

# Practices and Hindrances in Cancer Pain Management: Results of a National Multi-Cancer Center Survey Among Healthcare Professionals in China

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**Background:** Inadequate control of cancer-related pain in China is an ongoing problem. This study investigated the practices of cancer pain (CP) management at major cancer centers in China and perceived hindrances and knowledge of CP management among health professionals.

**Methods:** From September to October 2019, a survey was conducted using electronic questionnaires via the internet to investigate the practices, and perceived hindrances and knowledge in managing CP among healthcare professionals from 7 provincial cancer centers in China. The questionnaire included demographic data, the professionals' practices among their own patients, their opinions regarding hindrances to CP management, and knowledge of CP management.

**Results:** We gathered validated responses from 411 anonymous healthcare professionals, with 82.2% (411/500) of response rate. Based on the analysis of these 411 questionnaires, the results demonstrated that CP was prevalent among patients with cancer, while moderate-to-severe pain took a great proportion. CP management was inadequate for a significant proportion of the patients with CP. Pain assessment, analgesic treatment, attention to adverse effects of analgesic, and multidisciplinary management were usually ineffectual in many cases. The duration of work experience did not significantly affect CP management. The respondents considered that both patients and healthcare professionals were responsible for the undermanagement of CP. Only 26 (6.3%) respondents were able to answer correctly all 10 of the professional questions regarding CP.

**Conclusion:** CP is commonly undermanaged in China. Effective pain control requires the implementation of standards, and the sufficient attention and training of healthcare professionals.

**Keywords:** cancer pain, pain control, pain treatment, quality of life, electronic questionnaire

## Introduction

Cancer-related pain is one of the most common symptoms among patients with cancer and is often moderate to severe. A population-based study in the Netherlands with 1429 respondents reported that 55% of these patients with cancer had suffered pain in the previous week, and the pain was moderate-to-severe in 44%.<sup>1</sup> According to a nationwide survey in China, there are more than 1.8 million patients with newly diagnosed cancer annually, and 61.6% suffer cancer pain (CP). In 50%, CP is moderate to severe; and in 30%, CP is severe.<sup>2</sup> More recently, a national survey in

the United States found that the prevalence of chronic pain was higher in patients with cancer (30.8%) than in the general population (15.7%).<sup>3</sup>

With increased attention, there have been substantial improvements in the management of CP,<sup>4</sup> and updated guidelines, educational interventions, and patient education have resulted in a gradual decline in undertreatment. Greco et al<sup>5</sup> reported that from 2007 to 2013, the rate of undertreatment of CP decreased from 43.4% to 31.8%, and in the Asian population the decrease was from 59.1% to 45.2%.

However, the undermanagement of CP in China remains prevalent. A survey of 477 patients with cancer in Beijing revealed that 78.8% had experienced moderate to severe pain during the previous 24 hours (42.4% and 36.3% for moderate and severe, respectively). Rates of patient dissatisfaction with analgesic treatment were mild (10.0%), moderate (7.9%), and strong (1.4%).<sup>6</sup> Xia et al<sup>7</sup> reported that 43.8% of patients in several tertiary hospitals in China complained of inadequate control of CP.

The three barriers to adequate CP management are healthcare professionals, patients, and the healthcare system.<sup>8</sup> A worldwide, regional, and national study faulted especially the absence of training and awareness of medical professionals, but also the fear of dependence and restricted financial resources of the patients.<sup>9</sup>

Clarifying the deficiencies in CP management that can be controlled by healthcare professionals may help promote effective control of CP. We surveyed the practices, perceived barriers, and knowledge of CP management among healthcare professionals from 7 provincial cancer centers across China.

## Methods

### Respondent Eligibility

We chose 7 cancer centers from different regions with differing economic development in China. The institutional review board of the following 7 hospitals approved this study: Guangxi Medical University Cancer Hospital; Shandong Cancer Hospital Affiliated to Shandong University; Hunan Cancer Hospital & The Affiliated Cancer Hospital of Xiangya School of Medicine, Central South University; Henan Cancer Hospital & The Affiliated Cancer Hospital of Zhengzhou University; Fudan University Shanghai Cancer Center; Cancer Hospital of the University of Chinese Academy of Sciences &

Zhejiang Cancer Hospital; and Sun Yat-sen University Cancer Center.

