participate that actually responded to survey) of 47%. Response rates for the various specialties were as follows: Anesth (60%), PM (60%), FP (51%), Intern (51%), Ortho (45%), PM&R (40%), Psych (40%), Surg (39%), Neurol (33%), and Rheum (15%).

Demographic and descriptive characteristics of survey respondents are presented in Table 1. The majority of our sample respondents were male (83%), 45 to 60 years of age (53%), and had been in practice for >19 years (32%). With regards to training, 16% were board certified in pain and more than half (65%) practiced in a clinic or hospital setting. Of the physicians who indicated they prescribed opioids for CNCP, 25% prescribed opioids for more than 50% of these patients, whereas 23% prescribed opioids for only 1 to 10% of these patients. Physicians with a higher weekly volume of visits for CNCP were more likely to report prescribing opioids ($\chi^2 [27] = 461.81, P < .001$). The medical specialties reporting more than 50% of their weekly patient volume involved treatment of CNCP included PM (81.6%), PM&R (64.4%), and Rheum (63.8%) samples. Fewer than 16% of the remaining specialists reported a weekly patient CNCP volume more than 50%.

Means and standard deviations of individual questionnaire items are presented in Table 2. A total of 7 items had a mean score of >7 on the 0 to 10 scale with 10 being strongly agree, 3 of which were related to concerns about misuse/abuse and dependence. Physicians strongly agreed that patients “sometimes take opioids for reasons other than pain” (mean = 7.42, SD = 2.24) and that “addiction” (mean = 7.43, SD = 2.16) and “physical dependence” (mean = 7.35, SD = 2.06) were “impediments to taking opioids for long periods of time.” Moreover, physicians also strongly disagreed with the statement “Patients rarely misuse/abuse opioids” (mean = 3.37, SD = 2.36).
Other notable impediments to prescribing were concerns about the development of tolerance with extended use of opioids. On average, physicians strongly agreed with the statement “taking opioids for long periods of time will decrease their efficacy” (mean = 7.15, SD = 2.11) and “tolerance is an impediment to taking opioids for a long period of time” (mean = 7.27, SD = 2.03). Physicians also strongly agreed with the statement “I avoid prescribing opioids for long periods of time whenever possible” (mean = 7.14, SD = 2.60), as well as “I believe Schedule II and Schedule III opioids should be prescribed as required based on individual patient characteristics” (mean = 7.13, SD = 1.96). Consistent with earlier studies, on average, physicians strongly disagreed that their education regarding pain evaluation and treatment was adequate (mean = 3.88, SD = 2.55).

### Internal Consistency

Cronbach’s alpha for the questionnaire (N = 1,535) was .87 and for the individual subscales was as follows: Impediments and Concerns = .89; Perceived Effectiveness = .87; Schedule II versus III Opioids = .81; Medical Education = .83; and Tamper Resistant Formulations and Dosing = .62.

### PCA

We conducted a PCA to examine the dimensionality of the 54 scale questions of the CAOS concerning beliefs and practices surrounding opioid use for CNCP. Since some degree of a relationship was anticipated among items, an oblique rotation—direct oblimin—was selected to allow for factor correlation.

