

## Analysis of the Physician Variable in Pain Management

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### ABSTRACT

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*Background.* The role of physician variability in pain management is unknown.

*Objective.* To assess the role of physician variability in the management of pain and provide quantitative data regarding the status of pain management in Michigan.

*Design.* A multi-item mail survey was used to determine the physician's perceived knowledge of pain management modalities, goals, satisfaction, and confidence with pain treatment.

*Participants.* The focus of this report was a group of 368 licensed Michigan physicians who provide clinical care.

*Results.* Overall, 30% of the study group reported no formal education in pain management, although younger physicians reported more education (correlation coefficient =  $-0.252$ ,  $P < .001$ ). The physicians reported greater confidence in their knowledge of meperidine than other Schedule II opioids ( $P < .001$ ). In regards to the opinion that prescribing strong opioids would attract a medical review, the physician responses ranged from 1 (strongly disagree) to 5 (strongly agree). The median score for this scale was 4, accounting for 46% of the responses. The study group expressed less satisfaction with their treatment of chronic pain as well as lower goals for relief (mean: 3.8; 95% confidence interval: 3.7–3.9).

*Conclusions.* Lower expectations for relief and less satisfaction in its management may contribute to the undertreatment of chronic pain. Perceptions of regulatory scrutiny may contribute to suboptimal pain management. These preliminary data highlight physician variability in pain decision making while providing insights into educational needs.

*Key Words.* Pain Management; Barriers to Treatment; Physician Variability; Education or Knowledge; Goals and Treatment; Attitudes or Perceptions

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Complaints of pain are one of the most common reasons patients cite for consulting physicians for care.[1] This is true even though the pathogenesis and epidemiological impact of pain remain poorly understood and exact significant social and economic tolls.[2–4] Although a number of physical, societal, and economic barriers have been identified that prevent the optimal management of pain [5,6], there are limited data regarding the physician's knowledge of pain management. Less is known about the impact of physician variation on pain management. Physician variability in knowledge, attitudes, and goals for pain management may lead to inadequate treatment as well as unnecessary suffering of patients with pain.[7–9] This ar-

ticle reports the results of a study of physicians' knowledge about pain management as well as their attitudes and approaches to treating pain.

The adequate management of pain is important from both a physiological and an emotional standpoint [10,11]. Multiple strategies, modalities, and treatments are currently available to control pain, pain-related symptoms, and side effects from pain treatment[12–20]. The inadequate assessment and undertreatment of acute pain, chronic pain (i.e., benign or nonmalignant), cancer pain, and pain associated with a terminal illness increases morbidity and mortality[20–23]. The World Health Organization (WHO), the U.S. government, professional societies, and a plethora of special interest groups have created a framework for numerous pain-specific educational programs and clinical initiatives targeted to improve both the assessment and management of pain[6,12,14,15,24–26].

Significant differences exist in the attitudes of health care professionals regarding the goals and treatment of acute and cancer pain [27–33]. These differences may also exist among clinicians treating patients with chronic pain or pain resulting from terminal illness [8,9,27,34,35]. Perceptions of pain may be influenced by the health care professional's personal experiences with pain as well as their knowledge of the efficacy of different modalities used for pain management [12,36]. More importantly, differences in perception may prevent adequate assessment and optimal treatment of pain.

Information is lacking on how barriers to pain management affect outcome. This lack of information coupled with misinformation regarding the role and mechanism of action of different analgesics may limit their use in appropriate settings. In addition, because perceptions often correlate with behavior, misperceptions regarding the side effects of opioid analgesics may limit a physician's willingness to provide patients with optimal pain management. These attitudes may determine when, how, why, and what type of analgesic modality a physician may prescribe for the treatment of pain.

The role of regulatory scrutiny and insurance provider oversight of medical decision making may discourage physicians from prescribing appropriate analgesics [37]. In the state of Michigan, controlled-substance or Schedule II opioid analgesics must be prescribed on special prescription forms, which are monitored by the Michigan State Board of Medicine. Despite medical judgment supporting the use of Schedule II opioids for pain management, physicians may fear professional scrutiny if they prescribe this class of opioid analgesics. Mini-

mal information is available about whether physicians use opioid contracts when prescribing opioid analgesics [38].

