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Which Skills are Associated with Residents' Sense of Preparedness to Manage Chronic Pain?

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Abstract

Objective—To identify gaps in residents' confidence and knowledge in managing chronic non-malignant pain (CNMP) and to explore whether specific skills or pain knowledge were associated with global preparedness to manage CNMP.

Design—Cross-sectional web-based survey

Setting & Participants—Internal medicine residents in Bronx, NY

Main Outcome Measures—We assessed: (1) confidence in skills within four content areas: physical examination, diagnosis, treatment, and safer opioid prescribing; (2) pain-related knowledge on a 16-item scale; and (3) global preparedness to manage CNMP (agreement with, "I feel prepared to manage CNMP"). Gaps in confidence were skills in which fewer than 50% reported confidence. Gaps in knowledge were items in which fewer than 50% answered correctly. Using logistic regression, we examined whether skills or knowledge were associated with global preparedness.

Results—Of 145 residents, 92 (63%) responded. Gaps in confidence included diagnosing fibromyalgia, performing corticosteroid injections, and using pain medication agreements. Gaps in knowledge included pharmacotherapy for neuropathic pain and interpreting urine drug test results. Twenty-four residents (26%) felt globally prepared to manage CNMP. Confidence using pain medication agreements (AOR 5.99, 95% CI: 2.02, 17.75), prescribing long-acting opioids (AOR 5.85, 95% CI: 2.00, 17.18), and performing corticosteroid injection of the knee (AOR 5.76, 95% CI: 1.16, 28.60) were strongly associated with global preparedness.

Conclusions—Few internal medicine residents felt prepared to manage CNMP. Our findings suggest that educational interventions to improve residents' preparedness to manage CNMP should target complex pain syndromes (e.g., fibromyalgia and neuropathic pain), safer opioid prescribing practices, and alternatives to opioid analgesics.

Keywords

medical education; chronic pain; opioid medications; physician self-assessment

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Conflicts of Interest

None disclosed.

Background

Chronic non-malignant pain (CNMP) is common in ambulatory care, with prevalence as high as 40% in population-based surveys and 33% in primary care settings.^{1,2} The majority of patients with CNMP are treated in primary care settings³ and referral options for pain management specialists are often limited.⁴ Therefore, it is critical that primary care physicians (PCPs) feel prepared to manage CNMP. However, PCPs have reported lack of preparedness to manage CNMP, due at least in part to inadequate training.^{5–12} PCPs' lack of training and preparedness to manage CNMP may negatively affect the quality of pain management patients receive. For example, ill-prepared PCPs may fail to provide the safest or most effective treatments for individual patients, rely too much on opioid analgesics, or inadequately monitor patients who are prescribed opioid analgesics for evidence of addiction or diversion.^{13,14}

Improving pain management training for PCPs during the formative years of residency may increase their preparedness to treat CNMP, which in turn could lead to improved patient outcomes. A national survey of internal medicine residents¹⁵ and two studies within internal medicine residency programs^{16,17} have found that residents also feel unprepared to manage CNMP. In response, management of CNMP has become a focus for quality improvement in residency training programs.^{18–20} However, previous reports did not address important pain management skills in which residents may lack confidence (e.g., skills in physical examination vs. skills in interpreting urine drug test results), gaps in pain-related knowledge, and whether skills or knowledge are associated with global preparedness to manage CNMP.

As preparation for developing a chronic pain curriculum, we surveyed internal medicine residents about their: (1) confidence in specific skills within four content areas-- physical examination (e.g., examining the shoulder), diagnosis (e.g., diagnosing fibromyalgia), treatment (e.g., prescribing NSAIDs), and safer opioid prescribing practices (e.g., identifying red flags of opioid-analgesic abuse); (2) pain-related knowledge; and (3) global preparedness to manage CNMP. In order to identify areas that residency programs could target in educational interventions, we determined the gaps in confidence and knowledge in managing CNMP, and we explored whether specific skills or pain knowledge were associated with global preparedness to manage CNMP.