Means, standard deviations of individual questionnaire items, and PCA results (ie, pattern matrix) are presented in Table 2. The PCA resulted in 5 components, accounting for a total variance of 43.17%. An item with a loading of >.44 was considered to load on a component, and cross-loading was defined as <.15 difference between 2 loadings. Items that cross-loaded or that did not load on any component were eliminated from the final component interpretation. Fifteen out of the 54 questions did not meet the criteria for loading on the 5 components, and 1 item (“I would choose not to prescribe long-acting or extended-release opioids”) was complex, loading on more than 1 component.
<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Comp 1</th>
<th>Comp 2</th>
<th>Comp 3</th>
<th>Comp 4</th>
<th>Comp 5</th>
<th>M (SD)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q43: Physical dependence is an impediment to taking opioids for long periods of time.</td>
<td>.74</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7.35 (2.06)</td>
</tr>
<tr>
<td>Q26: Tolerance is an impediment to taking opioids for long periods of time.</td>
<td>.73</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7.27 (2.03)</td>
</tr>
<tr>
<td>Q31: Addiction is an impediment to taking opioids for long periods of time.</td>
<td>.70</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7.49 (2.16)</td>
</tr>
<tr>
<td>Q34: Long-term use of opioids is overprescribed for patients with chronic non-cancer pain.</td>
<td>.68</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.40 (2.21)</td>
</tr>
<tr>
<td>Q37: Cognitive functioning side effects are an impediment to taking opioids for long periods of time.</td>
<td>.68</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.47 (2.00)</td>
</tr>
<tr>
<td>Q24: Taking opioids for long periods of time will decrease their efficacy.</td>
<td>.67</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7.15 (2.11)</td>
</tr>
<tr>
<td>Q38: Long-term opioids are an impediment to physical functioning.</td>
<td>.65</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.91 (2.13)</td>
</tr>
<tr>
<td>Q42: I avoid prescribing opioids for long periods of time whenever possible.</td>
<td>.60</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7.14 (2.60)</td>
</tr>
<tr>
<td>Q21: Patients have too high expectations for the benefits of long-term use of opioids.</td>
<td>.60</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.94 (1.92)</td>
</tr>
<tr>
<td>Q35: Patient compliance is a concern for me in prescribing opioids for long periods of time.</td>
<td>.50</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.68 (2.17)</td>
</tr>
<tr>
<td>Q15: Depressed mood is an impediment to taking opioids for long periods of time.</td>
<td>.49</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.23 (2.41)</td>
</tr>
<tr>
<td>Q22: My negative experience with prescribing opioids for long periods of time for chronic non-cancer pain has led me to change my prescribing practices.</td>
<td>.49</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.49 (2.43)</td>
</tr>
<tr>
<td>Q29: Gastrointestinal side effects are an impediment to taking opioids for long periods of time.</td>
<td>.48</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.31 (2.01)</td>
</tr>
<tr>
<td>Q26: Prescribing opioids for long periods of time is burdensome for physicians.</td>
<td>.48</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.91 (2.21)</td>
</tr>
<tr>
<td>Q47: Long-term use of opioids is not warranted for many of my chronic non-cancer pain patients.</td>
<td>.46</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.98 (2.38)</td>
</tr>
<tr>
<td>Q33: In general, opioids are effective for mixed pain.</td>
<td>—</td>
<td>.75</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.95 (1.76)</td>
</tr>
<tr>
<td>Q28: In general, opioids are effective for nociceptive pain.</td>
<td>—</td>
<td>.71</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.99 (1.95)</td>
</tr>
<tr>
<td>Q26: Opioids are most effective treatments available for persistent pain.</td>
<td>—</td>
<td>.67</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.08 (2.39)</td>
</tr>
<tr>
<td>Q45: In general, opioids are effective for neuropathic pain.</td>
<td>—</td>
<td>.65</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>4.78 (2.28)</td>
</tr>
<tr>
<td>Q27: Taking opioids for long periods of time is necessary for many of my chronic non-cancer pain patients.</td>
<td>—</td>
<td>.65</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.90 (2.33)</td>
</tr>
<tr>
<td>Q19: Opioids are effective in controlling chronic non-cancer pain.</td>
<td>—</td>
<td>.62</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.42 (2.10)</td>
</tr>
<tr>
<td>Q39: Symptomatic relief is a sufficient justification for prescribing opioids for long periods of time.</td>
<td>—</td>
<td>.52</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.22 (2.00)</td>
</tr>
<tr>
<td>Q41: My positive experience with prescribing opioids for long periods of time for chronic non-cancer pain has led me to increase my prescribing of the drugs.</td>
<td>—</td>
<td>.46</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>4.26 (2.39)</td>
</tr>
<tr>
<td>Q23: Physicians have an obligation to treat patients’ chronic non-cancer pain with opioids if their pain is not well controlled by other measures.</td>
<td>—</td>
<td>.45</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.89 (2.58)</td>
</tr>
<tr>
<td>Q61: Increased administrative burden prevents me from prescribing Schedule II opioids.</td>
<td>—</td>
<td>—</td>
<td>.88</td>
<td>—</td>
<td>—</td>
<td>5.29 (2.53)</td>
</tr>
<tr>
<td>Q60: Fear of DEA scrutiny inhibits me from prescribing Schedule II opioids.</td>
<td>—</td>
<td>—</td>
<td>.85</td>
<td>—</td>
<td>—</td>
<td>4.90 (2.70)</td>
</tr>
<tr>
<td>CQ59: Increased regulatory requirements with Schedule II opioids inhibit me from prescribing Schedule II opioids.</td>
<td>—</td>
<td>—</td>
<td>.82</td>
<td>—</td>
<td>—</td>
<td>5.40 (2.43)</td>
</tr>
</tbody>
</table>
### Table 2. Continued