Limited information is available about physician variability in knowledge, attitudes, goals, and perceptions regarding pain management. We hypothesized that differences in pain management may be due to physician characteristics, attitudes, knowledge, and goals for pain management. We further speculated that these differences contributed to variability in decision making, which may be a potential barrier to adequate pain management. A study was designed to examine the role of physician variability in the management of pain in Michigan. In this article, we present some descriptive results of a survey designed for a general population of physicians, including all specialties. The results presented may permit some inferences regarding potential physician barriers to optimal pain management.

## Method

The University of Michigan Health System (UMHS) Institutional Review Board approved this study. The investigators developed a four-page survey to provide a quantitative analysis of pain management in Michigan. Questions pertaining to physician demographics, opinions on pain management, and professional practice. In addition, clinical vignettes were developed. The multi-item survey was designed to obtain the physician's perceived knowledge of pain management modalities, goals, satisfaction, and confidence with their treatment of acute, chronic, and cancer pain. In May 1999, faculty members of the UMHS Department of Anesthesiology were enlisted to critique an early draft of the survey instrument. Using face validity, questions that were ambiguous or lacked clarity were revised, and content areas that were overlooked were added to enhance the value of the questionnaire. The second step in the refinement of the survey tool was to administer the questionnaire to a pilot group of 14 UMHS physicians who provide outpatient care and were not members of the Department of Anesthesiology. Those questions still having poor face validity were deleted and substitutions made to the questionnaire.

The final Physician Pain Management Survey consisted of 110 questions. Using the Michigan Board of Medical Licensure directory of 36,000 physicians, 1,400 licensed medical doctors and doctors of osteopathy were randomly sampled. In addition, we included a sample of 373 physicians who referred patients to the Multidisciplinary Pain Center (MPC) at UMHS to determine whether there were differ-

ences between the two groups. Hence, the survey was distributed by mail to a total of 1,773 physicians practicing in Michigan. Three follow-ups of the questionnaire were allowed as described by Dillman [39] (i.e., postcard reminders and letters accompanied with the survey in a 2-month period) to provide an optimal response. An abbreviated questionnaire was mailed to nonresponding physicians to determine their reasons for not responding. Sample size calculations were based on a convenience sample.

Descriptive statistics (i.e., frequency distributions, means, and percentages) were used to characterize the sample of physicians with respect to demographic information. The hypotheses were tested by Student's *t* tests for continuous data (e.g., pain education and knowledge) and confidence intervals (e.g., physician goals and satisfaction with treatment). Stepwise logistic regression and analysis of variance (ANOVA) was used to characterize the relationship of the physician attitudes about prescribing opioids to their frequency of prescribing. Coefficients of correlation were also calculated. All analyses were performed using the SPSS/PC+ statistical package [40].

## Results

At the end of the response time frame, 1,553 questionnaires were successfully delivered and 132 were deemed "undeliverable" because of incorrect addresses. Three hundred seventy-five questionnaires were completed and returned. Seven responses were excluded because they did not meet the eligibility criteria for the study that "only responses from physicians that have clinical responsibilities" be included, and 219 physicians returned the questionnaire unanswered. A total of 368 survey responses were entered into a database for analysis. The overall response rate was 26%: 33% of nonreferring

physicians and 67% of UMHS referring physicians. Because no differences were found in the response rate to either survey or responses to the items on the survey between the two groups of physicians, the data from the two groups were combined. The average age of the respondents was 45 years  $\pm$  13 SD, and the majority of respondents described their race as White/Caucasian. Demographic characteristics of respondents are presented in Table 1. Physicians were categorized based on type of practice as either primary (those who provide basic medical care) or specialist (those who provide specialty care and for whom referral is typically required; Table 2) [41].

Analysis of the 122 nonresponse questionnaires (11%) revealed that the most common reason for the physician's decision not to participate was time constraints, consistent with other physician surveys [42]. The age and racial origin of the survey respondents closely reflected the racial origin of the nonrespondents. Furthermore, the respondents were representative of Michigan physicians in terms of personal demographic and practice characteristics [41].

