

Original Contribution

Evaluation of Primary Care Physician Chronic Pain Management Practice Patterns

David A. Provenzano, MD¹ Khalid M. Kamal, PhD², and Vincent Giannetti, PhD²

From: ¹Pain Diagnostics and Interventional Care, Sewickley, Pennsylvania; ²School of Pharmacy and Graduate School of Pharmaceutical Sciences Division of Pharmaceutical, Administrative and Social Sciences Duquesne University, Duquesne University

Address Correspondence:
David Provenzano, MD
Pain Diagnostics and Interventional Care
301 Ohio River Blvd, Suite 203
Sewickley, Pennsylvania 15136
E-mail:
davidprovenzano@hotmail.com

Disclaimer: There was no external funding in the preparation of this manuscript.

Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

Manuscript received:
02-15-2018

Revised manuscript received:
05-10-2018

Accepted for publication:
05-22-2018

Free full manuscript:
www.painphysicianjournal.com

Background: The management of chronic pain is complex and often involves the integration of multiple clinical, humanistic, and economic factors. Primary care physicians (PCPs) are often at the forefront of managing chronic pain and often initiate pharmacological pain management therapy. To date little is known surrounding the pain management practices of PCPs.

Objective: The purpose of this study is to assess the knowledge and practice of PCPs in management of chronic pain.

Study Design: A survey.

Setting: Western region of Pennsylvania, US.

Methods: A cross-sectional questionnaire survey evaluated PCPs pain management treatment practices including assessment of chronic pain, procedural activities surrounding therapy, decision-making input, and knowledge for therapeutic pain management including the 5 main classes of medications. The questionnaire was developed based on a review of the literature including published chronic pain guidelines. The questionnaire was mailed to a convenience sample of 300 PCPs practicing in Western Pennsylvania. The study was approved by the University Institutional Review Board.

Results: The survey had a response rate of 16%. The respondents on average treated 30 chronic pain patients per month predominately in a community setting. The most common conditions treated included osteoarthritis, back and neuropathic pain. Although the major reported source of education was published literature, only 67% respondents referred to pain management guidelines. Multiple knowledge and practice gaps were identified surrounding pharmacological treatment, medication management including compliance practices, and pain assessment.

Limitations: Although low, the response rate is comparable to response rates for other chronic pain management topics including anticoagulation and prescription patterns for chronic pain physicians. Also, greater than 50% of the respondents were from private practice, therefore, the results may not pertain to other practice settings including academic and hospital-based practices.

Conclusions: The survey provided significant insight into PCP practices and highlights areas for future educational efforts. Further opioid prescribing education would be beneficial especially regarding the utilization of opioid risk assessment tools, the selection of opioids, and opioid end organ effects. Furthermore, patient education on the realities of chronic pain management and the importance of nonpharmacological treatment are needed in order to reduce the challenges faced by PCPs surrounding chronic pain management.

Key words: Chronic pain, primary care physician, pain management, survey questionnaire

Pain Physician 2018; 21:E593-E602

Primarily care physicians (PCPs) are often at the forefront of pain treatment for the estimated 100 million Americans suffering from chronic pain. A 2003 survey conducted to gauge the perception of pain sufferers reported that most pain sufferers (63%) had seen their family doctor for help (1). Furthermore, a large percentage of a PCPs' practice will involve some management of chronic pain since the prevalence of chronic pain is more than the combined incidences of diabetes, heart disease, and cancer in the United States (US) (2).

The knowledge base of a PCP is critical to guiding appropriate pain management care. The management of chronic pain is complex and involves the integration of multiple clinical, humanistic, and economic factors (1). Primary care physicians are often involved in the initiation of pain management therapy, especially pharmacologic therapy. Appropriate treatment of chronic pain involves accurate patient assessment, adherence to evidence-based treatment guidelines, appropriate patient monitoring, and specialized physician knowledge of treatment interventions.

In the US, opioid prescriptions by PCPs has been increasing since 2007 without corresponding evidence for their widespread use for chronic noncancer pain (2). Recognizing the importance of PCPs in the management of pain and the opioid epidemic, the Center for Disease Control and Prevention (CDC) in March of 2016 issued PCP opioid prescribing guidelines (2-5). Some of the key action statements in the guidelines include: 1) preference for non-opioid medication for chronic pain treatment; 2) risks and benefits should be considered before opioids; 3) treatment goals for opioid therapy should be established; 4) consider lowest possible dose and consider risks when increasing to 50 morphine milligram equivalents or more per day; 5) avoid multiple opioids or benzodiazepines with opioids; 6) continued assessment at a minimum of every 3 months and review drug monitoring data for high risk patients; and 7) provide treatment options for patient with opioid use disorder.

Given the important role PCPs play in the management of chronic pain, it is surprising to note that the assessment, prescribing and monitoring of chronic pain patients in a primary care setting has not been extensively studied raising concerns regarding appropriate treatment. The aim of this study is to assess the knowledge and practice of PCPs in treating chronic pain patients. Specifically, the research will assess the

knowledge of PCPs regarding the therapeutics of pain medication, assessment and patient monitoring practices, within the framework of both evidence-based medicine and professional association guidelines for chronic pain treatment.

METHODS

Study Design

The cross-sectional questionnaire survey evaluated PCPs pain management treatment practices including adherence to evidence-based chronic pain management guidelines, level of patient monitoring, knowledge, educational sources, and patient challenges and barriers for appropriate chronic pain treatments. The study was approved by the University Institutional Review Board.