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Comp 1</th>
<th>Comp 2</th>
<th>Comp 3</th>
<th>Comp 4</th>
<th>Comp 5</th>
<th>M (SD)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q55: I prefer not to prescribe Schedule II opioids.</td>
<td></td>
<td>4.9</td>
<td></td>
<td></td>
<td></td>
<td>6.01 (2.62)</td>
</tr>
<tr>
<td>Q56: I prefer Schedule III to Schedule II opioids.</td>
<td></td>
<td>4.8</td>
<td></td>
<td></td>
<td></td>
<td>5.81 (2.32)</td>
</tr>
<tr>
<td>Q65: I would choose not to prescribe long-acting or extended-release opioids.</td>
<td></td>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td>4.36 (2.87)</td>
</tr>
<tr>
<td>Component 4: Medical Education, $R^2 = 4.70$</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Q48: My education regarding pain evaluation and treatment during medical school as appropriate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Q49: My education regarding pain evaluation and treatment during residency training was appropriate.</td>
<td></td>
<td></td>
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<tr>
<td>Q50: My current practice involving the use of opioids for the treatment of chronic non-cancer pain patients is consistent with my training.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Component 5: Tamper Resistant Formulations and Dosing, $R^2 = 3.56$</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Q44: For chronic pain, giving opioids on a regular schedule is preferred over PRN dosing.</td>
<td></td>
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<td>Q53: I would prescribe a TRF form over a generic standard form for my patients even if it was more expensive.</td>
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<tr>
<td>Q64: I would be likely to obtain the necessary training and education.</td>
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<td>Q52: I would be more likely to prescribe opioids if TRF formulas were available.</td>
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<tr>
<td>Items that did not load on any factor and were deleted from final scale</td>
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<tr>
<td>Q14: Patient demographics (for example age, sex, race) influence my prescribing opioids on a long-term basis.</td>
<td>5.06 (2.89)</td>
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<tr>
<td>Q16: Patients sometimes take opioids for reasons other than pain (eg, anxiety, stress, sleep).</td>
<td>7.42 (2.24)</td>
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<td>Q17: Patients rarely misuse/abuse opioids.</td>
<td>3.37 (2.36)</td>
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<td>Q18: The majority of my patients prescribed opioids for long periods of time take them as directed.</td>
<td>5.66 (2.07)</td>
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<td>Q20: Respiratory depression is an impediment to taking opioids for long periods of time.</td>
<td>5.35 (2.59)</td>
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<td>Q25: Opioids are the most effective treatments available for persistent pain.</td>
<td>5.53 (2.24)</td>
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<tr>
<td>Q26.2: My opioid prescribing is influenced by my pharmacy benefits package.</td>
<td>3.84 (2.87)</td>
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<tr>
<td>Q30: Increasing opioid-related mortalities has influenced my opioid prescribing habits.</td>
<td>5.22 (2.49)</td>
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<tr>
<td>Q32: Concerns about diversion affect my willingness to prescribe opioids.</td>
<td>6.68 (2.17)</td>
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<td>Q40: I believe standard practice policies would be beneficial in helping to make decisions regarding the prescription of opioids for long periods of time for certain chronic non-cancer pain patients.</td>
<td>6.82 (2.11)</td>
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<tr>
<td>Q54: I would try to prescribe a TRF over the generic/standard form only for those patients with higher abuse potential.</td>
<td>6.91 (2.23)</td>
<td></td>
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<tr>
<td>Q57: I believe Schedule III and Schedule II opioids should be prescribed as required based on individual patient characteristics.</td>
<td>7.13 (1.96)</td>
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<tr>
<td>Q58: I have concerns about decreased patient tolerability with Schedule II opioids compared to Schedule III.</td>
<td>5.43 (1.98)</td>
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<td>Q62: I believe both short-acting and long-acting opioids may be prescribed when needed to treat chronic non-cancer pain.</td>
<td>6.96 (2.09)</td>
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<td>Q63: I prefer long-acting to short-acting opioids to treat chronic non-cancer pain.</td>
<td>6.30 (2.28)</td>
<td></td>
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Abbreviation: Comp, component.

