

# Understanding Practitioner Comfort and Educational Priorities for Safe Opioid Prescribing: A Repeated Cross-Sectional Study

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**Background:** The Centers for Disease Control and Prevention (CDC) released revised opioid prescribing guidelines in 2022 to address unintended harms associated with its original 2016 guidelines and to emphasize individualized care, shared decision-making, and appropriate screening for opioid use disorder. The extent to which clinicians are aware of and feel prepared to apply these revised recommendations remains unclear.

**Methods:** In a repeated cross-sectional study, we conducted an anonymized electronic survey of attendees to a nationally recognized annual opioid conference from 2022 to 2024 to assess familiarity with CDC opioid prescribing guidelines, perceived competence in chronic opioid management, and comfort with guideline application. Attendees included physicians, advanced practice providers (encompassing nurse practitioners and physician assistants), pharmacists, nurses, researchers and hospital/clinic administrators. Survey responses were compared across self-identified academic versus non-academic practice types, urban versus rural settings, and clinician roles.

**Results:** Across the three years, 72.3% of attendees completed the survey. No significant differences were observed between rural and urban clinicians in guideline familiarity or perceived competence. Academic clinicians were significantly more likely than non-academic clinicians to report the presence of institutional acute opioid prescribing guidelines. Clinicians with higher self-reported competence, particularly those in academic settings, had higher odds of perceiving that applying CDC guidelines and using opioid risk assessment tools require high levels of expertise. Differences by years of experience were not statistically significant.

**Conclusion:** These findings suggest meaningful variation in perceived competence between academic and non-academic clinicians and highlight potential educational opportunities needed to put prescribing guidelines into practice. Continued efforts to disseminate clear, practical guidance and provide targeted education may support safer, more confident opioid prescribing across diverse practice settings.

**Keywords:** CDC opioid prescribing guidelines, opioids, pain management, opioid prescribing, academic versus non-academic

## Introduction

The Centers for Disease Control and Prevention (CDC) released opioid prescribing guidelines in 2016 to assist clinicians—particularly those in primary care—with initiating and managing opioid therapy for chronic non-cancer pain.<sup>1</sup> Although intended to support best practices in response to the opioid epidemic, the guidelines led to several unintended consequences. These included rigid and inappropriate application, including use in populations explicitly excluded in the guidelines (such as patients with cancer-related pain or those in hospice). For example, shortly after the publication of the 2016 guidelines, several US States passed legislation to restrict the amount of opioids a patient was able to receive,<sup>2–4</sup> with multiple national pharmacy chains adapting similar policies,<sup>5,6</sup> which in some cases, delayed access of opioids for vulnerable patients, including those with end-of-life pain.<sup>4</sup> Reports of abrupt opioid discontinuations, rapid tapers, and reports of patient abandonment were also published.<sup>3,4,7–9</sup> An increasing number of

studies have demonstrated the association between opioid tapering and increased risk of psychiatric destabilization,<sup>10,11</sup> suicidality,<sup>12,13</sup> and pain-related emergency department visits and hospitalizations.<sup>14,15</sup> Meanwhile, opioid-involved overdose deaths continued to rise in the years following the 2016 publication.<sup>16,17</sup>

In response, the CDC issued revised guidelines in November 2022 emphasizing shared decision-making, individualizing care through clinical judgment, and cautioning against inflexible guideline implementation.<sup>18</sup> The term “chronic pain” was removed from the guideline title, as the revised recommendations more precisely define and address acute, subacute and chronic pain. The update also underscored the importance of screening for opioid use disorder (OUD) and offering medications for OUD, such as buprenorphine.

The extent to which these guidelines influence prescribing practices remains uncertain. Opioid prescribing had already begun to decline before the 2016 guidelines,<sup>19</sup> and it is unclear how widely or consistently the 2022 recommendations have been incorporated into routine practice. Further evaluation is needed to understand adoption patterns across clinical settings and their impact on patient care and opportunities for educational focus.