Healthcare professionals from the above 7 provincial cancer centers in China were surveyed from September to October 2019. The participants were informed about the purpose of this survey, and that it was conducted in accordance with the Declaration of Helsinki. The respondents deemed eligible comprised physicians and nurses who were actively providing analgesic treatment for patients with CP; had worked in the 7 investigated cancer centers for at least one year; and willingly participated in this study. Written consent was obtained from all the included participants.

### Study Design

The questionnaire (completed in 8–10 min) was designed by a panel of 6 experts (including two medical oncologists, a surgical oncologist, a radiologist, a pain specialist and a nurse) with up to 10 years of experience in cancer management. Information including demographic data of respondents, practice of CP management among their own patients, their opinions regarding obstacles to pain management, and their basic knowledge of CP management was collected (see [Supplementary material](#)). Questions regarding barriers to CP management was developed based on literature reviews<sup>10–13</sup> summarized as healthcare professionals, patients, and the healthcare system. Ten questions regarding CP-related professional knowledge were designed through the discussion of our experts panel based on the review of literatures<sup>11,14</sup> and National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines of Adult Cancer Pain to assess the knowledge of pain assessment, pharmacy, analgesia therapy, and characters of cancer pain. Pilot-testing was conducted and the questionnaire was revised by researchers accordingly.

For a recovery of 400 questionnaires as our plan, we delivered 500 pieces, with an estimation of 20% no response. CP occurrence in the department of medical oncology was approximate three times compared to the department of surgery or other departments (including department of radiotherapy and department of interventional therapy) based on pilot-tested. We presumed that higher proportion of advanced disease in the department of medical oncology may contribute to higher CP occurrence. Therefore, we delivered the questionnaires randomly, in a 3:1:1 ratio, in the department of medical oncology (300 pieces), the department of surgery (100 pieces), and other

departments (100 pieces). The healthcare professionals responded anonymously to questionnaires via the internet. Each responder received 10 RMB in compensation.

## Statistical Analysis

Statistical differences were determined by Mann–Whitney test or chi-squared test. P values less than 0.05 were considered statistically significant. All analyses were conducted using SPSS v17.0 software (SPSS, Chicago, USA).

## Results

### General Characteristics of the Respondents

With a total of 500 questionnaires sent out, 411 healthcare professionals responded. Response rate was 82.2%. The respondents included 186 physicians (45.3%) and 225 nurses (54.7%); 79 (19.2%) men and 332 (80.8%) women (Table 1). The median age was 32 years (20–60 y), and the median duration of work experience was 8 years (1–44 y). Among the respondents, 207 (50.4%), 154 (37.5), and 50 (12.2) held junior (residents or junior nurses), intermediate (attendings or senior nurses), and senior (chief physician or chief nurse) academic titles, respectively. The majority of physicians (90.3%) and nurses (83.1%) had ever attended any form of CP training.

**Table 1** Demographics of the Respondents\*

		Total	Physician	Nurse
Subjects, n		411	186	225
Age, 2y		32 (20–60)	34 (23–60)	30 (20–53)
Work experience, y		8 (1–44)	7 (1–44)	9 (1–35)
Gender	Male	79 (19.2)	68 (36.6)	11 (4.9)
	Female	332 (80.8)	118 (63.4)	214 (95.1)
Academic title	Junior	207 (50.4)	55 (29.6)	152 (67.6)
	Intermediate	154 (37.5)	90 (48.4)	64 (28.4)
	Senior	50 (12.2)	41 (22.0)	9 (4.0)
Department	Medical	236 (57.4)	97 (52.2)	139 (61.7)
	Oncology			
	Surgery	86 (20.9)	33 (17.7)	53 (23.6)
	Others	89 (21.7)	56 (30.1)	33 (14.7)
CP training	Yes	355 (86.4)	168 (90.3)	187 (83.1)
	No	56 (13.6)	18 (9.7)	38 (16.9)