## Experience in Treating Pain

Physicians were asked to rate the frequency that they evaluated patients with pain in their practice (ranging from never to very often) according to the type of pain (Table 3). The most common type of pain evaluated by physicians was determined by adding the "often" and "very often" responses. The majority of primary physicians (61%) reported evaluating chronic pain more frequently, whereas the majority of specialty physicians (52%) reported evaluating acute pain more frequently. Physicians were asked to rate the frequency that they prescribed pain treatment for each type of pain (Table 4). For acute pain, specialty physicians prescribed more frequently than primary physicians (52% vs. 44%). Primary physicians prescribed treatment for

**Table 1** Race, gender, and age distribution of study population

Ethnic origin	N	Gender						Total (%)
		male			female			
	n	(%)	Age (mean $\pm$ SD)	n	(%)	Age (mean $\pm$ SD)		
White/Caucasian	288	223	(77.4)	48 $\pm$ 12	65	(22.6)	40 $\pm$ 7	(80)
African American/Black	15	9	(60)	42 $\pm$ 8	6	(40)	40 $\pm$ 7	(4)
Hispanic/ Latino	8	4	(50)	44 $\pm$ 9	4	(50)	45 $\pm$ 18	(2)
Asian	42	23	(54.8)	53 $\pm$ 12	19	(45.2)	37 $\pm$ 14	(12)
Other	7	5	(71.4)	43 $\pm$ 5	2	(28.6)	36 $\pm$ 7	(2)
Total	360	264	(73.3)	48 $\pm$ 11	96	(26.7)	39 $\pm$ 10	(100)

**Table 2** Michigan physician practice categories: specialty and gender

Practice category	Areas of practice	Total N	Physician gender			
			female		male	
			n	Row %	n	Row %
Primary	Internal Medicine	100	30	30.0	70	70.0
	OB/GYN	34	14	40.0	20	57.1
	Family/ General Practice	71	18	25.0	53	73.6
	Pediatrics	23	12	50.0	11	45.8
	Total in category	228	74	32.5	154	67.5
Specialty	Surgery	71	9	12.7	62	87.3
	Anesthesiology	15	2	13.3	13	86.7
	Physical Medicine/ Rehab.	15	4	26.7	11	73.3
	Neurology	6	3	50.0	3	50.0
	Psychiatry	12	2	16.7	10	83.3
	Other	14	3	21.4	11	78.6
	Total for category	133	23	17.3	110	82.7
TOTAL		361	97	26.4	265	72.0

chronic pain more frequently than specialty physicians (45% vs. 31%).

#### Pain Education and Knowledge

Thirty percent of physicians reported that they did not receive any pain management education during medical school, residency training, or via continuing medical education (CME). Only 10% of the physicians reported pain education during medical school, residency training, and via CME (Table 5). The cumulative pain education of the physicians by age is shown in Figure 1. There is a negative correlation (correlation coefficient =  $-0.252$ ,  $P < .001$ ) between age and education that is independent of practice type. Younger physicians were more likely to have received formal pain management education than older physicians.

The survey assessed perceived knowledge of pain treatment modalities. Figure 2 illustrates how confident physicians were in their knowledge of several pain treatment modalities. For the purposes of this study, Schedule II opioids, which require the

use of the state of Michigan official prescription form, were described as “triplicate.” Opioids that did not require a special prescription were defined as “nontriplicate.” The results for the triplicate drug meperidine are considered separately because of its unique pharmacology and concerns regarding toxicity [43–45]. The other two modalities were nerve blocks (physician intervention) and transcutaneous electrical nerve stimulation (TENS) unit (a nonpharmacological method). Figure 3 shows the physicians’ perceived confidence in their knowledge of different pain treatment modalities by their practice category. Both specialty and primary physicians reported a greater knowledge of meperidine, nontriplicate, and triplicate drugs, whereas their knowledge of nerve blocks and TENS unit was less. When  $t$  tests were used to determine the difference between the mean scores of pain treatment knowledge, only their knowledge of nerve blocks was significantly different between the two practice categories ( $P < .0001$ ); specialty physicians reported a higher knowledge score for nerve blocks than pri-

**Table 3** Frequency of pain treatment by type of pain and physician practice category

Type of pain	Practice category	Frequency of treatment Number of Physicians (% within practice category)				Total N
		never	sometimes	often	very often	
Acute	Primary	75 (32.4)	105 (45.4)	31 (13.4)	20 (8.6)	231
	Specialist	32 (24.6)	30 (23)	17 (13)	51 (39.2)	120
Chronic	Primary	15 (6.5)	75 (32.7)	96 (41.9)	43 (18.7)	219
	Specialist	19 (14.3)	48 (36.3)	37 (28)	28 (21.2)	132
Cancer	Primary	76 (33.1)	115 (50.2)	23 (10)	15 (6.5)	229
	Specialist	48 (36.9)	66 (50.7)	12 (9.2)	4 (3)	130
Terminal Illness	Primary	75 (33)	107 (47.1)	26 (11.4)	19 (8.3)	227
	Specialist	51 (39.5)	62 (48)	12 (9.3)	4 (3.1)	129