To this end, we conducted a repeated cross-sectional study whereby we deployed a confidential, anonymized electronic survey to multidisciplinary medical practitioners who attended a nationally recognized annual opioid conference hosted by our institution from 2022 to 2024 (3 cohorts) to assess awareness and knowledge of the 2022 revised CDC opioid prescribing guidelines, comfort applying these guidelines in clinical practice, and perceptions of the knowledge needed to use them effectively. We also compared responses between clinicians in academic settings (ie. those working in academic or university medical centers and usually involved in medical education and/or research) versus non-academic settings (ie. those working in private practice, independent clinics, community hospitals not affiliated with an academic medical center with limited to no formal teaching/research obligations). This is an important comparison as those in academic settings may be more aware of and to adapt latest guidelines given their responsibilities in education and research.

## Materials and Methods

### Study Setting

Our institution’s annual Opioid Conference, “Mayo Clinic Opioid Conference: Evidence, Clinical Considerations and Best Practice”, is a nationally recognized continuous medical education (CME) course spanning 3 days.<sup>20</sup> The conference has been in existence since 2017 (not held in 2020 due to the COVID-19 pandemic) and offers CME credits for physicians, nurses and nurse practitioners, physician assistants, and pharmacists. Since 2021, the course has been offered in a hybrid format with attendees participating virtually and in-person. Topics of the conference range from interventional modalities, medications for opioid use disorder (MOUD), opioid prescribing guideline reviews, urine drug test result interpretations, and legal matters related to opioid prescribing. The conference took place between September 29-October 1, 2022 in Palm Springs, California; September 21-September 23, 2023 in Phoenix, Arizona; and September 19–21, 2024 in San Diego, California.

### Survey Design

The survey was conducted electronically and contained 15 multiple-choice items. The first 6 items were related to demographics, which includes practice setting type. Items 7 and 8 inquired about the presence of acute opioid prescribing guidelines in the respondent’s institution, and whether opioid prescribing metrics are collected and made available for individual clinicians or department leadership to review, respectively (answer choices were yes, no, and unsure). Items 9 and 10 assess the respondent’s perceived level of competency related to opioid management, and the level of competency that respondents feel is necessary to manage patients using chronic opioids. These items were scored on a 5-point Likert scale ranging from None/No competency (1) to Expert competency (5). The remaining items assess respondents’ familiarity with the CDC opioid prescribing guidelines, comfort level in communicating with patients on chronic opioids, familiarity with opioid prescribing best practices and guidelines, ability to stay on time when seeing patients on chronic opioids and confidence level in screening those on chronic opioids for OUD (see [Figures 1 and 2](#) for our questionnaire).

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Figure 1 2022 Version of Survey.

<input type="checkbox"/> Ohio; <input type="checkbox"/> Oklahoma; <input type="checkbox"/> Oregon; <input type="checkbox"/> Pennsylvania; <input type="checkbox"/> Puerto Rico; <input type="checkbox"/> Rhode Island; <input type="checkbox"/> South Carolina; <input type="checkbox"/> South Dakota; <input type="checkbox"/> Tennessee; <input type="checkbox"/> Texas; <input type="checkbox"/> Utah; <input type="checkbox"/> Vermont; <input type="checkbox"/> Virginia; <input type="checkbox"/> Washington; <input type="checkbox"/> West Virginia; <input type="checkbox"/> Wisconsin; <input type="checkbox"/> Wyoming	
5) Practice Setting: <input type="checkbox"/> Urban; <input type="checkbox"/> Rural; <input type="checkbox"/> Both	13) I'm familiar with opioid best practice tools and guidelines for the use of opioids for acute prescribing. <input type="checkbox"/> Strongly agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly disagree
6) Practice Type: <input type="checkbox"/> Academic medical center; <input type="checkbox"/> Private practice; <input type="checkbox"/> Hospital affiliate; <input type="checkbox"/> Non-patient facing; <input type="checkbox"/> Other, please specify	14) I frequently struggle to stay on time when seeing patients on chronic opioids. <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable (I do not provide clinical care to patients)
7) Does your place of practice have opioid prescribing guidelines developed for acute prescribing based on indication and quantity? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	15) I feel confident about screening patients on chronic opioids for opioid use disorder. <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
8) Does your place of practice collate opioid prescribing metrics or a dashboard for department and/or individual review? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	<b>THANK YOU FOR COMPLETING THE SURVEY!</b>  <b>Please click <u>SUBMIT</u> to record your answers.</b>

Figure 1 continued.