NOTE. *0 = do not agree, 10 = agree strongly or completely.
Analyses

Aim 2: CAOS Assessment of Attitudes

Test-Retest Reliability (Stability)

To examine test-retest reliability (ie, stability over time), a subset (n = 250) of the total sample (N = 1,535) were contacted between 2 and 3 weeks following completion of the questionnaire and asked to complete a follow-up questionnaire regarding their beliefs about opioids (Time 2). Response rates for the various specialties were as follows: Anesth (61%), PM (55%), Intern (48%), FP (45%), Surg (45%), Ortho (40%), Psych (39%), Neurol (35%), PM&R (34%), and Rheum (25%). To evaluate test-retest reliability, we calculated mean component scores for Time 2 for the test-retest reliability subset, and then calculated Pearson r correlation coefficients between these scores for Time 1 and Time 2. Correlations were moderate to large for all component summary scores (.62–.78), as well as for the total scale score (r = .78).

Aim 2: CAOS Assessment of Attitudes and Behaviors

We assessed clinician attitudes about opioids and prescribing practices using the newly validated CAOS instrument and the same representative sample of 1,535 physician participants as used in Phases 2 and 3 of the instrument development procedure described above (see Table 1 for the characteristics of the sample).

Analyses

The distribution of survey items was assessed using frequencies and percentages for categorical variables and means and standard deviations for continuous variables. Five, 3-way analysis of variance tests (ANOVAs), with prespecified demographic and practice characteristics (ie, age, gender, and weekly volume of patients treated with CNCP) as independent variables, and mean component scores for the 5 CAOS domains as the dependent variables were used to assess differences across demographic and practice characteristics hypothesized to affect beliefs and practices.

To evaluate differences in beliefs and attitudes among regions and specialties, significant demographic and practice characteristics from the above analyses were utilized as covariates in a series of analyses of covariance (ANCOVAs) with mean subscale scores for each of the 5 CAOS subscales as dependent variables and region of practice and specialty as independent variables. Tukey post hoc tests were conducted on any significant omnibus results. Finally, a hierarchical multiple linear regression analysis was conducted to evaluate the relationship between the 5 CAOS subscales as predictors of the rate of opioid prescribing for CNCP, controlling for demographic, practice, region, and medical specialty characteristics. Because this was an exploratory study, a significance level of P < .05 was used for interpretation of significant findings for all analyses with no corrections for multiplicity (see Appendix 1 for scale scoring calculations).

Results

Differences in CAOS Subscale Scores Across Demographic Variables, Regions, and Specialties

Demographic Characteristics

To evaluate differences in beliefs and practices among demographic and practice characteristics (ie, age, gender, and weekly volume of CNCP patients), 5, 3-way ANOVAs were performed on 5 dependent variables: the mean subscale scores for Impediments and Concerns, Perceived Effectiveness, Schedule II vs III Opioids, Medical Education, and Tamper Resistant Formulations and Dosing (Table 3). Possible interactions between predictor variables were assessed, but no significant 2- or 3-way interactions were found in any model (results not shown). Beliefs about Impediments and Concerns surrounding opioid use for CNCP did not vary among any of the 3 predictor variables. Beliefs about Perceived Effectiveness varied significantly across gender, age, and volume of chronic pain patients. Male physicians on average agreed more strongly with beliefs about the efficacy of opioids for CNCP than females; physicians younger than 45 years were slightly less confident compared to physicians between 45 and 60 years (P < .001); and physicians with less than 10% volume of chronic pain patients believed significantly less in efficacy compared to those with 11–30% (P = .004), 31–50% (P = .02), and >50% (P < .001), respectively.