Methods

Setting and Participants

Between September and December 2009, all 145 internal medicine residents at Montefiore Medical Center in Bronx, NY were invited to participate in an anonymous web-based questionnaire. Residents were in all three years of post-graduate training in the categorical (N=115) or primary care (N=30) training programs. Residents provided primary care for patients with predominantly low socioeconomic status in an urban hospital-based clinic or one of two federally qualified health centers. Residents were e-mailed an invitation to participate in the study, which included a description of the study and a link to the web-based questionnaire. Residents who did not respond were sent additional messages every 2 weeks until a maximum of five e-mails had been sent. The Montefiore Medical Center Institutional Review Board reviewed and exempted the study.

Data Collection and Measures

The questionnaire assessed: (1) confidence in specific skills within 4 content areas: examination, diagnosis, treatment, or safer opioid prescribing practices; (2) pain-related knowledge; and (3) global preparedness to manage CNMP. Questions were adapted from previously published questionnaires that assessed general pain knowledge and residents'

attitudes toward treatment of chronic pain.^{16,17,21} The questionnaire was reviewed by 6 senior primary care faculty members for face validity, pilot tested among 12 graduating medical residents, and revised based on feedback to enhance clarity. The final version of the questionnaire contained 48 questions and required approximately 20 minutes to complete.

To assess confidence in specific pain management skills, participants were asked to rate their confidence in their ability to perform each of 17 skills (e.g., I feel confident in my ability to diagnosis sciatica), using a 5-point Likert scale (1 = “strongly disagree”; 5 = “strongly agree”). Skills were organized by content area: (a) physical examination (knee, hip, shoulder, back); (b) diagnosis (osteoarthritis, sciatica, fibromyalgia, peripheral neuropathy); (c) treatment (prescription of NSAIDs, long-acting opioids, short-acting opioids, and gabapentin and corticosteroid injection of the knee and subacromial bursa); and (d) safer opioid prescribing practices (identifying red flags of abuse, using pain medication agreements, interpreting urine drug test results). To assess pain-related knowledge, we used 14 multiple choice and true/false questions from the validated KnowPain50 survey²¹ and 2 clinical vignettes developed by the authors that addressed common clinical challenges in management of CNMP. To assess global preparedness, participants were asked to rate their agreement with the statement, “I feel prepared to manage CNMP,” on the same Likert scale (1 = “strongly disagree”; 5 = “strongly agree”). Self-reported global preparedness in broad areas of clinical practice (e.g., managing chronic pain or caring for chronically ill patients) has been previously used to evaluate readiness for clinical practice in regional and national surveys of graduating residents and has been validated against formal performance measures such as oral examination.^{15,22,23}

Analysis

In our primary analyses, we dichotomized responses about confidence in specific pain management skills and global preparedness to manage CNMP, and we report the proportion of residents who agreed or strongly agreed with each statement (i.e., a response of 4 or 5 on the Likert scale). We considered a skill to be a “gap in confidence” if fewer than 50% reported feeling confident. We considered items to reflect a “gap in knowledge” if fewer than 50% of residents answered the item correctly. We also created a general pain-related knowledge score, the number of questions answered correctly (out of 16), which we dichotomized to either “low knowledge” if the resident’s knowledge score was below the median, or “high knowledge” if the resident’s knowledge score was at or above the median.

To explore whether specific skills or knowledge were associated with global preparedness to manage CNMP, we first conducted a series of unadjusted logistic regression models. In each model, the dependent variable was global preparedness to manage CNMP. The independent variable was confidence in a specific skill (a dichotomous variable) or whether a knowledge question was answered correctly (yes/no). Additional models used the general pain-related knowledge score (as a continuous or dichotomous variable) as the independent variable. Next, we repeated the logistic regression models adjusting for resident gender and training level, which may affect confidence.²⁴

We conducted two sensitivity analyses. Because global preparedness to manage CNMP was a single measure reported by a minority of residents, we repeated these analyses using a composite measure of global preparedness. In the composite measure, residents were classified as “prepared” if they agreed or strongly agreed with feeling either prepared (as above), or confident (“I feel confident in managing CNMP”), or both. Secondly, because gender has been previously identified as an effect modifier of confidence variables,^{24,25} we also evaluated gender-stratified models. These analyses did not significantly alter our findings and are not reported here.

Results

Overall, 92 out of 145 residents (63%) completed the survey. Of these, 62% were female; 36% were PGY-1s, 35% were PGY-2s, and 29% were PGY-3s; and 28% were in the primary care training program (see Table 1). These distributions reflected the sample population and did not differ significantly when compared with non-responders. Participants estimated on average that 26% (SD = 17%) of their primary care visits were for CNMP, and that 8% (SD = 20%) of their patients receiving opioid analgesics had signed pain medication agreements and 14% (SD = 27%) had ever underwent urine drug testing.