Instrument Description

The questionnaire was developed based on an extensive review of the literature including published professional association guidelines. The survey included close ended, fixed choice questions assessing physician knowledge and practice. Prior to administration, the questionnaire was tested for content validity and clarity by a pain specialist and was pilot tested on a limited number of PCPs (n = 5). The survey instrument is included in Appendix A.

Survey Administration

Following pilot testing, the questionnaire was mailed in the summer of 2015 to a convenience sample (n = 300) of PCPs practicing in Western Pennsylvania. The survey responses were evaluated for knowledge determination and compliance with evidence-based guidelines. When possible, the evidence-based knowledge questions were categorized as true or false responses if peer-reviewed references provided well-defined knowledge information. When conflicting or inconclusive evidence existed for a specific question, the question was classified as conflicting or inconclusive evidence. In addition, the opioid prescribing survey responses were compared to the 12 opioid prescribing recommendations detailed in the CDC Guideline for Prescribing Opioids for Chronic Pain to evaluate practice compliance prior to publication in 2016. In order to discuss the results, a threshold of greater than or equal to 75% adherence rate to evidence-based research was chosen for the evidence-based knowledge questions.

Statistical Analysis

Descriptive statistics were utilized for patient demographic and practice characteristics such as assessment and monitoring practices with categorical variables represented with n (%) and continuous variables reported as mean and standard deviation (SD). The respondents were asked to rank 6 sources of information in order: published literature, pharmaceutical drug representatives, expert opinion, medical liaisons, clinical experience and academic detailers. All statistical analysis was conducted using Statistical Package for Social Sciences version 22.0 (SPSS Inc., Armonk, NY: IBM Corp.).

RESULTS

A total of 48 useable responses were received for a response rate of 16%. Table 1 summarizes physician demographic and practice characteristics. The majority of the sample was comprised of middle-aged, male physicians with an average of 19 years in practice, primarily practicing in suburban settings treating an average of 20 chronic pain patients a week. In descending order osteoarthritis, back, and neuropathic pain were the most common pain states treated. Only 67% of respondents referred to pain management guidelines. The major source of educational information was published literature (58.3%) with clinical experience as the second highest rated source (31.3%). Educational information from drug representatives (2.1%), medical liaisons (4.2%), and academic detailers (4.2%) accounted for the least referenced educational sources.

Table 2 presents assessment practices for chronic pain. Approximately 50% of surveyed PCPs used pain assessment scales for chronic pain and continued their utilization at time of follow-up. For opioid pain management, greater than 68% of surveyed PCPs did not utilize opioid risk assessment tools either prior to initiation or at follow-up for opioid therapy.

Table 3 presents PCPs perceived importance of procedures/activities before initiating chronic pain therapy. Assessing physical history and discussing the risks and benefits of treatment were rated as highly important by 100% of the sample. Assessing psychiatric and medical comorbidities, medication history, identifying barriers, and discussing non-pharmacological treatment were rated as extremely important by over 90% of the sample. Furthermore, assessing pain duration, utilizing a written contract and categorizing pain based upon biological mechanism was extremely important to the majority of the sample. Using a pain rating scale for

Table 1. *Physician demographic and practice characteristics (n = 48).*

Characteristic	n (%)
Gender	
Female	13 (27.1)
Male	35 (72.9)
Age, mean+ SD	48.98 (11.45)
Years in Practice, mean+ SD	19.17 (11.44)
Type of Practice	
Hospital	5 (10.4)
Academic	4 (8.3)
Private Practice	28 (58.3)
Other	11 (22.9)
Location of Practice	
Urban	19 (39.6)
Suburban	27 (56.3)
Rural	1 (2.1)
Other	1 (2.1)
No. Chronic Pain Patients per Month, median, mean+ SD	20.00, 30.53 (30.40)
Referral to Guidelines for Therapy	
Yes	16 (33.3)
No	32 (66.7)
Diseases Treated for Chronic Pain*	
Cancer	38 (79.2)
Migraine	30 (62.5)
Neuropathic Pain	43 (89.6)
Nociceptive Pain	19 (39.6)
Osteoarthritis	46 (98.8)
Multiple Sclerosis	20 (41.7)
Radicular Pain	39 (81.3)
Mixed Types of Pain	30 (62.5)
Fibromyalgia	37 (77.1)
Back Pain	46 (95.8)
Visceral Pain	20 (41.7)

*The percentage represents the percent of primary care physicians surveyed that treat patients with the listed chronic pain state.

every visit was rated as low importance by slightly over half of the sample.

Table 4 reports the frequency of challenges that PCPs face in treating patients with chronic pain. The two most prevalent challenges cited were resistance to non-pharmacological treatment (mean = 4.23, SD = 0.92) and unrealistic treatment expectations (Mean = 4.17, SD = 0.86). Poor adherence and cultural beliefs were perceived as less frequent challenges. Chemical

Table 2. *Assessment of chronic pain (n = 48).*

	Yes n (%)	No n (%)
Use of Opioid Risk Assessment Tools before Treatment	15 (31.3)	33 (68.8)
Use of Assessment Tools for Follow-up	11 (30.6)	25 (69.4) ^a
Use of Pain Assessment Scales for Chronic Pain	26 (54.2)	22 (48.5)
Use of Pain Assessment Scales for Follow-up Care	25 (64.1)	14 (25.9) ^b

^amissing data = 12

^bmissing data = 9

Table 3. *Importance* of procedures/activities before and after initiating chronic pain therapy (n = 48).*