Beliefs about Schedule II versus III opioids varied significantly by the volume of chronic pain patients in their practices. Physicians treating >50% of patients with CNCP per week on average had less concern or avoidance of prescribing Schedule II versus III opioids than physicians treating 11–30% of patients with CNCP per week (P = .001).
Beliefs about Medical Education varied significantly by age and volume of chronic pain patients treated. Physicians younger than 45 years indicated greater agreement that education and training for treatment of CNCP was appropriate and consistent with practice, as compared to physicians between 45 and 60 years ($P < .001$). Physicians whose practices consisted of fewer than 10% of chronic pain patients indicated significantly less agreement with education and training for treatment of CNCP being appropriate and consistent with current practice, as compared to those with 11–30% ($P < .001$), 31–50% ($P < .001$), and >50% ($P = .02$), respectively.

Beliefs about TRFs and Dosing varied by the volume of CNCP patients treated. Physicians with less than 10% volume of CNCP patients indicated significantly less confidence or benefit of TRFs compared to those with 11–30% ($P = .001$), 31–50% ($P = .04$), and >50% ($P < .001$). Each significant demographic variable was covaried in the subsequent analyses below to evaluate differences among regions and specialties.

Differences Among Regions of the Country

To assess for differences in prescribing beliefs among regions of the country, a 1-way ANOVA was conducted, with region of practice as the independent variable and average Impediments and Concerns score as the dependent variable. No significant differences among geographical regions were found. Similarly, ANCOVAs for each of the remaining 4 component scores controlling for significant demographic and practice characteristics indicated no significant differences among regions.

Differences Among Specialties

Five ANOVA or ANCOVA (where appropriate) analyses were conducted to assess differences in beliefs about opioids among medical specialties. A 1-way ANOVA, with medical specialty as the independent variable, and mean Impediments and Concerns score as the dependent variable, indicated an overall main effect ($F_{9, 1525} = 16.27, P < .001, \eta^2 = .05$). The average scores for beliefs about Impediments and Concerns (eg, dependence, side effects, patient compliance) by medical specialty are presented in Fig 1. Ortho, on average, indicated the greatest concern regarding impediments to opioids for CNCP (mean = 7.34, SD = 1.21), and this group was significantly different than Anesth (mean = 6.36, SD = 1.35), IM (mean = 6.59, SD = 1.31), PM (mean = 5.99, SD = 1.18), PM&R (mean = 5.89, SD = 1.32), and Psych (mean = 6.77, SD = 1.34) samples.
PM and PM&R (mean = 5.89, SD = 1.32) samples indicated the least degree of concern regarding impediments to opioid use for CNCP (mean = 5.99, SD = 1.18), and were significantly different from Neurol (mean = 6.8, SD = 1.25), Ortho (mean = 7.34, SD = 1.21), Surg (mean = 6.99, SD = 1.42), and Psych (mean = 6.77, SD = 1.34) samples.

An ANCOVA with gender, age, and weekly volume of chronic pain patients as covariates, the Perceived Effectiveness subscale score as the dependent variable, and medical specialty as the independent variable, indicated a significant main effect for medical specialty (F9, 1522 = 13.32, *P* < .001, partial *h*² = .07). The average scores for effectiveness of opioids for CNCP by medical specialty are presented in Fig 2. The Ortho sample, on average, had the lowest confidence in efficacy of opioids for CNCP (M = 4.64, SD = 1.58), and, after controlling for demographic variables, were significantly different from all other specialists except Rheum. PM (mean = 6.07, SD = 1.13) and PM&R (mean = 5.98, SD = 1.72) samples on average indicated the greatest confidence in efficacy of opioids, and PM were significantly different from Rheum (mean = 5.24, SD = 1.69) in addition to the Ortho sample as indicated above.

An ANCOVA, with weekly volume of CNCP patients as a covariate, mean Schedule II versus Schedule III Opioids subscale score as the dependent variable, and medical specialty as the independent variable, indicated a significant main effect for medical specialty (F9, 1524 = 5.03, *P* < .001,

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**Figure 1.** Average score by medical specialty for Factor 1: Impediments and concerns surrounding opioid use. A, different from Anesthesiology; G, different from General/Family; I, different from Internal Medicine; N, different from Neurology; O, different from Orthopedics; P, different from Pain Management; PMR, different from Physical Medicine and Rehabilitation; S, different from Surgery; R, different from Rheumatology; PSY, different from Psychiatry; all at *P* < .05.