Gaps in confidence in specific pain management skills

Several specific skills were identified in which residents lacked confidence, as presented in Table 2. We identified the following gaps in confidence (percent of residents who felt confident): physical examination of the hip (32%) or shoulder (43%), diagnosis of fibromyalgia (26%) or neuropathic pain (43%), treatment with long-acting opioids (42%) or corticosteroid injection of the knee (9%) or subacromial bursa (3%), and safer opioid prescribing practices such as identifying red flags of abuse (47%) or using pain medication agreements (33%). Skills in which more than half of residents felt confident included diagnosing sciatica (87%), and prescribing NSAIDs (96%) or short-acting opioids (63%).

Gaps in knowledge

The median pain-related knowledge score was 12 (IQ Range 11–13) out of 16 (75%). We identified the following gaps in knowledge (percent of residents who answered the item correctly): pharmacotherapy for neuropathic pain (23%), prescribing anticonvulsants for pain (29%), interpreting urine drug test results (33%), and the effectiveness of pharmacotherapy alone for chronic pain (47%). The content area evaluated in each item and percent of residents who answered correctly are presented in Table 3.

Global preparedness to manage CNMP

Only 26% of residents felt globally prepared to manage CNMP, and only 12% felt globally confident to manage CNMP. Global preparedness did not differ significantly by gender, residency program (categorical vs. primary care), training level (post-graduate year), or the estimated percent of the resident's patients who have CNMP.

Skills and knowledge associated with global preparedness to manage CNMP

There was wide variability in the strength of association between confidence in specific skills and residents' sense of global preparedness for managing CNMP, though all were in a positive direction (Table 2). All associations that were significant in unadjusted models remained significant in models adjusting for gender and training level. In adjusted models, confidence in the following specific skills were significantly associated with global preparedness, in order of descending strength of association: using pain medication agreements (AOR 5.99, 95% CI [2.02 – 17.75]), prescribing long-acting opioids (AOR 5.85, 95% CI [2.00 – 17.18]), performing corticosteroid injection of the knee (AOR 5.76, 95% CI [1.16 – 28.60]), identifying red flags of abuse (AOR 4.25, 95% CI [1.43 – 12.50]), prescribing short-acting opioids (AOR 4.21, 95% CI [1.27 – 13.98]), prescribing gabapentin (AOR 3.97, 95% CI [1.04 – 15.18]), diagnosing fibromyalgia (AOR 3.32, 95% CI [1.14 – 9.66]), and diagnosing neuropathy (AOR 2.81, 95% CI [1.03 – 7.63]).

Of the 16 pain-related knowledge items, none was significantly associated with global preparedness to manage CNMP (Table 3). The pain-related knowledge score also was not associated with global preparedness to manage CNMP when analyzed as a continuous or dichotomous variable (low knowledge score vs. high knowledge score).

Discussion

In this study of internal medicine residents, we identified gaps in confidence in a range of specific pain management skills, including managing fibromyalgia and neuropathic pain, safer opioid prescribing practices, and corticosteroid injections. We also identified gaps in knowledge regarding management of neuropathic pain and safer opioid prescribing practices. Overall, despite reporting high prevalence of patients with CNMP in their practices, only one-quarter of residents felt globally prepared to manage them. In exploratory analyses, residents who were confident using pain medication agreements, prescribing long-acting opioid analgesics, and performing corticosteroid injection of the knee were greater than five times as likely to feel globally prepared to manage CNMP, when compared to residents who lacked confidence in these skills. These findings suggest that educational initiatives to improve internal medicine residents' preparedness to manage CNMP should aim to develop confidence in managing complex pain syndromes (e.g., fibromyalgia and neuropathic pain), safer opioid prescribing practices, and alternatives to opioid analgesics.

Though other studies have evaluated global preparedness or confidence in managing CNMP, to our knowledge, ours is the first to explore which specific skills are most closely associated with feeling globally prepared. Two studies of internal medicine residents in Virginia and Rhode Island found similarly low levels of global preparedness and identified specific skills that are challenging to residents, including identifying red flags of abuse and diagnosing fibromyalgia.^{16,17} Our study extends this work by identifying additional gaps in confidence, assessing knowledge, and suggesting skills that might be high-yield for educational interventions to improve preparedness. For example, our findings suggest that beyond basic education in musculoskeletal examination, training in diagnosing and treating neuropathic pain and use of pain medication agreements may be important to improve preparedness to manage CNMP.