	Low n (%)	High n (%)	Mean	SD
Assessing Physical History		48 (100)	4.90	0.309
Assessing Psychiatric Comorbidities	2 (4.2)	46 (95.8)	4.73	0.536
Assessing Medical Comorbidities	3 (6.3)	45 (93.8)	4.6	0.610
Categorizing Patient Pain Based on Underlying Biological Mechanism	10 (20.8)	38 (79.2)	4.15	0.945
Assessing Medication History	1 (2.1)	47 (97.9)	4.81	0.445
Assessing Pain Duration	7 (14.6)	41 (85.4)	4.46	0.798
Identifying Barriers to Chronic Pain Treatment	4 (8.3)	44 (91.7)	4.52	0.652
Discussing Risk and Benefits of Chronic Pain Treatment		48 (100)	4.73	0.449
Utilizing a Written Contract for Pain Medication	5 (10.4)	43 (89.6)	4.38	0.866
Using a Pain Rating Scale for Every Visit	25 (52.1)	23 (47.9)	3.35	1.240
Discussing Non Pharmacological Therapy	1 (2.1)	47 (97.9)	4.69	0.512

* Measured on a scale of 1-5 where 1 = Not Important; 5 = Extremely important

Low importance = 1-3 on importance scale

High importance = 4-5 on importance scale

SD = Standard Deviation

Table 4. *Frequency* of challenges faced in treating patients with chronic pain (n = 48).*

	Mean	SD
Unrealistic Treatment Expectations	4.17	0.859
Aberrant Opioid Behavior	3.35	0.102
Poor Adherence	2.83	1.17
Chemical Dependency	3.54	1.09
Cultural Beliefs of the Patient	2.71	1.22
Lack of Social Support	3.58	1.04
Patient Health Literacy	3.23	1.12
Formulary Restrictions	3.19	1.21
Patient's Financial Problems	3.48	1.03
Resistance to Non-Pharmacological Treatments	4.23	0.928

* Measured on a scale of 1-5 where 1 = Not Frequent; 5 = Extremely Frequent

SD = Standard Deviation

Table 5. *Importance* of assessment parameters for selecting pharmacotherapeutic treatment in patients with chronic pain.*

	Mean	SD
Drug Effectiveness	4.17	0.559
Drug Safety	4.69	0.589
Drug Cost	4.19	0.79
Patient Preference for Therapy	3.29	1.03
Ease of Drug Administration	4.08	0.821
Patient Socioeconomic Status	3.31	1.206
Drug Interactions	4.52	0.714
Patient Medical History	4.56	0.649
History of Substance Abuse	4.85	0.412

* Measured on a scale of 1-5 where 1 = Not Important; 5 = Extremely Important

SD = Standard Deviation

dependency, lack of social supports and financial problems were viewed as somewhat more frequent.

The relevant factors involved in therapeutic agent selection are shown in Table 5. Patient factors including medical and substance abuse history as well as drug effectiveness, safety, cost, and drug interactions were all viewed as extremely important. Interestingly, patient preferences and socioeconomic status were rated as less important.

PCPs' knowledge on 5 main classes of medications (antidepressants, anticonvulsants, opioids, and acetaminophen and nonsteroidal anti-inflammatory drugs and topical agents) utilized for chronic pain were assessed (Table 6) (19-59). The first set of questions assessed the knowledge of evidence for antidepressant use. The respondents scored 75% or better adherence rate on 4 of the 12 conclusive evidence questions. Of particular note was that 29.2% and 16.6%, respectively, either cited no evidence or were not sure regarding the safe use of TCAs with cardiac patients. The requirement for ECGs for patients above 40 years of age was cited as no evidence or not sure by 25% and 29.1% of the respondents, respectively.

For the anticonvulsants questions, only 1 out of 8 had an adherence rate of greater than 75%. Approximately 37.6% of the respondents believed that it is safe to stop anti-epileptics which is not consistent with the available evidence recommending tapering because withdrawal symptoms can develop in addition to exacerbation of psychotic symptoms in vulnerable populations. Pregabalin can be associated with suicidal thoughts and depression and still 71.9% of the respondents either were not sure or cited no evidence. Also, the respondents did not meet the 75% adherence level for evidence regarding anticonvulsants use for nociceptive pain, caution for use for gabapentin and pregabalin in renal insufficiency and the use of gabapentin for lower back pain.

Regarding opiate prescribing, this study was conducted before the publication of the CDC guidelines (2-5). However, 3 of the survey questions paralleled the CDC guidelines. Regarding the use of opioids as first line therapy for chronic pain, while the CDC guidelines do not recommend opiates as a first line treatment, the respondents were divided based on the available evidence. Also, 90% of the respondents preferred long-acting opioids over short-acting while the CDC guidelines recommend the opposite. Finally, the CDC guidelines recommend against opioid doses exceeding 90 MME per day, but the respondents were split be-

tween no evidence or not sure with only 22.9% citing evidence for the guideline recommendation. Although the evidence is inconclusive or conflicting, the effectiveness of random drug screens compared to routine screens were endorsed by 91.7% of the respondents. A total of 89.7% of PCPS stated there was evidence demonstrating preference for the use of extended release opioids over immediate release and 39.6% stated that there was evidence of reduced respiratory depression when opioids are used for chronic pain management in comparison to acute pain management. For the 2 questions, which seem to have equivocal evidence [fixed interval versus PRN dosing (6), neonatal risk in pregnant women (7), driving safely on opioid prescriptions (8)] greater than 50% of the respondents stated that there was evidence for these practices.