**Note:** \*Data is reported as median (range), or n (%).

**Table 2** Status of CP Among the Patients of the Respondents\*

		n (%)
Incidence of CP	<10%	10 (2.4)
	10–30%	129 (31.4)
	30–50%	156 (38.0)
	50–70%	68 (16.5)
	70–90%	46 (11.2)
	>90%	2 (0.5)
Incidence of moderate to severe CP	<10%	18 (4.4)
	10–30%	185 (45.0)
	30–50%	136 (33.1)
	50–70%	49 (11.9)
	70–90%	22 (5.4)
	>90%	1 (0.2)
Percentage of undermanagement of CP	<10%	242 (58.9)
	10–30%	124 (30.2)
	30–50%	32 (7.8)
	50–70%	8 (2.0)
	70–90%	5 (1.2)
	>90%	0 (0.0)
Incidence of refractory CP	<10%	307 (74.7)
	10–30%	80 (19.5)
	30–50%	15 (3.7)
	50–70%	6 (1.5)
	70–90%	2 (0.5)
	>90%	1 (0.2)

**Note:** \*Total n = 411.

### Prevalence of CP Among the Patients of the Respondents

A percentage of 31.4% respondents reported a range of 10–30% of their patients had experienced CP in the previous month, while 38.0% of respondents reported 30–50% (Table 2). Moderate to severe CP was prevalent among patients with CP, with 45.0% of respondents reporting 10–30% incidence of moderate to severe CP, and 33.1% of respondents reporting 30–50%. Only 58.9% of respondents reported that undermanagement of CP occurred in <10% of patients with CP treated with analgesics. A percentage of 74.7% respondents reported incidence of refractory CP was <10%.

### Respondents' Management of CP

Table 3 presents the management of CP among respondents. Fewer than half (46.2%) of the respondents reported that >90% of their patients were routinely screened for CP; while 56.9% performed a comprehensive assessment of CP within 8 hours of admission among >90% of their

**Table 3** Management Rates of Patients with CP\*:

	Total (%)	Work Experience (%)		P <sup>b</sup>
		< 8 Years n=190	≥ 8 Years n=221	
Routine screening for CP				>0.05
<10%	48 (11.7)	23 (12.1)	25 (11.3)	
10–30%	66 (16.1)	31 (16.3)	35 (15.8)	
30–50%	30 (7.3)	12 (6.3)	18 (8.1)	
50–70%	35 (8.5)	16 (8.4)	19 (8.6)	
70–90%	42 (10.2)	23 (12.1)	19 (8.6)	
>90%	190 (46.2)	85 (44.7)	105 (47.5)	
Pain assessment within 8 hours of admission				>0.05
<10%	39 (9.5)	22 (11.6)	17 (7.7)	
10–30%	41 (10.0)	18 (9.5)	23 (10.4)	
30–50%	15 (3.7)	5 (2.6)	10 (4.5)	
50–70%	28 (6.8)	14 (7.4)	14 (6.3)	
70–90%	54 (13.1)	31 (16.3)	23 (10.4)	
>90%	234 (56.9)	100 (52.6)	134 (60.6)	
Assessment using pain assessment tools				>0.05
<10%	35 (8.5)	16 (8.4)	19 (8.6)	
10–30%	46 (11.2)	21 (11.1)	25 (11.3)	
30–50%	32 (7.8)	15 (7.9)	17 (7.7)	
50–70%	33 (8.0)	15 (7.9)	18 (8.1)	
70–90%	51 (12.4)	26 (13.7)	25 (11.3)	
>90%	214 (52.1)	97 (51.1)	117 (52.9)	
Titration for first administration of opioid				>0.05
<10%	102 (24.8)	46 (24.2)	56 (25.3)	
10–30%	87 (21.2)	41 (21.6)	46 (20.8)	
30–50%	62 (15.1)	31 (16.3)	31 (14.0)	
50–70%	43 (10.5)	19 (10.0)	24 (10.9)	
70–90%	44 (10.7)	21 (11.1)	23 (10.4)	
>90%	73 (17.8)	32 (16.8)	41 (18.6)	
Adequate pain control within 3 days				>0.05
<10%	18 (4.4)	10 (5.3)	8 (3.6)	
10–30%	28 (6.8)	13 (6.8)	15 (6.8)	
30–50%	47 (11.4)	24 (12.6)	23 (10.4)	
50–70%	97 (23.6)	46 (24.2)	51 (23.1)	
70–90%	109 (26.5)	48 (25.3)	61 (27.6)	
>90%	112 (27.3)	49 (25.8)	63 (28.5)	
Long-acting opioid prescription for moderate-to-severe CP				>0.05
<10%	63 (15.3)	29 (15.3)	34 (15.4)	
10–30%	81 (19.7)	37 (19.5)	44 (19.9)	
30–50%	81 (19.7)	39 (20.5)	42 (19.0)	
50–70%	92 (22.4)	48 (25.3)	44 (19.9)	
70–90%	52 (12.7)	23 (12.1)	29 (13.1)	
>90%	42 (10.2)	14 (7.4)	28 (12.7)	