**Figure 2.** Average score by medical specialty for Factor 2: Perceived effectiveness of opioids. A, different from Anesthesiology; G, different from General/Family; I, different from Internal Medicine; N, different from Neurology; O, different from Orthopedics; P, different from Pain Management; PMR, different from Physical Medicine & Rehabilitation; S, different from Surgery; R, different from Rheumatology; PSY, different from Psychiatry; all at *P* < .05.
partial $\eta^2 = .03)$. Average scores by medical specialty for beliefs regarding Schedule II versus III are presented in Fig 3. PM (mean = 4.58, SD = 1.94) and PM&R (mean = 4.42, SD = 2.08) samples indicated the least degree of concern or avoidance of prescribing Schedule II as opposed to Schedule III opioids, and were significantly different than G/FP, IM, Neurol, Ortho, and Psych samples. An ANCOVA, with age and weekly volume of CNCP patients as covariates, beliefs about Medical Education subscale score as the dependent variable, and medical specialty as the independent variable indicated no significant differences in beliefs among medical specialties.

Lastly, an ANCOVA with weekly volume of CNCP patients as a covariate, beliefs about TRFs and Dosing as the dependent variable, and medical specialty as the independent variable, indicated a significant main effect for medical specialty ($F_{9, 1524} = 5.11, P < .001$, partial $\eta^2 = .03)$. Average scores by medical specialty for beliefs regarding Tamper Resistant Formulations and Dosing are presented in Fig 4. After controlling for weekly volume of CNCP patients, the Ortho sample on average indicated less preference (mean = 5.96, SD = 1.61) for regular schedule versus PRN (ie, on an as needed basis), and less confidence in TRFs, and were significantly different than Anesth (mean = 6.76, SD = 1.55), G/FP (mean = 6.64, SD = 1.30), IM (mean = 6.61, SD = 1.53), PM (mean = 6.95, SD = 1.08), Surg (mean = 6.33, SD = 1.61), and Psych (mean = 6.22, SD = 1.82) samples.

**Figure 3.** Average score by medical specialty for Factor 3: Schedule II versus III. $^A$, different from Anesthesiology; $^G$, different from General/Family; $^I$, different from Internal Medicine; $^N$, different from Neurology; $^O$, different from Orthopedics; $^R$, different from Pain Management; $^{PM}$, different from Physical Medicine & Rehabilitation; $^S$, different from Surgery; $^R$, different from Rheumatology; $^{PSY}$, different from Psychiatry; all at $P < .05$.

**Figure 4.** Average score by medical specialty for Factor 5: Tamper resistant formulations and dosing. $^A$, different from Anesthesiology; $^G$, different from General/Family; $^I$, different from Internal Medicine; $^N$, different from Neurology; $^O$, different from Orthopedics; $^R$, different from Pain Management; $^{PM}$, different from Physical Medicine and Rehabilitation; $^S$, different from Surgery; $^R$, different from Rheumatology; $^{PSY}$, different from Psychiatry; all at $P < .05$. 

[Image 163x588 to 448x671] [Image 162x137 to 450x232]
Survey respondents were asked, “Approximately what percent of the patients with chronic non-cancer pain that you currently manage do you prescribe opioids?” This variable was used as the dependent variable in a hierarchical multiple regression analysis to determine the strength of the relationships between the rate of opioid prescribing and the 5 subscales of the CAOS (Step 3), after controlling for select demographic (ie, age of physician and gender; Step 1), and region and medical specialty characteristics (Step 2). The results of this analysis indicated that the CAOS subscales accounted for a significant amount of variance (R² change = .12), after controlling for demographic (R² change = .01) and region and medical specialty (R² change = .02). Overall, the model accounted for 15% of the variance for the rate of prescribing, with Perceived Effectiveness (β = .27, P < .001), Schedule II vs III Opioids (β = -.13, P < .001), and beliefs about TRFs and Dosing (β = .09, P < .001) being significant predictors of the rate of opioid prescribing (mean subscale scores for Impediments and Concerns and Medical Education failed to research statistical significance).

Discussion

The primary objectives of the current study were to 1) develop a comprehensive and psychologically sound measure to assess providers’ practices and beliefs about the use of opioids for patients with CNCP; and 2) use this scale to evaluate differences in physicians’ beliefs and practices across geographic regions and medical specialties. Using the Turk et al22 1994 investigation for comparison, we sought to assess how these beliefs and practices evolved over time in parallel with changes in regulation, availability of TRFs, changes in misuse and abuse, and popular beliefs.