Finally, for NSAIDs, acetaminophen, and topical agents, the 75% threshold for adherence to evidence was not achieved by the respondents regarding the following questions: acetaminophen as a better agent for first line therapy in lower back pain; capsaicin cream as first line therapy in HIV neuropathy; and lidocaine patch as an effective first line therapy for postherpetic neuralgia. Additional analyses was conducted comparing private practice physicians with all other categories primarily focusing on the opioid knowledge questions that parallel the CDC guidelines and drug information sources. There were no statistical differences observed between the groups on these selected parameters.

DISCUSSION

Primary care physicians are often at the forefront of chronic pain management. The survey results here provide significant insight into PCP practices and highlight areas for future educational efforts that are needed to enhance pain management. First, educational efforts to enhance PCP understanding of evidence-based guidelines, pharmacological management, opioid compliance monitoring, and pain assessment of chronic pain are needed. In addition, the survey highlights the need for patient education on the realities of chronic pain management and the importance of nonpharmacological treatment.

Our data indicate that PCPs have significant insight into the importance of knowledge acquisition surrounding patients' physical and mental status including medical and psychiatric comorbidities including substance abuse prior to the initiation of chronic pain therapy. Greater than 90% of the surveyed physicians considered assessing physical history, psychiatric co-

Table 6. Evidence based knowledge for chronic pain therapeutics.

	Evidence n (%)	No Evidence n (%)	Not Sure/ Don't Know n (%)	True/False (Ref)
Antidepressants				
Conclusive Evidence				
TCAs are First Line Therapy for Neuropathic Pain	36 (75)	5 (10.4)	7 (14.6)	True (13,14,19,20)
TCAs have an Immediate Onset of Action	5 (10.4)	31 (64.6)	12 (25)	False (14)
TCAs are Administered Early Morning	2 (4.2)	39 (81.3)	7 (14.6)	False (14)
TCAs Cause Anticholinergic Side Effects	44 (91.7)	2 (4.2)	2 (4.2)	True (13,14,20)
Starting Dose TCAs < 25 mg	29 (60.4)	9 (18.8)	8 (16.7)	True (14,20)
Secondary TCAs Commonly Used as They Cause Fewer Side Effects	11 (22.9)	15 (31.3)	20 (41.7)	True (13,14,19)
TCAs are Safely Used in Patients with Cardiac Disorders	14 (29.2)	23 (47.9)	8 (16.6)	False (14,19,20)
TCAs Contraindicated in Patients with Suicide Tendencies	18 (37.5)	20 (41.7)	10 (20.8)	False (21,22)
Maximum Doses of TCAs < 100 mg for Neuropathic Pain	15 (31.3)	18 (37.5)	15 (14.6)	True (20)
ECGs Required for Patients above 40 years for Initiation of TCAs	21 (43.8)	12 (25)	14 (29.1)	True (14, 23)
Duloxetine First Line Therapy for Patients with Diabetic Neuropathy	19 (39.6)	20 (41.7)	9 (18.7)	True (20,24,25)
SNRIs Effective for Treatment of Fibromyalgia	38 (79.2)	4 (8.3)	6 (12.6)	True (26-28)
Conflicting or Inconclusive Evidence				
SNRIs First Line Therapy Chronic Low Back Pain	17 (35.4)	20 (41.7)	11 (22.9)	(29)
SSRIs Manage the Psychological Symptoms for Chronic Pain	41 (85.4)	3 (6.3)	4 (8.4)	(30)
Anticonvulsants				
Conclusive Evidence				
Utilization for Neuropathic Pain	42 (87.5)	0 (0)	5 (10.5)	True (13,14,20)
Utilization for Nociceptive Pain	29 (60.4)	6 (12.5)	12 (25)	False (31,32)
Safe to Stop without Tapering Anti-Epileptics	9 (18.8)	29 (60.4)	9 (18.8)	False (33-35)
Correlation Between Gabapentin and Depressive Symptoms	13 (27.1)	18 (37.5)	16 (33.4)	True (36-37)
Gabapentin Effective for Lower Back Pain	27 (56.3)	10 (20.8)	9 (18.7)	False (38)
Gabapentin to be Used with Caution in Patients with Renal Insufficiency	30 (62.5)	9 (18.8)	8 (16.7)	True (39,40)
Pregabalin Used with Caution in Patients with Renal Insufficiency	29 (60.4)	5 (10.4)	13 (27.1)	True (40)
Correlation Between Pregabalin and Suicide/Depression	13 (27.1)	14 (29.2)	20 (41.7)	True (35,41)
Opioids				
Conclusive Evidence				
Can Be Given As First Line Therapy for Chronic Pain	20 (41.7)	22 (45.8)	6 (12.5)	False (3,4)
Long Acting Opioids Preferred over Short Acting	43 (89.6)	5 (10.4)	0 (0)	False (3,4,7,42)
Laxatives for All Patients on Chronic Opioid Therapy	28 (58.3)	17 (35.4)	3 (6.3)	True (43)
Opioid Rotation Helpful in Patients with Intolerable Side Effects	23 (47.9)	6 (12.5)	19 (39.6)	True (43,45)
Neonatal Risk in Pregnant Women	25 (52.1)	17 (35.4)	6 (12.5)	True (46)
Respiratory Depression Not Common at Doses for Chronic Pain	19 (39.6)	18 (37.5)	11 (22.9)	False (47)
Methadone Less Risk for Adverse Neonatal Events	9 (18.8)	16 (33.3)	23 (47.9)	False (48-51)
Testosterone Should be Considered for Men	14 (29.2)	3 (6.3)	31 (64.6)	True (52)
Testosterone Should be Considered for Women	2 (4.2)	13 (27.1)	32 (66.7)	False (52)
Opioids Dose Should Not Exceed 100 mg Morphine or Morphine Equivalent	11 (22.9)	19 (39.6)	18 (33.4)	True (5)