Item 11 in our 2022 survey differs from that of 2023 and 2024; this item assessed respondents' familiarity with CDC opioid prescribing guidelines. When our 2022 survey was deployed, the revised 2022 CDC guidelines had not yet been published, although there was communication from the CDC about its upcoming publication. Therefore, in the 2022 version of the survey, respondents were asked about their familiarity with the 2016 CDC guidelines, and separately, about their awareness of the proposed revised CDC opioid prescribing guidelines in 2022 (Figure 1). In 2023 and 2024, Item 11 only assessed respondents' familiarity with the 2022 CDC guidelines (Figure 2).

We sought assistance from our institution's Research Survey Center to verify the language and clarity of our questions. Neither patients nor members of the public were involved in the conceptualization, design and conduct of the study as our primary focus was on clinicians' familiarity with CDC guidelines. This study was reviewed by our Mayo Clinic's Institution Review Board (IRB) and was determined to be exempt from ethical/IRB review under 45 CFR 46.102.

## Survey Pilot Testing

Six participants (3 physicians, 1 nurse practitioner, 1 pharmacist, and 1 administrator) were asked to pilot-test the survey and provide feedback on the content, length, and language of the survey. All respondents took less than 10 minutes to complete the survey. This was not a validated survey.

## Survey Deployment

All conference attendees were required to provide an Email address at the time of registration. Basic demographic information, such as region of practice and specialty, was collected as part of conference registration.

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Patient communication related to opioids (Q10_3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																
Alternative therapies to opioids (Q10_4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																
Opioid risk assessment tools (Q10_5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>																																
<p>3) Geographic location:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> United States; <input type="checkbox"/> Elsewhere in North America; <input type="checkbox"/> South America; <input type="checkbox"/> Europe; <input type="checkbox"/> Africa; <input type="checkbox"/> Asia; <input type="checkbox"/> Australasia</li> </ul>	<p>11) I'm familiar with the 2022 CDC guidelines.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Strongly agree</li> <li><input type="checkbox"/> Agree</li> <li><input type="checkbox"/> Disagree</li> <li><input type="checkbox"/> Strongly disagree</li> </ul>																																				
<p>4) If Question #3 is "United States". If Question #3 is not "United States", skip this question.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Alabama; <input type="checkbox"/> Alaska; <input type="checkbox"/> Arizona; <input type="checkbox"/> Arkansas; <input type="checkbox"/> California; <input type="checkbox"/> Colorado; <input type="checkbox"/> Connecticut; <input type="checkbox"/> Delaware; <input type="checkbox"/> District of Columbia; <input type="checkbox"/> Florida; <input type="checkbox"/> Georgia; <input type="checkbox"/> Hawaii; <input type="checkbox"/> Idaho; <input type="checkbox"/> Illinois; <input type="checkbox"/> Indiana; <input type="checkbox"/> Iowa; <input type="checkbox"/> Kansas; <input type="checkbox"/> Kentucky; <input type="checkbox"/> Louisiana; <input type="checkbox"/> Maine; <input type="checkbox"/> Maryland; <input type="checkbox"/> Massachusetts; <input type="checkbox"/> Michigan; <input type="checkbox"/> Minnesota; <input type="checkbox"/> Mississippi; <input type="checkbox"/> Missouri; <input type="checkbox"/> Montana; <input type="checkbox"/> Nebraska; <input type="checkbox"/> Nevada; <input type="checkbox"/> New Hampshire; <input type="checkbox"/> New Jersey; <input type="checkbox"/> New Mexico; <input type="checkbox"/> New York; <input type="checkbox"/> North Carolina; <input type="checkbox"/> North Dakota; <input type="checkbox"/> Ohio; <input type="checkbox"/> Oklahoma; <input type="checkbox"/> Oregon; <input type="checkbox"/> Pennsylvania; <input type="checkbox"/> Puerto Rico; <input type="checkbox"/> Rhode Island; <input type="checkbox"/> South Carolina; <input type="checkbox"/> South Dakota; <input type="checkbox"/> Tennessee; <input type="checkbox"/> Texas; <input type="checkbox"/> Utah; <input type="checkbox"/> Vermont; <input type="checkbox"/> Virginia; <input type="checkbox"/> Washington; <input type="checkbox"/> West Virginia; <input type="checkbox"/> Wisconsin; <input type="checkbox"/> Wyoming</li> </ul>	<p>12) I feel comfortable communicating with patients related to their chronic opioid use.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Strongly agree</li> <li><input type="checkbox"/> Agree</li> <li><input type="checkbox"/> Disagree</li> <li><input type="checkbox"/> Strong disagree</li> <li><input type="checkbox"/> Not applicable (I do not provide clinical care to patients)</li> </ul>																																				