Based on interviews and pilot testing of a national survey of 1,535 physicians, we developed the CAOS. The final instrument consists of 38 items within 5 subscales (Impediments and Concerns, Perceived Effectiveness, Medical Education, Schedule II vs III Opioids, and Tamper Resistant Formulations and Dosing) and can be completed in 10 to 15 minutes. The internal reliability and test-retest stability of the CAOS were excellent. Although the first 3 scales cover topics that have been included in previous surveys,22 there has been less attention given to issues related to attitudes and practices pertaining to scheduling and long-acting (extended release) versus short-acting (immediate release) formulations. TRFs are of relatively recent origin and we are not aware of any surveys of beliefs about these formulations or their use.

The majority (71.4%) of respondents reported long-term use of opioids in fewer than 30% of their weekly CNCP patients. Survey results indicated that physicians who had a higher CNCP patient volume were 1) more likely to report prescribing opioids; 2) less concerned with impediments surrounding opioids; 3) less concerned or avoidant of prescribing Schedule II versus III opioids; 4) more confident in the benefit of TRFs; and 5) more likely to agree that they were trained adequately for treating CNCP. These results complement Potter et al,19 who found that a lower concern about physical dependence and more recent graduation from medical school significantly predicted a greater willingness to prescribe Schedule II and III opioids. These results are also consistent with findings from other studies indicating that uneasiness regarding long-term prescribing of opioids is associated with inexperience with these medications.1,21 In the current study, no differences were found between specialty groups in their beliefs on the adequacy of the medical education training they received, which is in contrast to Turk et al,22 who found that G/FP and Ortho/Neurosurgeons were more satisfied with their pain education in medical school than samples of Neur and Rheums. This finding may indicate the changing content of medical education programs in their emphasis on pain management education.

The PM, PM&R, and Rheum samples had the highest weekly volume of chronic pain patients. Rheums were comparable to PM&R and PM samples regarding beliefs about Schedule II versus III. However, after controlling for patient volume, PM and PM&R samples indicated greater confidence regarding the efficacy of opioids as compared to Rheum, despite a comparable volume of CNCP patients. One factor that might account for this finding is the potential differences in the pain patient populations among these specialties. The majority of CNCP patients with long-term pain treated by Rheums on a regular basis have osteoarthritis, rheumatoid arthritis, and fibromyalgia. Opioids are not currently approved for fibromyalgia, have not been recommended for this diagnosis by practice guidelines, and are commonly not thought of as effective for symptom management in this population.7 Additionally, patients with osteoarthritis may be older than the average pain patient being treated by a PM&R specialist. The decreased confidence in efficacy may stem from greater concerns about treating elderly patients, including increased incidence of falls and drug-drug interactions.

Overall, the Ortho sample had the most negative view of opioids, including the least confidence in efficacy and the greatest concern regarding impediments and barriers to opioid use. Orthos often treat patients with acute injuries and have less CNCP patient volume. The decreased volume does not entirely account for their increased concern in impediments and decreased belief in efficacy as compared to other specialists. After controlling for weekly volume of CNCP patients, Orthos were significantly different from Anesth, G/FP, IM, PM, Surg, and Psych samples in their concerns. Although Turk et al22 did not find significant differences between specialty groups on concerns about side effects of opioids, they did find that orthopedic/neurosurgeons reported the highest mean levels of concern about opioid addiction, tolerance, and dependence, as well as the lowest mean frequency of prescribing opioids, demonstrating the stability of this finding over 20 years.

No differences in beliefs or practices were identified among regions of the country. In 1994, Turk et al22 also
reported no differences in concerns about addiction, dependence, or tolerance; however, physicians in the Midwest were less likely to prescribe opioids long-term than physicians in the Southeast or West. This finding was not replicated in the current study and could reflect growing nationwide concern regarding misuse and abuse of prescription opioids, although this hypothesis could not be statistically evaluated because rates of responding were measured differentially across studies. Geographical differences have also been reported comparing attitudes and beliefs concerning opioids for CNCP in small communities versus large communities. A comparison of community size was not made in the current study, but administration of the CAOS instrument in rural versus urban communities could be an area of future research.