Evaluation of Primary Care Physician Chronic Pain Management Practice Patterns

Table 6 con't. *Evidence based knowledge for chronic pain therapeutics.*

	Evidence n (%)	No Evidence n (%)	Not Sure/ Don't Know n (%)	True/False (Ref)
Conflicting or Inconclusive Evidence				
Random Drug Screen More Informative than Routine Screening	44 (91.7)	0(0)	4(8.4)	(3, 43,44)
Patients Can Drive Safely on Opioids	26 (54.2)	10 (20.8)	12 (25)	Mixed (53,54)
Opioid – anticonvulsants are safer than opioids alone	26 (54.2)	10 (20.8)	12 (25)	Mixed (55)
Fixed Interval Allows Better Pain Control than PRN	43 (89.6)	3 (6.3)	2 (4.2)	Mixed (56)
NSAIDs and Acetaminophen				
Conclusive Evidence				
Acetaminophen is better than NSAIDS as First Line Therapy in Chronic Back Pain	22 (45.8)	17 (35.4)	9 (18.7)	False (29)
Conflicting or Inconclusive Evidence				
Acetaminophen is the First Line Therapy in Osteoarthritis	40 (83.3)	7 (14.6)	1 (2.1)	Mixed (57,58)
NSAIDSs can be Effective First Line Therapy in Mild to Moderate Back Pain	45 (93.8)	1 (2.1)	2 (4.2)	Mixed (59)
Topical Agents				
Conclusive Evidence				
Capsaicin Cream is First Line Therapy in HIV Neuropathy	7 (14.6)	8 (16.7)	33 (68.8)	False (20)
Lidocaine Patch is Effective as First Line Therapy Post-Herpetic Neuralgia	35 (72.9)	6 (12.5)	7 (14.6)	True (13)
Conflicting or Inconclusive Evidence				
Capsaicin Cream is Effective Post-Herpetic Neurologic Patients	37 (77.1)	4 (8.3)	7 (14.6)	Mixed (20)

Due to missing data, some statements have less than 48 responses.

morbidities, medical comorbidities, and medication history highly important prior to the initiation of therapy. These practices are reassuring since managing chronic pain is complex and includes multiple variable assessments during the decision process. A recent claims data analysis examining pain management in 4 cohorts of patients demonstrated that chronic pain patients have on average 4 or more prescribing physicians and greater than 50 prescription claim counts over a 2-year period (9). Both of these data points further reinforce the importance of the measures taken by PCPs in the survey prior to the initiation of chronic pain therapy.

In addition to the importance of assessing medical and psychiatric comorbidities, the PCPs in the survey also understood the importance of gathering patient history before initiating chronic pain therapy. When selecting pharmacotherapeutic treatment options for chronic pain management, the PCPs survey listed drug effectiveness, drug safety, drug cost, and ease of drug administration as highly important. Both medication regimen and cost have been shown to influence compliance with therapy in multiple disease states. When regimen complexity and burden is reduced,

compliance with therapy increases (10). Furthermore, when cost-sharing increases adherence to medication management protocols decreases (11). Therefore, cost assessment, including patient financial responsibility, should be factored in decision-making when selecting pharmacotherapeutic agents for the treatment of chronic pain.

One area of assessment that would benefit from additional education is the importance of pain assessment. Among the PCPs surveyed in the study, less than 50% of the respondents viewed the use of pain assessment scales in follow-up care as important. Additionally, less than 50% of responding PCPs thought that using a pain rating scale at each follow-up visit was of high importance. The assessment of pain is a critical step in providing high-quality pain management. A lack of appropriate pain assessment has been shown to negatively influence the quality of pain care (12). Therefore, additional education is warranted on appropriate pain assessment tools and in encouraging PCPs to regularly assess pain control at follow-up care.

Significant evidence gaps were identified in the use of nonopioid pharmacotherapeutics for pain man-

agement. A large number of physicians in the survey treated conditions that often utilize non-opioid forms of pain control as the first line of treatment. Approximately 90% of the patients treated by the PCPs had neuropathic pain and 99% had osteoarthritic pain. Both of these conditions utilize non-opioid pharmacotherapeutic treatment options for pain management. Evidence gaps were identified in the use of non-opioid medications commonly used for the treatment of neuropathic pain including antidepressants and anticonvulsants (13).

Evidence-based guidelines have been published for the pharmacological management of neuropathic pain which have defined first line, second line, and third line medications (13,14). These recommendations not only assess efficacy but also provide insight on side-effects and appropriate prescribing. Unfortunately, a majority (67%) of responding physicians did not seem to refer to guidelines for therapy. This suggests that when pain management guidelines are published, educational efforts should not only be made to chronic pain physicians but also the PCPs.

Based on the survey responses regarding opioid therapy, additional education is warranted. Primary care physicians represent the largest group of opioid prescribers in the US (15). The CDC published opioid guidelines in 2016 based on the significant role that PCPs play in the management of chronic pain and in prescribing opioids (4,5). Although the survey occurred prior to the guidelines and the associated 12 recommendations for opioid therapy, it provides insight into PCP practices and reaffirms the recommendations made by the CDC guidelines. Multiple areas surrounding opioid therapy requiring further education were highlighted in the survey including the use of opioids as first-line treatments and opioid risk assessment tools prior to the initiation of therapy, safe dose limits, extended release opioids, impact of opioids on the endocrine and respiratory systems, and the influence of opioids on driving ability. In addition, continued reinforcement of important practice patterns already being highly considered by PCPs including assessment of substance abuse and discussing the risks and benefits of chronic pain treatment should continue.