**Table 4** Frequency of prescribing pain treatments by type of pain and physician practice category

Type of pain	Practice category	Frequency of Prescription Number of Physicians (% within practice category)				Total N
		never	sometimes	often	very often	
Acute	Primary	83 (36.7)	66 (29.2)	46 (20.3)	31 (13.7)	226
	Specialist	41 (31.2)	22 (16.7)	15 (11.4)	53 (40.4)	131
Chronic	Primary	23 (10.1)	102 (45.1)	80 (35.3)	21 (9.2)	226
	Specialist	33 (25.1)	57 (43.5)	27 (20.6)	14 (10.6)	131
Cancer	Primary	76 (33.7)	63 (28)	49 (21.7)	36 (16)	224
	Specialist	56 (43.0)	51 (39.2)	13 (10)	10 (7.6)	130
Terminal illness	Primary	78 (34.6)	64 (28.4)	41 (18.2)	41 (18.2)	224
	Specialist	61 (47.2)	47 (36.4)	9 (6.9)	11 (8.5)	128

mary physicians (2.8 vs. 2.0). Two-way ANOVA demonstrated significant differences ( $P < .05$ ) by educational group in physician knowledge of drugs and treatments, except for meperidine. When physicians reported a greater number of pain programs attended (i.e., medical school, residency, or CME), their reported knowledge of pain treatments was significantly greater (Figure 4).

**Physician Goals and Satisfaction With Pain Management**

Physicians were asked to identify their goals for the management of all types of pain. Table 6 shows the physicians' goals for pain management by the type of pain. Using the categories of absolute and complete pain relief, adequate pain relief without distress, moderate pain relief, or pain relief only during painful periods, more than 75% of the physicians reported a goal of adequate pain relief without distress. Physicians more frequently reported a goal of absolute and complete pain relief when asked about the management of cancer and the pain of terminal illness (24.8% vs. 38.2%) but reported this goal less frequently for chronic pain (5.4%). When specifically asked about treating chronic pain, more than 90% of physicians reported a goal of either adequate pain relief without distress or moderate pain relief. When evaluating the confidence intervals, a

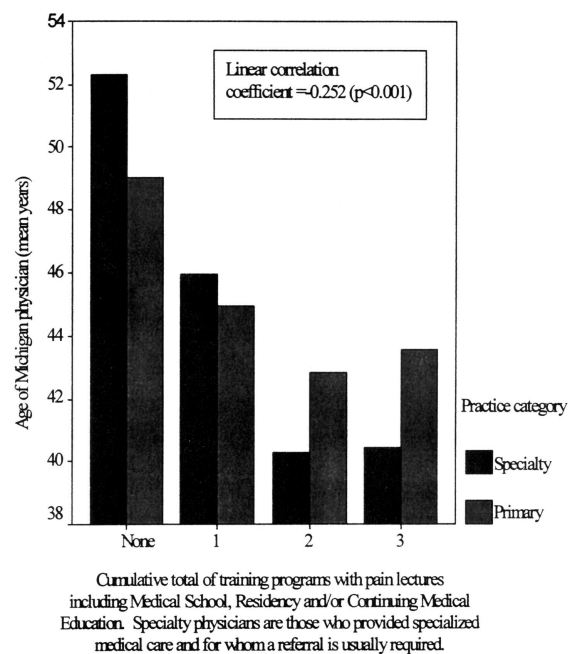
positive shift for the physicians reported goals for the management of acute pain (mean: 4.2; 95% CI: 4.1–4.2), cancer pain (mean: 4.2; 95% CI: 4.1–4.3), and the pain of terminal illness (mean: 4.3; 95% CI: 4.3–4.4) was noted compared with their goals for chronic pain management (mean: 3.8; 95% CI: 3.8–3.9). In these instances, the physicians reported a goal of absolute and complete pain relief or adequate pain relief without distress.