Figure 2 2023 and 2024 Version of Survey.

5) Practice Setting: <input type="checkbox"/> Urban; <input type="checkbox"/> Rural; <input type="checkbox"/> Both	13) I'm familiar with opioid best practice tools and guidelines for the use of opioids for acute prescribing. <input type="checkbox"/> Strongly agree <input type="checkbox"/> Agree <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly disagree
6) Practice Type: <input type="checkbox"/> Academic medical center; <input type="checkbox"/> Private practice; <input type="checkbox"/> Hospital affiliate; <input type="checkbox"/> Non-patient facing; <input type="checkbox"/> Other, please specify	14) I frequently struggle to stay on time when seeing patients on chronic opioids. <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable (I do not provide clinical care to patients)
7) Does your place of practice have opioid prescribing guidelines developed for acute prescribing based on indication and quantity? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	15) I feel confident about screening patients on chronic opioids for opioid use disorder. <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
8) Does your place of practice collate opioid prescribing metrics or a dashboard for department and/or individual review? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unsure	THANK YOU FOR COMPLETING THE SURVEY!  <b>Please click <u>SUBMIT</u> to record your answers.</b>

Figure 2 continued.

The confidential and anonymized electronic survey was deployed to all registered conference attendees 1 day prior to conference start date. The electronic survey was sent to the Email address that attendees used to register for the conference. A reminder Email was sent on each of the 3 conference days in 2022. In 2023 and 2024, in addition to the reminders in each of the conference days, we added a final reminder 2 days after the conference end date based on attendee feedback in 2022. The survey was open until 1 week after the last day of the conference. All conference attendees were eligible and were informed that completing the survey was entirely voluntary; no incentives or compensation were provided for participation. All participants provided informed consent.

## Data Analysis

Demographic and characteristics of conference attendees are summarized. Categorical variables are reported as count and percentages.

Fisher's Exact Test and trend test for ordinal variables were used to compare survey responses between practice setting (urban, rural, or both) and practice type (academic or non-academic). Wilcoxon Rank Sum Test was used to determine if there was a potential difference in the percentage of physicians compared to advanced practice providers (APPs), which include nurse practitioners and physician assistants, and years of experience.

Respondents were asked about their current level of competence on topics related to opioid prescribing and the level of competency needed in those topics to manage patients on chronic opioids. These topics included current competence with CDC/state practice guidelines, opioid tapering, patient communication related to opioids, alternative therapies, and opioid risk assessment tools. Ordinal logistic regression was used to assess the potential association between level of increasing current competence reported on these topics and the outcome of perceived necessary competence level, stratified by academic and non-academic and survey years. Competence level was multinomial with the following answer options: none, some, moderate, competent, and expert (see Figures 1 and 2 for our original survey). A p-value of <0.05 was considered statistically significant. Statistical analyses were performed using RStudio (version 4.5.1, Posit team

(2025). RStudio: Integrated Development Environment for R. Posit Software, PBC, Boston, MA. URL <http://www.posit.co/>.