(Continued)

**Table 3** (Continued).

	Total (%)	Work Experience (%)		P <sup>b</sup>
		< 8 Years n=190	≥ 8 Years n=221	
Referral to multidisciplinary team				>0.05
<20%	146 (35.5)	62 (32.6)	84 (38.0)	
20–40%	102 (24.8)	56 (29.5)	46 (20.8)	
40–60%	74 (18.0)	34 (17.9)	40 (18.1)	
60–80%	47 (11.4)	18 (9.5)	29 (13.1)	
>80%	42 (10.2)	20 (10.5)	22 (10.0)	
Adequate attention for adverse effects of analgesic				
<20%	81 (19.7)	44 (23.2)	37 (16.7)	
20–40%	79 (19.2)	40 (21.1)	39 (17.6)	
40–60%	59 (14.4)	29 (15.3)	30 (13.6)	
60–80%	72 (17.5)	32 (16.8)	40 (18.1)	
>80%	120 (29.2)	45 (23.7)	75 (33.9)	
Routine patient CP education				>0.05
<10%	38 (9.3)	19 (10.0)	19 (8.6)	
10–30%	42 (10.2)	22 (11.6)	20 (9.0)	
30–50%	36 (8.8)	14 (7.4)	22 (10.0)	
50–70%	52 (12.7)	22 (11.6)	30 (13.6)	
70–90%	58 (14.1)	31 (16.3)	27 (12.2)	
>90%	185 (45.0)	82 (43.2)	103 (46.6)	
Follow-up of patients with CP				>0.05
<20%	70 (17.0)	30 (15.8)	40 (18.1)	
20–40%	53 (12.9)	30 (15.8)	23 (10.4)	
40–60%	69 (16.8)	34 (17.9)	35 (15.8)	
>80%	146 (35.5)	62 (32.6)	84 (38.0)	
Who is in charge of follow-up				>0.05
Physician	51 (12.4)	26 (13.7)	25 (11.3)	
Nurse	133 (32.4)	49 (25.8)	84 (38.0)	
Clinician and nurse	227 (55.2)	115 (60.5)	112 (50.7)	
Frequency of CP assessment during titration period				>0.05
Every assessment cycle	135 (32.9)	58 (30.5)	77 (34.8)	
Some times of a day	50 (12.2)	25 (13.2)	25 (11.3)	
Once a day	218 (53.0)	102 (53.7)	116 (52.5)	
Almost not	8 (2.0)	5 (2.6)	3 (1.4)	
Contents of CP assessment				>0.05
Location of pain	386 (93.9)	181 (95.3)	205 (92.8)	
Characteristics	385 (93.7)	177 (93.2)	208 (94.1)	
Interference with activities	338 (82.2)	158 (83.2)	180 (81.4)	
Severity	395 (96.1)	182 (95.8)	213 (96.4)	
Onset, duration, and frequency	345 (83.9)	157 (82.6)	188 (85.1)	>0.05
Record pain at each assessment				>0.05
Yes	361 (87.8)	170 (89.5)	191 (86.4)	
No	50 (12.2)	20 (10.5)	30 (13.6)	

**Notes:** \*Total n = 411; data reported as n (%); <sup>b</sup>Comparison between respondents with work experience <8 years and ≥8 years.

patients. Standardized pain assessment tools, including the Numerical Rating Scale and Visual Analog Scale, were limitedly used for CP assessment, with 52.1% of respondents using among >90% of their patients.