Physicians were asked to report their level of satisfaction with the pain care they provide on a five-point scale ranging from 1 (extremely dissatisfied) to 5 (extremely satisfied). Table VII shows that, overall, physicians were satisfied with the pain care they provided and consistently reported scores of 3 or more. When compared with the specialty physicians,

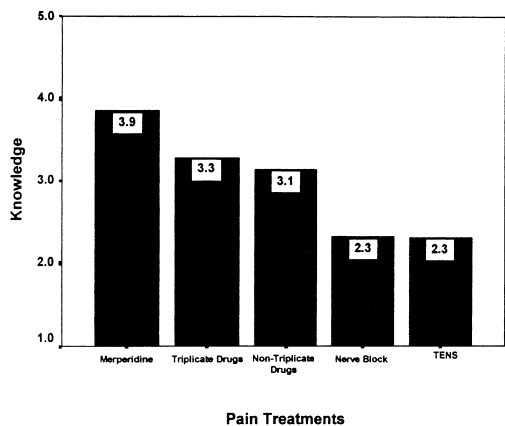
**Table 5** Number of medical training programs with pain education and practice category

# of programs*	Practice category		
	Specialty (N %)	Primary N (%)	N (%)
None	44 (41)	64 (59)	108 (29.7)
1	43 (36)	76 (64)	119 (32.7)
2	33 (32)	70 (67)	103 (28.3)
3	13 (38)	21 (62)	34 (9.3)
Total n (%)	133 (36.5)	231 (63.5)	364 (100)

\*Including medical school, residency and continuing medical education (CME)



**Figure 1** Mean physician age by level of pain education and practice category.



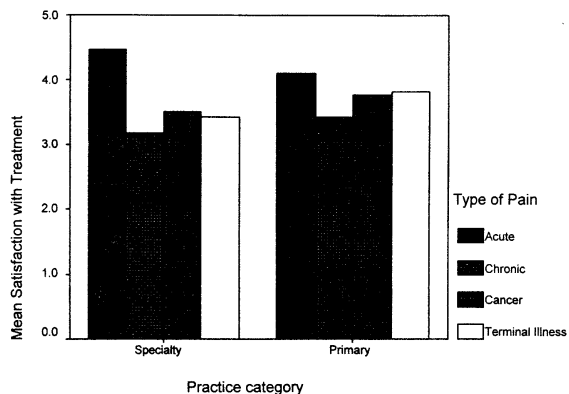
Non-triplicate=opioid analgesics that do not require State of Michigan official prescription form.  
TENS units=Transcutaneous Electrical Nerve Stimulation.

**Figure 2** Distribution of Michigan physicians knowledge of pain treatments.

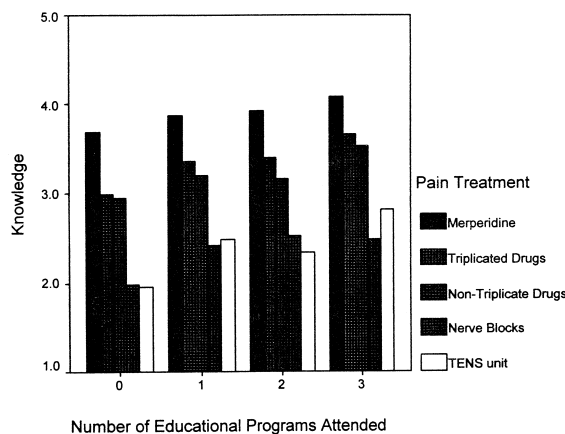
the primary physicians were significantly more satisfied with the level of pain care provided to cancer and terminally ill patients and less satisfied with the care provided to patients with acute pain (Figure 5). The level of satisfaction with the care provided to chronic pain patients was not significantly different between the primary and the specialty physicians but was the lowest satisfaction level reported overall.

**Opinions on Issues Related to Regulatory Scrutiny**

The majority of the study group (71%) owned a state of Michigan official prescription book for prescribing Schedule II drugs. Primary physicians were more likely to prescribe chronic opioids for chronic pain than specialty physicians (59% vs. 28%). A mi-



**Figure 3** Distribution of Michigan physicians confidence of knowledge of pain treatment by practice category.



**Figure 4** Pain treatment knowledge of Michigan physicians by the level of pain education.

nority of physicians (36%) reported the use of opioid contracts for patients using opioids for chronic pain.