## Results

### Conference Attendee Demographics

From 2022 to 2024, 700 individuals attended the conference. Attendee demographics, including regions of practice, specialty of practice, and discipline (ie. physician, APPs, nurse, pharmacist, researcher) are summarized in Table 1. The majority of attendees practiced in Family or Internal Medicine, were physicians or APPs, and were from the Midwest and Western regions of the United States.<sup>21</sup>

**Table 1** Demographics

	<b>All Conference Attendees 2022–2024 (N=700)</b>	<b>Conference Survey Respondents 2022–2024 (N=506)</b>
<b>Disciplines, N (%):</b>		
Physician	315 (53.5)	271 (53.6)
Advanced Practice Provider	196 (33.3)	182 (36)
Nurse	23 (3.9)	18 (3.5)
Pharmacist	33 (5.6)	25 (4.9)
Other	22 (3.7)	10 (2)
Missing	111	0
<b>Regions of United States*, N (%):</b>		
Northeast	33(4.8)	19 (4.2)
Midwest	309 (45)	211 (46.7)
South	79 (11.5)	45 (10)
West	266 (38.7)	177 (39.1)
Outside the US/Unknown	13	54
<b>Specialties**, N (%):</b>		NA
Family Medicine	171 (24.5)	
Internal Medicine	110 (15.8)	
Pain Medicine	96 (13.8)	
Palliative Medicine	42 (6)	
Physical Medicine & Rehab	39 (5.6)	
Psychiatry & Psychology	42 (6)	
Other	197 (28.3)	
Missing	3	
<b>Practice Setting, N (%)</b>	NA	
Urban		292 (58.5%)
Rural		112 (22.4%)
Both		95 (19.1%)
Missing		7
<b>Practice Type, N (%)</b>	NA	
Academic Medical Center		134 (26.7%)
Private Practice		128 (25.5%)
Hospital Affiliate		140 (27.9%)
Non-patient Facing		3 (0.6%)
Other		97 (19.3%)
Missing		4

(Continued)

**Table 1** (Continued).

	<b>All Conference Attendees 2022–2024 (N=700)</b>	<b>Conference Survey Respondents 2022–2024 (N=506)</b>
<b>Years of Practice, N(%)</b>	NA	
Currently in Training		0 (0.0%)
0–5 years		75 (14.9%)
6–10 years		86 (17.0%)
11–15 years		91 (18.0%)
16–20 years		59 (11.7%)
21 or more years		194 (38.4%)
Missing		1

**Note:** \*Based on the CDC Geographic Regions; \*\*Represents specialties with more than 10 attendees.

**Abbreviation:** NA, Not available.

## Survey Response

Survey respondent demographics are summarized in [Table 1](#). Across the 3 years (2022–2024), 72.3% attendees completed the survey (54.2% in 2022, 51.9% in 2023, and 83.6% in 2024). The survey respondents and the total conference attendee population discipline type and regional demographics were proportionally consistent.

Greater than half of respondents reported a discipline of physician (MD/DO; 53.6%), and 38.4% of respondents report 21 or more years of practice.

## Rural versus Urban Comparison

We found no significant differences in the presence of institutional opioid prescribing guidelines and metrics available between rural and urban practitioners. There were no significant differences found in the level of familiarity with opioid prescribing guidelines between these groups. Similarly, no between-group differences were found in the perceived level of competence required to apply guidelines, opioid tapering, communicating with patients about opioids, use of alternate pain management therapies, and using the opioid risk assessment tools. In sum, there were no statistically significant differences found in any of our surveyed items between rural and urban practitioners.

## Respondent Clinician Type and Years of Experience

There was a significant difference between clinician type (MD/DO vs APP) and years of experience, where MD/DOs (median of 6 years) have more years of experience after qualification compared to APPs (median of 3.5 years). Other disciplines were not compared due to small sample size. There were no statistical differences found in any of the surveyed item responses between clinician type and years of experience.

## Academic versus Non-Academic Comparison

During all three survey years, there was a significant difference between academic and non-academic respondents in having opioid prescribing guidelines developed for acute prescribing/indications, with more academics reporting opioid prescribing guidelines during each survey year than non-academic respondents ( $p < 0.05$  for all, [Table 2](#)).