Our results indicated that physicians' beliefs and attitudes regarding opioids vary, as assessed by the 5 subscales of the CAOS measure. We then used these subscales of beliefs about prescribing (eg, Medical Education, Perceived Effectiveness) to assess if and what types of beliefs influence opioid prescribing rates in practice. Indeed, we found that Perceived Effectiveness, Schedule II versus III Opioids, and beliefs about TRFs and Dosing were all significantly predictive of the percentage of patients with CNCP in which physicians prescribe opioids. Specifically, increased concern with Schedule II opioids was associated with lower rates of prescribing, while higher rated beliefs in the efficacy of opioids for treatment of CNCP and an increased preference for TRFs were associated with higher rates of prescribing. Our findings in regard to Schedule II opioids coincide with a recent survey in Georgia that found that physicians who did not prescribe Schedule II opioids were significantly more likely to believe that using opioids to manage CNCP was unacceptable. Little is known regarding the influence of TRFs on prescribing practices: future research should assess not only whether rates for prescribing of TRFs increase, but also whether physicians prescribe TRFs at a higher rate compared with traditional opioids.

The overall response to the questionnaire was relatively high (47%) for surveys of this type, and almost twice as high as reported by Turk et al22 in the largest national survey to date. A limitation is that the questionnaire was administered to a preexisting panel maintained by a private company, and it is possible that there is some bias in the set of physicians who are willing to serve on such panels. However, the panel is carefully screened to be representative of physicians in the United States. Although this panel is representative, the proportion of female respondents in our study was relatively low, and the number of responders within each medical specialty varied relative to the available physician pool. Unfortunately, no data were available on nonresponders to enable us to assess for potential responder bias. Moreover, the 14 respondents included in the focus groups used to augment the questionnaire content were all from Washington State and were pain specialists and general practitioners and therefore were not a representative sample of medical disciplines who prescribe opioids. The experiences and beliefs from this group of clinicians could differ from other provider groups across the country. Thus, future research should be conducted to confirm the construct validity of the CAOS. In future research it would be useful to assess how closely related the CAOS domains are to other questionnaires of clinician attitudes about opioids, as well as to assess the component structure of the CAOS with comparable samples and with samples of providers other than physicians (eg, dentists, advance practice nurses).

Despite the limitations acknowledged, there are a number of strengths of the current research. It is the first study of which we are aware that used a carefully designed sequence of steps to develop a psychometrically sound scale on providers' attitudes and beliefs about opioids. Although multiple survey investigations have been conducted since Turk et al’s survey, subsequent investigations have not assessed the psychometric properties of their survey instrument, and have been limited to a particular geographic region11,16,23 or medical specialty.2,5,6 As an update to our earlier study, we similarly surveyed a large, nationally representative sample of physicians from multiple medical specialties. The final CAOS measure is timely as it includes beliefs related to scheduling, dosing, and formulations of opioids, and the stability of this survey will enable us to use this instrument to update our current findings in future research.

Acknowledgment

We would like to thank Christina Kemp for her assistance in interviewing focus group participants.

References


6. Greenwald BD, Narcessian EJ, Pomeranz BA: Assessment of physiatrists' knowledge and perspectives on the use of...


Appendix 1

Scoring and interpretation of each of the scales is as follows:

(1) Impediments and Concerns scale: Take the average of Q43, Q26, Q31, Q34, Q37, Q24, Q38, Q46, Q42, Q21, Q35, Q15, Q22, Q29, Q36, and Q47. Score on a 0–10 scale, with higher scores associated with increased concerns.

(2) Effectiveness scale: Take the average of Q33, Q28, Q26.1, Q45, Q27, Q19, Q39, Q41, and Q23. Score on a 0–10 scale, with higher scores associated with increased beliefs in efficacy of opioids for treatment of CNCP.

(3) Schedule II versus III Opioids: Take average score of Q61, Q60, Q59, Q55, Q56. Score on a 0–10 scale, with higher scores associated with decreased preference and increased concern surrounding Schedule II.

(4) Medical Education: Take the average score of Q48, Q49, and Q50. Score on a 0–10 scale, with higher scores indicative of increased confidence in education received for the treatment of CNCP.

(5) Tamper Resistant Formulations and Dosing: Take average score of Q53, Q64, and Q52. Score on a 0–10 scale, with higher scores indicative of preference for more controlled dosing and tamper resistant formulations.