In light of the recent increase in opioid analgesic addiction and overdose,^{26,27} primary care physicians must become prepared to manage CNMP in ways that limit the negative consequences of opioids. These include: 1) diagnosing pain syndromes where non-opioid strategies might yield better results (e.g., fibromyalgia and neuropathic pain), 2) using alternatives to opioids whenever possible (e.g., prescribing gabapentin or performing corticosteroid injections), and 3) implementing safer opioid prescribing practices aimed at reducing misuse when opioids are deemed necessary (e.g., using pain medication agreements and identifying red flags of abuse).²⁸ We identified gaps in confidence and knowledge in all three of these sets of skills and found that residents' confidence in each were associated with global preparedness. These findings indicate that training residents in the use of strategies to limit the negative consequences of opioids might simultaneously improve their sense of preparedness to manage CNMP. This is supported by prior findings that use of pain medication agreements²⁹ and training in identifying red flags of abuse¹⁸ are associated with improvements in preparedness to manage CNMP.

In our study, general pain knowledge was not associated with global preparedness to manage CNMP, and there was no pattern suggesting that knowledge in one content area was more strongly associated with preparedness than other areas. This suggests that curricula aiming to improve residents' preparedness to manage CNMP should emphasize skills building, not solely knowledge. Though our analysis was exploratory and this conclusion requires confirmation by direct evaluation of educational interventions, it is supported by Sullivan and colleagues' finding that training physicians in shared-decision making regarding use of pain medication agreements and prescribing long-acting opioids improved

physician satisfaction, prescribing behaviors and use of pain medication agreements, when compared to a standard didactic curriculum.³⁰

Our study has several limitations. First, our sample of internal medicine residents was recruited from a single urban institution, which may limit generalizability. Second, the moderate response rate (63%) could lead to selection bias and our sample may not be representative of the residency program as a whole. Third, we used a single self-reported measure of global preparedness and the clinical skills of residents were not directly assessed. Fourth, the small sample size resulted in wide confidence intervals and limited precision in the associations we found with global preparedness. Finally, while the knowledge items were excerpted from a validated questionnaire to measure pain management expertise, they have not been evaluated separately.

In sum, we have identified several areas of need for focused training in management of chronic non-malignant pain, and our data suggest that confidence and knowledge regarding management of complex pain syndromes (e.g., fibromyalgia and neuropathy), using alternatives to opioid analgesics, and safer opioid prescribing practices, may be the best targets for educational interventions for internal medicine residents. Further research is needed to determine whether educational initiatives in these areas improve patient safety and functional outcomes.

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Table 1

Resident Characteristics, Knowledge, and Sense of Global Preparedness to Manage Chronic Non-Malignant Pain (n=92)

	n	%
Sociodemographic and Clinical Characteristics		
Female	57	62
Training Level		
PGY-1	33	36
PGY-2	32	35
PGY-3	27	29
Primary Care Program	26	28
Estimated percent of patients who have CNMP		
5% or fewer	4	4
6% to 10%	17	18
11% to 30%	46	50
More than 30%	25	28
Estimated percent patients who have CNMP who had signed pain medication agreements [†]		
5% or fewer	71	79
6% to 50%	15	17
More than 50%	4	4
Estimated percent of patients who have CNMP who had ever underwent urine drug testing [†]		
5% or fewer	65	72
6% to 50%	17	19
More than 50%	8	9
Pain-related knowledge[‡]		
Median score (IQ range)		12 (11,13)
Global preparedness to manage CNMP		
Median score (IQ range) [*]		3 (2,3)
I feel prepared, n (%) agree or strongly agree	24	26
Confidence in managing CNMP		
Median score (IQ range) [*]		3 (2,3)
I feel confident, n (%) agree or strongly agree	11	12

^{*} On a 5-point Likert Scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree

[†] 2 missing estimates

[‡] 5 missing answers from knowledge questionnaire

Table 2

Association of residents' confidence in specific skills and general pain knowledge with perceived global preparedness to manage chronic non-malignant pain (CNMP)