Over time, for each increasing level of competence reported in academic respondents (versus non-academic respondents), there was an increased odds of respondents stating that greater competence is needed to apply CDC/state practice guidelines, opioid tapering, patient communication related to opioids, alternative therapies, and opioid risk assessment tools (see [Table 3](#) for odds ratios and 95% confidence intervals across all 3 surveyed years). Interestingly, in 2022, academics had decreased odds (compared to non-academics) in reporting high competence in prescribing guidelines needed to manage patients on chronic opioids; the odds reversed by 2023. The same increased odds were seen for non-academics but to a lesser degree ([Table 3](#)).

**Table 2** Presence of Opioid Prescribing Guidelines for Acute Prescribing for Non-Academic versus Academic Survey Respondents

Does Your Place of Practice Have Opioid Prescribing Guidelines Developed for Acute Prescribing Based on Indication and Quantity?	Non-Academic	Academic	Total	p-value
	<b>2022</b>			
Yes	48 (57.1%)	20 (87.0%)	68 (63.6%)	
No	27 (32.1%)	1 (4.3%)	28 (26.2%)	
Unsure	9 (10.7%)	2 (8.7%)	11 (10.3%)	
Missing	2	0	2	
<b>2023</b>				
Yes	57 (50.9%)	27 (71.1%)	84 (56.0%)	0.009
No	40 (35.7%)	4 (10.5%)	44 (29.3%)	
Unsure	15 (13.4%)	7 (18.4%)	22 (14.7%)	
Missing	1	0	1	
<b>2024</b>				
Yes	87 (51.8%)	55 (75.3%)	142 (58.9%)	< 0.001
No	55 (32.7%)	7 (9.6%)	62 (25.7%)	
Unsure	26 (15.5%)	11 (15.1%)	37 (15.4%)	
Missing	1	0	1	

**Table 3** Ordinal Logistic Regression for Outcomes of Opioid Topics and Perceived Necessary Competence Level, Stratified by Year and Practice Type

	Odds Ratio (OR; 95%) for Perceived Level of Competence Needed for Each Level of Respondent Self-Reported Competency					
	Academic Year 2022	Academic Year 2023	Academic Year 2024	Non-Academic Year 2022	Non-Academic Year 2023	Non-Academic Year 2024
CDC or State practice guidelines	0.66(0.2,2.08)	2.15(1.02,4.79)	3.24(1.81,6.2)	3.23(1.81,6.13)	2.29(1.39,3.88)	2.63(1.79,3.95)
Opioid tapering	1.11(0.5,2.54)	3.53(1.74,8.26)	4.28(2.37,8.6)	1.4(0.91,2.19)	1.82(1.25,2.72)	1.64(1.22,2.23)
Patient communication related to opioids	1.6(0.64,4.65)	4.08(1.87,10.22)	3.62(2.02,6.9)	1.69(1.07,2.71)	2.74(1.75,4.42)	2.78(1.94,4.04)
Alternative therapist to opioids	2.3(0.85,7.34)	2.65(1.33,5.74)	2.95(1.64,5.57)	2.76(1.6,4.96)	3.07(1.9,5.17)	3.01(2.06,4.5)
Opioid risk assessment tools	1.43(0.53,4.09)	5.47(2.24,15.56)	3.25(1.87,5.92)	2.79(1.77,4.56)	2.01(1.38,2.97)	2.18(1.59,3.03)

## Discussion

To our knowledge, this was the first multi-year survey study assessing familiarity with CDC opioid prescribing guidelines and respondent attitudes on competence levels needed to manage patients on opioids and implement guidelines in clinical practice.

We found a statistically significant difference between academic and non-academic respondents in the presence of opioid prescribing guidelines for acute pain indications in our sample. More academic respondents reported having acute prescribing guidelines in their institution than their non-academic peers. These findings may help explain prior research demonstrating higher pain assessment competence among academic clinicians.<sup>22</sup> Although we found a significant

difference between academic and non-academic respondents in collating or having access to opioid prescribing metrics in 2022, this difference no longer existed in 2023 and 2024. This may signal a more widespread institutional awareness of prescribing metrics and efforts to address opioid stewardship in the years following the publication of the revised CDC guidelines in 2022.