Surprisingly, the proportion of titration for patients receiving opioid for the first time was low, with 24.8% of respondents rarely (<10% of their patients) performing titration for first administration of opioid. During titration, 53.0% of the respondents performed assessment only once daily; while only 32.9% performed a stabilized assessment in every assessment cycle. Among patients with moderate-to-severe CP, the prescription of long-acting opioids was not satisfactory, with only 10.2% of respondents prescribing long-acting opioids for >90% of their patients. Only 27.3% of respondents reported that >90% of their patients were given adequate pain control within 3 days since CP presentation. Multidisciplinary involvement in the management of CP was insufficient, with 35.5% of respondents rarely (<20% of their patients) referred to

a multidisciplinary team. Quite a few patients were not paid attention for adverse effects associated with analgesic treatment, with only 29.2% of respondents concerning about the assessment, prevention and management of adverse effects for >80% of their patients.

We divided the included respondents into two groups based on the median of the work experience duration. Overall, the practice of CP management was not remarkably different between respondents with duration of work experience <8 years and ≥8 years, indicating that the duration of work experience did not significantly affect CP management.

## Barriers and Obstacles of CP Management

Among the respondents, 71.3% believed that undermanagement of CP by healthcare professionals was due to poor drug efficacy against refractory CP in a complex condition; 63.8% stated that empiric prescription without

**Table 4** Barriers to CP Management<sup>a</sup>

Respondents' Belief Regarding the Barriers of CP Management	n (%)
Three major obstacles for patients using opioids	
Patients' economic concerns	116 (28.2)
Patients' rejection of opioids	237 (57.7)
Patients' concerns about drug addiction	316 (76.9)
Clinicians' reluctance to drug adjustment and titration	119 (29.0)
Healthcare professionals' concerns about adverse effects	244 (59.4)
Prescription of opioid is cumbersome	109 (26.5)
Medical factors for undermanagement of CP	
Empiric prescription without personalized treatment	262 (63.8)
Knowledge deficiency of CP	208 (50.6)
Healthcare professionals' concerns regarding drug addiction	92 (22.4)
One-time dose of opioids is unsatisfactory	155 (37.7)
Inadequate educational interventions for patients	193 (47.0)
Poor drug efficacy against refractory CP in complex condition	293 (71.3)
Others	6 (1.5)
Patient-related factors in undermanagement of CP	
Misconceptions about CP treatment	296 (72.0)
Low opioid adherence and random medication	331 (80.5)
Inaccuracy of pain description	193 (47.0)
Lack of objectivity of pain intensity rating	163 (39.7)
Fear of opioid addiction	259 (63.0)
Uncontrollable factors among outpatients <sup>b</sup>	250 (60.8)
Personal financial situation	102 (24.8)
Concerns about adverse effects of opioids	201 (48.9)
Support from family members	157 (38.2)
Others	16 (3.9)

**Notes:** <sup>a</sup>Total n = 411. <sup>b</sup>Such as changes of work and residential location.

personalized treatment was a problem; and for 50.6%, lack of knowledge about CP was a deciding factor (Table 4). The participants reported 3 main factors of undermanagement of CP attributed to patients: according to 80.5%, 72.0%, and 63.0%, these factors were, respectively, low opioid adherence and random medication, misconceptions about CP treatment, and a fear of opioid addiction. Furthermore, 76.9%, 59.4%, and 57.7% attributed obstacles to patient use of opioids as, respectively, patients' concerns about drug addiction, healthcare professionals' concerns regarding adverse effects, and patients' rejection of opioids.

## Knowledge of CP Management

Among the 411 respondents, only 26 (6.3%) could correctly answer all of the 10 questions concerning professional knowledge of CP (Table 5). The percentage of physicians who achieved a perfect score (7.5%) was slightly higher but statistically comparable to that of the nurses (5.3%).

Notably, regarding the timing of assessment after oral short-acting morphine sulfate, only 40.9% of the respondents provided a correct response, which was significantly higher among nurses (46.2%) than physicians (34.4%). For moderate CP, 44.2% of respondents preferred low-dose strong opioids to weak opioids such as tramadol for moderate cancer pain; physicians were significantly more favorable (51.1%) than nurses (38.7%). Only 54.5% of the respondents answered correctly that patients with CP should not be given pethidine; a significantly higher percentage of physicians (64.5%) answered correctly than did the nurses (46.2%). For 6 questions regarding analgesic drugs, a significantly higher percentage of physicians answered correctly, but for one question regarding CP

assessment, the percentage of nurses with the correct response was significantly higher than the physicians.