Based on the survey results, further patient education is needed on chronic pain management treatment, the realities of treatment, and the goals of treatment. The management of chronic pain is often challenging and treatment results may be limited, with complete

pain relief often not achievable. Challenges highlighted in the survey included unrealistic treatment expectations and resistance to nonpharmacological treatments. Our data is in agreement with previous data demonstrating the discrepancy between patients and physicians on management goals for chronic pain treatment (16). The patient level of health literacy was also highlighted. Additional patient education may further help increase patients' knowledge levels and align patients and PCPs on chronic pain management goals.

As with any survey, limitations exist. First, the response rate was 16%. Although low, this response rate is comparable to response rates of 14% and 13% for other chronic pain management topics including anticoagulation and prescription patterns for chronic pain physicians (17,18). In addition, greater than 50% of the respondents were from private practice; therefore, the results may not pertain to other practice settings including academic and hospital-based practices. Even though the survey has limitations, it still provides significant insight into PCP pain management practices in the community setting for a group of physicians with an average of approximately 20 years in clinical practice that treat on average greater than 30 individuals dealing with chronic pain per month. In addition, the responding physicians treated a wide variety of pain states including neuropathic, nociceptive, osteoarthritis, radicular, fibromyalgia, and back and cancer pain. The survey is representative of the primary care practice setting where the predominance of care is provided to patients in the US, the community, and outpatient setting.

CONCLUSION

In conclusion, this study provides insight into PCPs' chronic pain management practices and highlights areas required for further education. Additionally, the survey defines the importance of increasing patients' knowledge of chronic pain treatment. When guidelines are published, educational efforts should be placed on informing not only pain management physicians but also PCPs. PCPs are often at the forefront of pain management treatment and enhancement in knowledge will ultimately influence pain management outcomes and treatment.

Appendix 1 is available online at:

REFERENCES

- Institute of Medicine Report from the Committee on Advancing Pain Research, Care, and Education: *Relieving Pain in America, A Blueprint for Transforming Prevention, Care, Education and Research*. The National Academies Press, 2011. http://books.nap.edu/openbook.php?record_id=13172&page=1.
- Bredemeyer M. CDC develops guideline for opioid prescribing. *Am Fam Physician* 2016; 93:1042-1043.
- Centers For Disease Control and Prevention Public Health Service USDOH, Human S. Guideline for prescribing opioids for chronic pain. *J Pain Palliat Care Pharmacother* 2016; 30:138-140.
- Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain - United States. *MMWR Recomm Rep* 2016; 65:1-49.
- Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain--United States. *JAMA* 2016; 315:1624-1645.
- Drew D, Gordon D, Renner L, Morgan B, Swensen H, Manworren R. A position statement on the use of "as-needed" range orders for opioid analgesics in the management of pain. A Consensus Statement of the American Society of Pain Management Nurses and the American Pain Society. Available on <http://americanpainsociety.org/uploads/about/position-statements/ps-opioid-dosage.pdf>. Accessed on October 17, 2017.
- Chou R, Clark E, Helfand M. Comparative efficacy and safety of long-acting oral opioids for chronic non-cancer pain: A systematic review. *J Pain Symptom Manage* 2003; 26:1026-1048.
- Verster JC, Veldhuijzen DS, Volkerts ER. Effects of an opioid (Oxycodone/Paracetamol) and an NSAID (Bromfenac) on driving ability, memory functioning, psychomotor performance, pupil size, and mood. *Clin J Pain* 2006; 22:499-504.
- Kozma CM, Provenzano DA, Slaton TL, Patel AA, Benson CJ. Complexity of pain management among patients with nociceptive or neuropathic neck, back, or osteoarthritis diagnoses. *J Manag Care Spec Pharm* 2014; 20:455-466b.
- Ingersoll KS, Cohen J. The impact of medication regimen factors on adherence to chronic treatment: A review of literature. *J Behav Med* 2008; 31:213-224.
- Eaddy MT, Cook CL, O'Day K, Burch SP, Cantrell CR. How patient cost-sharing trends affect adherence and outcomes: A literature review. *P & T* 2012; 37:45-55.
- Anderson KO, Mendoza TR, Valero V, Richman SP, Russell C, Hurley J, DeLeon C, Washington P, Palos G, Payne R, Cleeland CS. Minority cancer patients and their providers: Pain management attitudes and practice. *Cancer* 2000; 88:1929-1938.
- O'Connor AB, Dworkin RH. Treatment of neuropathic pain: An overview of recent guidelines. *Am J Med* 2009; 122:S22-S32.
- Dworkin RH, O'Connor AB, Backonja M, Farrar JT, Finnerup NB, Jensen TS, Kalso EA, Loeser JD, Miaskowski C, Nurmikko TJ, Portenoy RK, Rice AS, Stacey BR, Treede RD, Turk DC, Wallace MS. Pharmacologic management of neuropathic pain: Evidence-based recommendations. *Pain* 2007; 132:237-251.
- Chen JH, Humphreys K, Shah NH, Lembke A. Distribution of opioids by different types of medicare prescribers. *JAMA Internal Medicine* 2016; 176:259-261.
- Henry SG, Bell RA, Fenton JJ, Kravitz RL. Goals of chronic pain management: Do patients and primary care physicians agree and does it matter? *Clin J Pain* 2017; 33:955-961.
- Manchikanti L, Benyamin RM, Swicegood JR, Falco FJ, Datta S, Pampati V, Fellows B, Hirsch JA. Assessment of practice patterns of perioperative management of antiplatelet and anticoagulant therapy in interventional pain management. *Pain Physician* 2012; 15:E955-E968.
- Benzon HT, Kendall MC, Katz JA, Benzon HA, Malik K, Cox P, Dean K, Avram MJ. Prescription patterns of pain medicine physicians. *Pain Pract* 2013; 13:440-450.
- Finnerup NB, Attal N, Haroutounian S, McNicol E, Baron R, Dworkin RH, Gilron I, Haanpää M, Hansson P, Jensen TS, Kamerman PR, Lund K, Moore A, Raja SN, Rice AS, Rowbotham M, Sena E, Siddall P, Smith BH, Wallace M. Pharmacotherapy for neuropathic pain in adults: A systematic review and meta-analysis. *The Lancet Neurol* 2015; 14:162-173.
- Dworkin RH, O'Connor AB, Audette J, Baron R, Gourlay GK, Haanpää ML, Kent JL, Krane EJ, Lebel AA, Levy RM, Mackey SC, Mayer J, Miaskowski C, Raja SN, Rice AS, Schmader KE, Stacey B, Stanos S, Treede RD, Turk DC, Walco GA, Wells CD. Recommendations for the pharmacological management of neuropathic pain: An overview and literature update. *Mayo Clin Proc* 2010; 85:S3-S14.
- Cheung K, Aarts N, Noordam R, van Blijderveen JC, Sturkenboom MC, Ruiter R, Visser LE, Stricker BH. Antidepressant use and the risk of suicide: A population-based cohort study. *J Affect Disord* 2015; 15:479-484.
- Wijlaars LP, Nazareth I, Whitaker HJ, Evans SJ, Petersen I. Suicide-related events in young people following prescription of SSRIs and other antidepressants: A self-controlled case series analysis. *BMJ Open* 2013; 19:e003247.
- Dworkin RH, Backonja M, Rowbotham MC, Allen RR, Argoff CR, Bennett GJ, Bushnell MC, Farrar JT, Galer BS, Haythornthwaite JA, Hewitt DJ, Loeser JD, Max MB, Saltarelli M, Schmader KE, Stein C, Thompson D, Turk DC, Wallace MS, Watkins LR, Weinstein SM. Advances in neuropathic pain: Diagnosis, mechanisms, and treatment recommendations. *Arch Neurol* 2003; 60:1524-1534.
- Lunn MP, Hughes RA, Wiffen PJ. Duloxetine for treating painful neuropathy, chronic pain or fibromyalgia. *Cochrane Database Syst Re* 2014; 1:Cd007115.
- Waldfoegel JM, Nesbit SA, Dy SM, Sharma R, Zhang A, Wilson LM, Bennett WL, Yeh HC, Chelladurai Y, Feldman D, Robinson KA. Pharmacotherapy for diabetic peripheral neuropathy pain and quality of life: A systematic review. *Neurology* 2017; 88:1958-1967.
- Lunn MP, Hughes RA, Wiffen PJ. Duloxetine for treating painful neuropathy, chronic pain or fibromyalgia. *Cochrane Database Syst Rev* 2014; 1:Cd007115.
- Calandre EP, Rico-Villademoros F, Slim M. An update on pharmacotherapy for the treatment of fibromyalgia. *Expert Opin Pharmacother* 2015; 16:1347-1368.
- Sultan A, Gaskell H, Derry S, Moore RA. Duloxetine for painful diabetic neuropathy and fibromyalgia pain: systematic review of randomised trials. *BMC Neurolog* 2008; 8:29.
- Chou R, Deyo R, Friedly J, Skelly A, Weimer M, Fu R, Dana T, Kraegel P, Griffin J, Grusing S. Systemic pharmacologic therapies for low back pain: A systematic review for an American College of Physicians Clinical Practice Guideline. *Ann Intern Med* 2017; 166:480-492.
- Patestos E, Horjales-Araujo E. Treating chronic pain in SSRIs: What do we know? *Pain Res. Manag* 2016. Available at: <https://www.hindawi.com/journals/>