Our findings seem to suggest that clinicians working in academic settings and those who reported higher competence in opioid prescribing may be more likely than non-academic clinicians to believe that applying CDC's guidelines in practice and appropriately using opioid risk assessment tools require greater expertise. While a similar pattern was seen among non-academic clinicians, highly competent clinicians in this group seemed less likely to say that high competence or expertise is required. This belief seems consistent with previous findings showing CDC guideline awareness was associated with enhanced confidence in treating patients with chronic non-cancer pain.<sup>23</sup>

The discrepancies between academic versus non-academic clinicians on perceived competence may be related to the heightened awareness of prescribing guidelines among those working in academic settings, and the fact that they are more likely to train learners on these guidelines. This is supported by a prior study indicating that a higher percentage of academic (versus non-academic) pain physicians have completed a pain medicine fellowship or training in neurology, admit patients to hospital for aggressive management for severe pain, and have an interdisciplinary practice within institutions that conduct research.<sup>24</sup> Non-pain specialists in academic settings were also found to have greater access to pain specialist consultants compared to non-pain specialists in non-academic settings.<sup>22</sup> Furthermore, previous studies demonstrated that managing chronic pain to be particularly stressful for trainees,<sup>25</sup> which could further reinforce academic clinicians' perception that a high level of competence is required to manage this patient population. Taken together, academic clinicians may need more in-depth knowledge of opioid prescribing guidelines in order to train learners, conduct research, and participate in interdisciplinary team practices.

Academic clinicians may also be more likely to encounter patients with higher medical complexity in tertiary referral centers and thus may feel the need for higher competence to manage patients with chronic pain. Studies to date, however, point to similar patient complexity between primary care and tertiary care,<sup>26</sup> and in fact, patients with co-occurring mental health complexities are more likely to have their referrals declined for tertiary pain care.<sup>27</sup>

The interaction between years of experience and perceived level of competence needed to implement CDC guidelines was not statistically significant, which could suggest that perceived level of competence may be more related to prior training and level of exposure to guidelines rather than years of experience. However, we acknowledge that due to our relatively small sample size, we may lack adequate power to make this assertion. Future studies surveying a larger sample of academic and non-academic clinicians beyond our conference venues are being considered to determine whether this non-significant interaction persists in a larger sample.

This study has several important limitations. Survey respondents were all attendees of our institution's annual opioid conference, which was held in the western region of the United States during all 3 years. We acknowledge that respondents are likely a self-selected group of practitioners with a vested interest in learning more about opioid prescribing and pain management; they are also more likely to work within institutions where Continuing Medical Education funds and time allowance are available. Practitioners working in other regions of the country, those who are unaware of our conference, and those who are aware but did not register may have different levels of comfort, attitudes and knowledge of the CDC guidelines. Moreover, conference attendees who did not respond to the survey may also have different characteristics, comfort levels, and attitudes regarding opioid prescribing guidelines and management. Therefore, selection bias likely played a role, and our results may not be entirely generalizable. As well, we were unable to differentiate between survey respondents who attended our conference virtually versus in-person; these 2 groups may differ in knowledge and perceptions. Future efforts to assess differences in response between virtual and in-person attendees are being considered.

Finally, we acknowledge that some practitioners may have concerns related to CDC guidelines, which could influence their survey responses. Concerns raised and published include the strength of supporting evidence underlying CDC's recommendations and inter-individual variability in opioid responses,<sup>28,29</sup> as well as the need for greater clarity around shared decision making in pain management – a concept emphasized in the revised guidelines.<sup>30</sup>

## Conclusion

Across all 3 survey years of our study, we found that academic clinicians were more likely than non-academic clinicians to report having opioid prescribing guidelines for acute pain management in their workplace. Over time, academic clinicians who reported higher competence were also more likely to state that a high level of competence is needed to appropriately implement elements of CDC's opioid prescribing guidelines into clinical practice.

These findings underscore the need for targeted educational support for non-academic clinicians to promote guideline-concordant pain management and improve familiarity with CDC guidelines in non-academic settings. The association between greater self-reported competence and higher perceived competency requirements also suggests that longitudinal opioid prescribing training may be more effective than one-time education efforts.

## Data Sharing Statement

The data that support the findings of this study are available from the corresponding author, BL, upon reasonable request.

## Acknowledgments

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## Disclosure

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