The majority of the respondents (74.8%, 71.4%, and 70.4%) wished to learn more, respectively, about the management of refractory CP; developments in CP and palliative care; and opioid titration protocol, dose adjustment, and adverse event management.

## Discussion

The most widely accepted algorithm for CP treatment is the 3-tiered CP ladder developed by the World Health Organization (WHO) in 1982. Since 1990 when this algorithm was promoted in China, CP treatment has gradually received more attention and become standard. However, the control of pain is still inadequate for numerous patients.<sup>7</sup> In the present study, results revealed that the healthcare professionals in China remain face the prevalence of CP among patients with cancer. Noteworthy, moderate-to-severe pain took a great proportion of CP. This survey was conducted in provincial cancer hospitals that constitute the highest level of oncologic expertise in China, yet the issue of CP undermanagement has confronted us. Many patients experience CP that was not effectively and quickly controlled. This study found that assessment of CP, prescription of analgesic drugs, and attention to adverse effects of analgesic drugs remains far from satisfactory, and there is much room for improvement. Moreover, most patients did not receive multidisciplinary CP management, although all included cancer centers have multidisciplinary teams for CP management recruiting experts in medical oncology, radiation oncology, surgery, intervention, anesthesiology, and/or nursing (based on the results of pre-investigation). With emphasis on multidisciplinary management of CP from the

**Table 5** Rates of Correct Response Regarding CP-Related Professional Knowledge<sup>a</sup>

	All	Physicians	Nurses	P <sup>b</sup>
All questions	26 (6.3)	14 (7.5)	12 (5.3)	>0.05
1. Should we believe patients' reports of pain?	406 (98.8)	185 (99.4)	221 (98.2)	>0.05
2. Can patients with CP receive pethidine for analgesia?	224 (54.5)	120 (64.5)	104 (46.2)	<0.05
3. Is there a high risk of addiction in patients with CP receiving opioids?	311 (75.7)	156 (83.9)	155 (68.9)	<0.05
4. What is timing of efficacy assessment after administration of oral short-acting morphine sulfate?	168 (40.9)	64 (34.4)	104 (46.2)	<0.05
5. Is there a dose cap for opioids?	258 (62.8)	141 (75.8)	117 (52.0)	<0.05
6. Is it necessary to administer prophylactic laxatives with opioid treatment?	257 (62.5)	109 (58.6)	148 (65.8)	>0.05
7. Can adverse events of dizziness, nausea, and vomiting caused by opioids be tolerated?	345 (83.9)	172 (92.5)	173 (76.9)	<0.05
8. Is respiratory depression caused by opioid common?	349 (84.9)	164 (88.2)	185 (82.2)	>0.05
9. What is the preferred analgesic drug for moderate CP?	182 (44.2)	95 (51.1)	87 (38.7)	<0.05
10. A cancer patient complains of dull pain with inaccurate positioning in abdomen. What kind of pain is it?	370 (90.0)	176 (94.6)	194 (86.2)	<0.05

**Notes:** <sup>a</sup>Total (all) n = 411; data reported as n (%). <sup>b</sup>Comparison between physicians and nurses.

recommendation of major guidelines, multidisciplinary teams were increasingly built at many cancer centers in China. However, we are still at the beginning of multidisciplinary pain management and multidisciplinary involvement is still absent or a mere formality in many cases.

Many studies have shown that failure to make an accurate assessment of CP is a common obstacle to CP control.<sup>15,16</sup> As we known, scientific and accurate CP assessment is the cornerstone of management. However, in the present study, standardized pain assessment tools were limitedly used for CP assessment, and only 32.9% of the respondents performed a standardized CP assessment for every assessment cycle. We attribute the deficiency of CP assessment to lack of knowledge of protocol, inadequate appreciation of its importance, busy clinical work, and the tediousness of repeated assessment. For example, only 40.9% of the respondents knew the correct timing of assessment after administration of oral short-acting morphine sulfate. Performing incorrect assessment, or even no assessment, results in poor CP management. Therefore, correct assessment requires basic knowledge by professionals, and meticulous work. Assessment should not only be routine, quantitative, and comprehensive, but employed throughout CP management, and is crucial for CP management.