- prm/2016/2020915/ Accessed on October 17, 2017.
31. Anticonvulsants in the management of acute pain. Available at <http://www.bandolier.org.uk/booth/painpag/Acutrev/Other/AP021.html>. Accessed on 11/05/2018.
 32. Maizels M, McCarberg B. Antidepressants and antiepileptic drugs for chronic non-cancer pain. *Am Fam Physician* 2005; 17:483-490.
 33. Norton JW. Gabapentin withdrawal syndrome. *Clin neuropharmacol.* 2001; 24:245-246.
 34. Mersfelder TL & Nichols WH: Gabapentin: Abuse, dependence, and withdrawal. *Ann Pharmacother* 2016; 50:229-233.
 35. Lyrica (pregabalin) package insert. New York, NY: Pfizer; 2016. Available https://www.pfizer.com/products/product-detail/lyrica_and_lyrica_cr. Accessed on October 17, 2017.
 36. Coplan JD, Aaronson CJ, Panthangi V, Kim Y. Treating comorbid anxiety and depression: Psychosocial and pharmacological approaches. *World J Psychiatry* 2015; 5:366-378.
 37. Neurontin (gabapentin) package insert. New York, NY: Parke Davis; 2015. Available https://www.accessdata.fda.gov/drugsatfda_docs/label/2009/020235s041,020882s028,021129s027lbl.pdf. Accessed on October 17, 2017.
 38. Shanthanna H, Gilron I, Rajarathinam M, AlAmri R, Kamath S, Thabane L, Devereaux PJ, Bhandari M. Benefits and safety of gabapentinoids in chronic low back pain: A systematic review and meta-analysis of randomized controlled trials. *PLoS Med* 2017 ; 14:e1002369.
 39. Miller A, Price G. Gabapentin toxicity in renal failure: The importance of dose adjustment. *Pain Med* 2009; 10:190-192.
 40. Raouf M, Atkinson TJ, Crumb MW, Fudin J. Rational dosing of gabapentin and pregabalin in chronic kidney disease. *J Pain Res* 2017; 10:275-278.
 41. Stephen LJ, Wishart A, Brodie MJ. Psychiatric side effects and antiepileptic drugs: Observations from prospective audits. *Epilepsy Behav* 2017; 71:73-78.
 42. Pedersen L, Borchgrevink PC, Riphagen, II, Fredheim OM. Long- or short-acting opioids for chronic non-malignant pain? A qualitative systematic review. *Acta Anaesthesiol Scand* 2014; 58:390-401.
 43. Chou R, Fanciullo GJ, Fine PG, Adler JA, Ballantyne JC, Davies P, Donovan MI, Fishbain DA, Foley KM, Fudin J, Gilson AM, Kelter A, Mauskop A, O'Connor PG, Passik SD, Pasternak GW, Portenoy RK, Rich BA, Roberts RG, Todd KH, Miasowski C. Clinical guidelines for the use of chronic opioid therapy in chronic noncancer pain. *J Pain* 2009; 10:113-130.
 44. Chou R, Ballantyne JC, Fanciullo GJ, Fine PG, Miasowski C. Research gaps on use of opioids for chronic noncancer pain: findings from a review of the evidence for an American Pain Society and American Academy of Pain Medicine clinical practice guideline. *J Pain* 2009; 10:147-159.
 45. de Leon-Casasola OA. Opioids for chronic pain: New evidence, new strategies, safe prescribing. *Am J Med* 2013; 126:S3-S11.
 46. Logan BA, Brown MS, Hayes MJ. Neonatal abstinence syndrome: treatment and pediatric outcomes. *Clinical Obstetrics and Gynecology* 2013; 56:186-192.
 47. Walker JM, Farney RJ, Rhondeau SM, Boyle KM, Valentine K, Cloward TV, Shilling KC. Chronic opioid use is a risk factor for the development of central sleep apnea and ataxic breathing. *J Clin Sleep Med* 2007; 3:455-461.
 48. McCarthy JJ, Leamon MH, Stenson G, Biles LA. Outcomes of neonates conceived on methadone maintenance therapy. *J Sub Abuse Treat* 2008; 35:202-206.
 49. Seligman NS, Salva N, Hayes EJ, Dysart KC, Pequignot EC, Baxter JK. Predicting length of treatment for neonatal abstinence syndrome in methadone-exposed neonates. *Am J Obstet Gynecol* 2008; 199:396.e1-396.e7.
 50. Gold Standard, Inc. Methadone. Clinical Pharmacology [database online]. Available at <https://www.clinicalkey.com.authenticate.library.duq.edu/pharmacology/monograph/380?sec=onpreg>. Accessed: August 7, 2017.
 51. Sharpe C, Kuschel C. Outcomes of infants born to mothers receiving methadone for pain management in pregnancy. *Arch Dis Child Fetal Neonatal Ed* 2004; 89:F33-F36.
 52. Smith HS, Elliott JA. Opioid-induced androgen deficiency (OPIAD). *Pain Physician* 2012; 15:Es145-Es156.
 53. Gomes T, Redelmeier DA, Juurlink DN, Dhalla IA, Camacho X, Mamdani MM. Opioid dose and risk of road trauma in Canada: A population-based study. *JAMA Internal Medicine* 2013; 173:196-201.
 54. Mailis-Gagnon A, Lakha SF, Furlan A, Nicholson K, Yegneswaran B, Sabatowski R. Systematic review of the quality and generalizability of studies on the effects of opioids on driving and cognitive/psychomotor performance. *Clin J Pain* 2012; 28:542-555.
 55. Gomes T, Juurlink DN, Antoniou T, Mamdani MM, Paterson JM, van den Brink W. Gabapentin, opioids, and the risk of opioid-related death: A population-based nested case-control study. *PLoS Med* 2017; 14:e1002396.
 56. Carson S, Thakurta S, Low A, Smith B, Chou R. Drug Class Review: Long-Acting Opioid Analgesics: Final Update 6 Report [Internet]. Portland (OR): Oregon Health & Science University; 2011 July.
 57. McAlindon TE, Bannuru RR, Sullivan MC, Arden NK, Berenbaum F, Bierma-Zeinstra SM, Hawker GA, Henrotin Y, Hunter DJ, Kawaguchi H, Kwok K, Lohmander S, Rannou F, Roos EM, Underwood M. OARSJ guidelines for the non-surgical management of knee osteoarthritis. *Osteoarthritis and Cartilage* 2014; 22:363-388.
 58. Nelson AE, Allen KD, Golightly YM, Goode AP, Jordan JM. A systematic review of recommendations and guidelines for the management of osteoarthritis: The chronic osteoarthritis management initiative of the U.S. bone and joint initiative. *Semin Arthritis Rheum* 2014; 43:701-712.
 59. Roelofs PD, Deyo RA, Koes BW, Scholten RJ, van Tulder MW. Nonsteroidal anti-inflammatory drugs for low back pain: An updated Cochrane review. *Spine (Phila Pa 1976)* 2008; 33:1766-1774.