Physicians were asked to rate their level of agreement on issues related to regulatory scrutiny (Table 8). Respondents reported a range of responses (moderately disagree to moderately agree) in whether they believe that there was undue regulatory scrutiny of their prescribing strong opioids for pain (1.8–4.0). Physicians also varied in their level of agreement (moderately agree to moderately disagree) in regards to the experience of their colleagues as to whether regulatory agencies had affected their prescribing strong opioids for pain (1.2–3.8). However, they tended to agree that prescribing strong opioids would attract a medical review (2.6–4.4).

**Discussion**

Minimal attention has been devoted to understanding the potential educational, regulatory, and atti-

**Table 6** Percentage distribution of Michigan physician goals for pain relief according to the type of pain

Type of pain	Absolute and complete pain relief n (%)	Adequate pain relief without distress n (%)	Moderate pain relief n (%)	Pain relief only during painful periods or procedures n (%)
Acute	59 (17.4)	272 (80)	5 (1.5)	4 (1.2)
Cancer	63 (24.8)	174 (68.5)	16 (6.3)	1 (0.4)
Terminally ill	94 (38.2)	137 (55.7)	12 (4.9)	3 (1.2)
Chronic	18 (5.4)	237 (71.1)	67 (20.1)	11 (3.3)

**Table 7** Michigan physician satisfaction with pain care provided according to type of pain and practice category

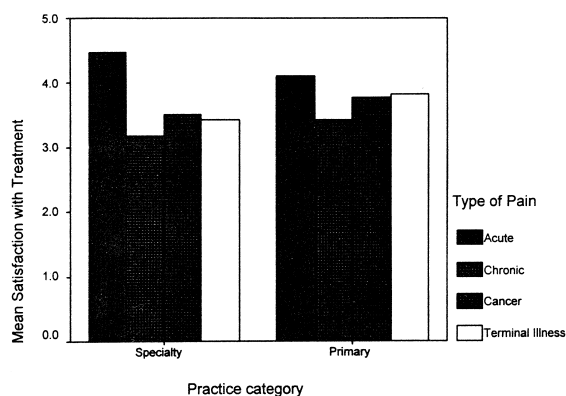
Type of pain	Practice Category	N	Satisfaction scores		
			Mean	S.D.	<i>p</i> value
Acute	Primary	212	4.2	0.6	0.014
	Specialty	116	4.4	0.8	
Cancer	Primary	150	3.8	0.9	0.016
	Specialty	80	3.5	1	
Terminally ill	Primary	150	3.9	0.9	0.001
	Specialty	73	3.4	1.1	
Chronic	Primary	213	3.3	1	NS
	Specialty	113	3.2	1	

Significance of t-tests (2-tailed) comparing average satisfaction between categories.

(1 = very dissatisfied; 5 = very satisfied)

tudinal barriers to optimal pain management. Although it is well known that incomplete knowledge and differing physician attitudes about pain control contribute to the inadequate assessment and continued undertreatment of pain [7,27,46], less is known about the determinants of knowledge and attitudes. This study has presented new information about physician pain education, attitudes, and goals concerning pain management to shed light on barriers to effective pain management. Results of this study showed that there is considerable variability in Michigan physician's knowledge of the modalities used for pain management.

Our study results again support the conclusion that the pain management education of physicians is generally inadequate [1]. It further highlights the paucity of educational efforts directed at pain management during medical school and residency training or via physician CME programs. It is revealing in that nearly one third of the study group reported they had never received any formal education in pain management. Furthermore, members of the

**Figure 5** Michigan physician satisfaction with pain care provided according to type of pain and practice category.

study group who did receive some formal pain education described it as minimal. However, younger physicians reported significantly more pain management education than did older physicians [22]. Further study is necessary to determine whether this is due to redesigned educational efforts or to differing attitudes regarding pain.

The importance of increased education in pain management is clear [47]. Von Roenn [27] concluded that the lack of formal cancer pain education and training among physicians resulted in the undertreatment of cancer pain. Furthermore, Rabow et al. revealed that, in the 50 top-selling medical books, little information was provided regarding end-of-life patient care [48]. However, Weinstein and colleagues revealed that traditional pain management education is unlikely to be sufficient for physicians [8]. Max demonstrated that educational efforts alone might not be adequate to improve pain management [22]. Thus, supplementary approaches to changing physician behavior, including altering attitudes and perhaps rewards, are necessary.