In this study, 44.2% of the respondents preferred to prescribe weak opioids rather than low-dose strong opioids for moderate CP, which was in line with insufficient prescription of long-acting opioids for patients with moderate to severe CP. In the past 30 years, the 3-tiered CP ladder algorithm has proved greatly effective for CP control and has been widely applied. Yet, over time its shortcomings have also become salient. Since 1994, the role of weak opioids in moderate CP has raised considerable controversy. Many studies have shown that weak opioids have short analgesic duration and poor analgesic effect, but are accompanied by adverse events.<sup>17–19</sup> Accumulating evidence supports that early administration of strong opioids can prevent central sensitization and development to refractory CP.<sup>19–23</sup> A prospective study revealed that patients with terminal cancer given strong opioids had better pain relief and greater satisfaction with treatment when compared with patients given the three-tiered CP ladder regime.<sup>9</sup> Since 2012, practice guidelines in CP have been revised by the European Association for Palliative Care (EAPC), European Society for Medical Oncology (ESMO), and National Comprehensive Cancer Network (NCCN). The new guidelines recommend that

strong rather than weak opioids should be prescribed during the second step of the 3-tiered CP ladder. Patients with moderate and severe CP should be prescribed strong opioids, but instead the traditional CP ladder is often adhered to, due to lack of updated training in CP management.

The present study determined that a major factor related to undermanagement of CP was due to healthcare professionals. The poor scores of the respondents for professional knowledge of CP management is unsatisfactory, and reflect deviations from standard protocol in provincial tumor hospitals that include CP assessment, treatment, and attitude toward adverse effects. Inaccurate assessment, lack of knowledge regarding analgesic drugs, and concerns about adverse events from healthcare professionals may impede the prescription of analgesic drugs, result in non-standard use of analgesic drugs, and application of empirical rather than personalized CP management. Given these dilemmas, healthcare professionals struggle to develop a reasonable and effective analgesic regimen, and undermanagement of CP is common.

The physicians' scores for basic knowledge of analgesic drugs in CP management were significantly higher than that of the nurses. This may be because physicians prescribe drugs, but nurses sometimes simply implement orders without understanding or thinking about them. However, the scores of the nurses regarding CP assessment were higher than that of the physicians. This indicates that nurses may be more aware and in better communication with patients' CP than physicians.

Previous study indicated that patients also contribute to the undermanagement of CP.<sup>10</sup> In this survey, the respondents usually attributed undermanagement of CP regarding patients to low opioid adherence, especially because of fear of addiction. As we known, this fear may lead to concealing pain, poor adherence with analgesic treatment, and rejection of opioid or random medication. To address this problem, healthcare professionals must pay more attention to patient education and follow-up. It is encouraging that a great proportion of patients were given routine education and follow-up from respondents concerning CP. Nevertheless, educational interventions targeting patients as well as professionals, have been shown to improve pain outcomes.<sup>24</sup>

The respondents of the present study reported the wish to learn more about advances in CP management, management of refractory CP, and therapeutic strategies including opioid titration, dose adjustment, and adverse event

management. Supplemental education based on these weaknesses could help further standardize CP management, enhance the efficacy of CP treatment, and improve patients' quality of life.

There were several limitations of this study. First, with respect to our choice of 7 included institutes, selection bias was existing; Nevertheless, the included cancer centers were chosen from different regions with differing economic development, and our survey at these centers maybe representative in China. Second, this study did not include patient-reported outcome and not demonstrate the real deficiencies in patient with cancer pain, which need our further investigation in future. Last, the absence of the definition regarding "cancer pain training" in Question 8 and the frequency of follow-up regarding cancer pain in Question 22 in this questionnaire may affect the reliability of these issues.

## Conclusion

In conclusion, the undermanagement of CP remains a substantial problem. Yet, sufficient attention, greater professional knowledge, and particular emphasis on adequate pain treatment from healthcare professionals can promote effective pain control. Educational interventions and CP management standards are urgently needed to improve the efficacy of CP management.

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## Disclosure

The authors declare that there are no conflicts of interest.

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