Variable	n (%) [*]	Association with preparedness to manage CNCP		
			95% CI	P value
Confidence in specific skills [†]		AOR [‡]		
Knee examination	51 (55)	1.89	0.70 – 5.14	0.21
Hip examination	28 (30)	1.27	0.45 – 3.53	0.65
Shoulder examination	39 (43)	2.45	0.92 – 6.57	0.07
Back examination	54 (59)	1.17	0.44 – 3.14	0.75
Diagnosing osteoarthritis of knee	72 (79)	3.43	0.71 – 16.61	0.13
Diagnosing sciatica	78 (87)	4.46	0.53 – 37.82	0.17
Diagnosing fibromyalgia	24 (27)	3.32	1.14 – 9.66	0.03
Diagnosing neuropathic pain	38 (42)	2.81	1.03 – 7.63	0.04
Knee injection	8 (9)	5.76	1.16 – 28.6	0.03
Subacromial bursa injection	3 (3)	-	-	-
Prescribing NSAIDs	87 (96)	-	-	-
Prescribing short-acting opioids	56 (62)	4.21	1.27 – 13.98	0.02
Prescribing long-acting opioids	36 (40)	5.85	1.99 – 17.17	<0.01
Prescribing gabapentin	62 (68)	3.97	1.04 – 15.18	0.04
Identifying red flags	41 (46)	4.23	1.43 – 12.51	<0.01
Using pain medication agreements	29 (32)	5.99	2.01 – 17.75	<0.01
Interpreting urine drug test results	64 (71)	1.25	0.42 – 3.73	0.69
General pain knowledge (score>12)	44 (51)	0.77	0.30 – 1.98	0.59

^{*} Out of 92 residents; missing data for shoulder, osteoarthritis of the knee, neuropathy, subacromial bursa injection, prescribing NSAIDs, prescribing short-acting opioids, and prescribing long-acting opioids (1 missing); diagnosing sciatica, diagnosing fibromyalgia, identifying red flags, using pain medication agreements (2 missing); knee injection (3 missing); pain knowledge (5 missing)

[†] Agreed or strongly agreed with the statement, "I feel confident in my ability to [perform the specific skill]"

Table 3

Association of residents' pain-related knowledge and sense of global preparedness to manage chronic non-malignant pain

Pain-related Knowledge	n (%)*	OR	P value
Total Knowledge Score	-	1.02	0.88
Knowledge Score (high vs. low)	44 [†] (51)	0.77	0.59
Knowledge items (content area evaluated)	Correct (%)		
Identify efficacious classes of medication for neuropathic pain	21 (23)	1.18	0.77
Identify most common side effects of opioid analgesics	85 (92)	2.23	0.47
Identify the "4 A's" (i.e. domains monitored when prescribing chronic opioid treatment)	49 (53)	0.84	0.71
Identify whether exercise worsens arthritis pain	72 (78)	1.54	0.49
Identify domains measured in pain assessment	87 (95)	-	
Acknowledge the limit of technology to determine the precise pathological cause of chronic pain	85 (92)	2.23	0.47
Identify the primary goal of treatment in chronic pain	56 (60)	1.81	0.25
Identify whether EMGs are useful to diagnose sciatica	75 (82)	1.81	0.39
Acknowledge that chronic daily pain that has persisted in an unchanging way for years may not have a clear cause or cure	61 (66)	0.78	0.65
Identify types of pain in which anticonvulsants have established analgesic efficacy	27 (29)	2.14	0.13
Acknowledge that in most patients pharmacotherapy alone is not effective for management of chronic pain	43 (47)	1.19	0.71
Acknowledge that vital signs are not reliable indicators of pain severity	60 (65)	1.16	0.76
Acknowledge that cognitive behavioral therapy is very effective in chronic pain management	74 (80)	0.90	0.86
Acknowledge that methadone maintenance therapy for opioid dependence is not an absolute contraindication to initiating opioid analgesics for pain	83 (90)	3.01	0.30
Identify whether pure agonist opioids have a dosage limit or "ceiling"	70 (76)	2.71	0.14
Vignette 1: interpreting urine drug testing results	30 (33)	0.61	0.40
Vignette 2: recognizing physical dependence	82 (89)	1.47	0.64

*
out of 87 residents