It is interesting to note that, regardless of education, physicians reported that they were extremely confident in their knowledge of meperidine. This finding was unrelated to age or education. The prescription of meperidine has been scrutinized because of its unique pharmacology and toxicity [43, 45,49]. Thus, our findings are particularly important because there are recommendations that meperidine should be avoided or its use limited in light of the potential for untoward side effects because its metabolite (normeperidine) may cause seizures at doses greater than 800 mg/day [50–53]. Both primary and specialty physicians reported a greater knowledge of meperidine, Schedule III and IV opioids (nontriplicate), and Schedule II opioid analgesics (triplicate). One limitation of this study is that we did not have specific questions that addressed their actual knowledge of meperidine or the other modalities. No efforts were made to test physician knowledge on the appropriate use of oral and intravenous meperidine. On the basis of the popularity of meperidine, the physicians may not have accurate knowledge despite their apparent confidence. This suggests that physicians may not be accurate in their judgments about their own knowledge regarding pain management. Our findings also suggest lack of education regarding complementary modalities that may be useful for the management of pain. Furthermore, our findings suggest discordance between what physicians actually know and what they think they know. This result emphasizes that testing physicians on what they actually know

**Table 8** Michigan physician opinions on issues related to regulatory scrutiny

Opinions regarding regulatory issues	N	Agreement scores*	
		Mean	S.D.
Experience of my colleagues with regulatory agencies has affected my prescribing of strong opioids for pain	364	2.5	1.3
There is undue regulatory scrutiny of physicians who prescribe strong opioids	364	2.9	1.1
My reputation in the physician community would be <i>negatively</i> affected by frequently prescribing strong opioids for pain	368	2.7	1.0
My reputation in the physician community would be <i>positively</i> affected by frequently prescribing strong opioids for pain	368	2.6	0.8
If I frequently prescribe strong opioids for pain management, I may attract a medical review of my prescribing habits	367	3.5	0.9

\*1 = strongly disagree, 5 = strongly agree

may be a better way to determine their educational needs.

Overall, the study group were satisfied with the pain care they provided whether or not they had experience treating the type of pain problem presented. Despite their high level of satisfaction with their care of patients with acute pain, cancer pain, or pain in terminal illness, this satisfaction is likely misplaced because all types of pain continue to be severely undertreated [28,54,55]. Furthermore, this study did not evaluate the patient's satisfaction with their physician's attention to or care of their pain complaints. Our findings do suggest that there was discordance between the physician's overall goal of pain management and their satisfaction with the pain management they provide for chronic pain patients. The majority of physicians reported a goal of absolute and complete to adequate pain relief for acute pain, cancer pain, and pain associated with terminal illness. However, the physician's reported a lower goal (i.e., adequate and complete to moderate pain relief) for chronic pain. Although we were surprised to find differences in the treatment goals for the different types of pain, this finding may be due to experience in caring for patients with difficult chronic pain problems. It is entirely conceivable that lower expectations may be realistically based on the physician's practice. Nonetheless, physicians in the study group were universally less satisfied with their management of chronic pain. We can only speculate that their lower goals for managing chronic pain may reflect difficulty in treating these complex patients, which may often require specialty care. Clearly, further study is required to determine whether this is due to less knowledge about how to achieve higher pain relief goals in this patient population.

Our respondents reported seeing patients with chronic pain more frequently than patients with other types of pain. They expressed less comfort and sat-

isfaction with their management of chronic pain. These results, taken together, confirm that, although assessment and treatment for chronic pain does occur, physicians have both lower expectations for treatment outcomes and are less satisfied with the care they are providing for chronic pain. The study data may support the conclusion that physicians recognize the added complications, challenges, and inconsistencies of chronic pain compared with acute pain, cancer pain, and the pain of terminal illness. The reason for lower expectations and goals for chronic pain relief deserve further study.

The identification of legislative barriers to the treatment of pain may ultimately lead to better care of patients with pain. Although the physicians did not report undue regulatory prescribing of strong opioids, it appears that perceptions of regulatory scrutiny in the state of Michigan may have an effect on the prescribing habits of physicians. The physicians believed that prescribing strong opioids for pain management would attract a medical review. However, they also reported that the experience of their colleagues with regulatory agencies had not affected their prescription of strong opioids for pain. Although we did not specifically evaluate prescribing habits, in general the physicians did not tend to endorse the utilization of chronic opioids for the management of chronic pain. Weinstein et al. also revealed that physicians were prejudiced about the use of opioid analgesics for pain and lacked knowledge about pain and its treatment [8]. This finding is consistent with the New York State experience in which the introduction of special prescription forms for Schedule II opioid analgesics led to a reduction in the prescription of these drugs [37]. These findings parallel and may contribute further to the reluctance of physicians to prescribe opioid analgesics for long periods to manage chronic pain in conjunction with potential regulatory scrutiny. The use of behavioral or opioid contracts in



reducing diversion remains controversial [38]. It was surprising to find that when physicians did use opioid analgesics for chronic pain management, there was modest utilization of opioid contracts with these patients. It is unclear whether this suggests that physicians may also need education about regulatory matters or that they justifiably feel that they are not appropriate or beneficial.

Development of physician-specific educational strategies for the management of different types of pain may be necessary. For example, efforts have been made to implement treatment guidelines, algorithms, or disease state management practices. Moreover, these efforts may especially be needed to address physician attitudes, goals, and perceptions regarding patients with chronic pain. Further study could evaluate standardizing treatment of pain using a disease management approach.

To minimize the potential urge to intentionally report untrue behaviors or attitudes (self-report bias), the questionnaires were completed confidentially. Despite broad coverage, we did not test for representation bias resulting from regional differences in the practice of pain management or differences resulting from the type of physician practice. However, other studies can be criticized for selecting physicians based on their membership in professional organizations or their medical specialty [28,30,46,56]. Because pain is ubiquitous and the goal was to evaluate the status of pain management by physicians practicing in the state of Michigan, a comprehensive sampling frame using the Michigan Board of Medical Licensure directory was chosen. It was noteworthy that physician specialties that are well represented in the American Pain Society and the American Academy of Pain Medicine (e.g., anesthesiology, neurology and PM and R) were underrepresented in this survey.

Providing reminders by mail (as done in this study) as well as by telephone has been shown to improve response rate [39]. In general, lower response rates have been associated with physicians and anonymous surveys [57]. Studies with greater than 60% response rate are achievable in physician populations [57]. However, the strategy used to calculate the response rate in these studies is not always clear from the methods; neither is it clear whether the investigators used monetary incentives. It is known that monetary incentives may improve response rates but may also introduce a selection bias [57]. Thus, we made a conscious decision to defer utilization of tokens. Our survey was fairly detailed and touched on a sensitive subject matter, both of which may have reduced the response rate.

Nonetheless, we believe that our response rate was acceptable for a population of physicians asked to complete a four-page survey.

To evaluate nonrespondent bias, an abbreviated questionnaire was used to determine reasons for nonresponse. By using a large physician sample and comparing their demographics to federal statistics, we believe that a representative sample was obtained [41]. Furthermore, analysis of the nonresponse questionnaire suggests that there was no substantive difference between those who responded and those who did not. An article by Asch et al. clearly articulates issues of response rate and bias: "Although there are more opportunities for non-response bias when response rates are low than high, there is no necessary relationship between response rates and bias. Surveys with very low response rates may provide a representative sample of the population of interest, and surveys with high response rates may not"[57]. Considering the aforementioned, we believe that our response rate is consistent with other mail survey studies that have recruited physicians [58]. If a bias is present, we believe that it did not affect our conclusions in a meaningful manner.

Finally, this work emphasizes the considerable variability in the physician practice of pain management. Physician variability and perceptions of regulatory scrutiny may contribute to the undertreatment of all types of pain. This is especially true as regards chronic pain management. In addition, physician perceptions may lead to the unintentional undertreatment of pain. This may be especially problematic for patients with chronic pain. Physician variability in their goals, knowledge, and attitudes based on the type of pain may very well be a barrier to the management of chronic pain. Furthermore, this finding is supported by Weinstein and colleagues, who reported that physicians often had negative views about patients with chronic pain [8]. Although this study was conducted in Michigan, these results may reflect the status of pain management in other states.

Our results support increasing educational efforts for physicians as well as the evaluation of current health care and legislative policy regarding pain management. Future studies will use the data from this study to direct population-based research focused on a larger physician sample to evaluate physician prescribing habits. More study is also essential to evaluate patients' perceptions and satisfaction with pain management in the context of function and quality of life and to evaluate ways of improving the quality of pain care in a cost-effective manner to enhance the health of those patients living with pain.

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