



# Factors Affecting Nurses' Performance of Cancer Pain Management in a Tertiary Hospital

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**Purpose:** More than 60% of patients with advanced cancer experience pain, and uncontrolled pain reduces the quality of life. Nurses are the closest healthcare providers to the patient and are suitable for managing cancer pain using pharmacological and non-pharmacological interventions. This study aimed to identify factors affecting the performance of cancer pain management among nurses. **Methods:** This study was conducted among 155 participating nurses working at a tertiary hospital who had experience with cancer pain management. Data collection was performed between October 18, 2021 and October 25, 2021. Data analysis was conducted using descriptive statistics, the independent-sample t-test, one-way analysis of variance, and hierarchical regression analysis. **Results:** There were 110 subjects (71.0%) who had no experience of cancer pain management education. The results of regression analysis indicated that barriers included medical staff, patients, and the hospital system for cancer pain management ( $\beta = 0.28$ ,  $P < 0.001$ ). The performance of cancer pain management was also affected by experience of cancer pain management training ( $\beta = 0.22$ ,  $P = 0.007$ ), and cancer pain management knowledge ( $\beta = 0.21$ ,  $P = 0.006$ ). The explanatory power of the variable was 16.6%. **Conclusion:** It is crucial to assess system-related obstacles, as well as patients and medical staff, in order to improve nurses' cancer pain management performance. A systematic approach incorporating multidisciplinary interventions from interprofessional teams is required for effective pain management. Furthermore, pain management education is required both for cancer ward nurses and nurses in other wards.

**Key Words:** Nurses, Neoplasms, Pain management, Knowledge, Attitude, Opioid analgesics

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## INTRODUCTION

### 1. Background

The incidence of cancer in South Korea has increased annually from 245,874 in 2018 to 254,718 in 2019 [1]. Cancer patients experience various symptoms including pain, short-

ness of breath, fatigue, depression, and cognitive impairment, which diminish their daily function and quality of life [2]. Among these, pain, as the fifth vital sign, should be evaluated regularly, and severe pain should be promptly and appropriately controlled [3]. It was reported that pain was prevalent in 64% of patients with advanced cancer, about 43% of whom had insufficient pain control [4]. Uncontrolled pain interferes

with patients' ability to perform daily life activities and causes negative emotions toward treatment, which can result in patients' and their families' refusal of treatment, as well as psychological helplessness, anxiety, and depression [5]. Therefore, pain should be managed properly.

Although most cancer pain can be controlled with medication prescribed according to the principles of appropriate pain management, radiotherapy, anesthetic, neurosurgical, psychological, or physical therapy and spiritual or social interventions also play crucial roles in proper cancer pain management [6]. Since nurses have the primary responsibility for pain management while assessing, intervening, and evaluating pain close to patients [7], they should manage cancer patients' pain using pharmacological and non-pharmacological approaches. To properly perform cancer pain management, nurses should have appropriate pain management knowledge and positive attitudes toward pain management, and barriers to pain management should be removed.

Nurses equipped with accurate cancer pain management knowledge can more actively engage in pain management [8]. In addition, to properly perform cancer pain management, it is important for nurses to understand the pain of cancer patients and have an appropriate attitude to actively control the pain. Misconceptions and prejudices among nurses about pain in patients include the putative risk of opioid addiction and fear of respiratory failure [9,10]. Nurses can underestimate or suspect the severity of patients' pain, thereby making patients suffer [11]. Since nurses' positive attitudes toward pain management enable more active management of pain [8], it is necessary to evaluate nurses' attitudes toward cancer pain management.

Despite the importance of managing cancer pain, some factors make pain control difficult, including those related to medical staff (nurses and physicians), patients, and the healthcare system [12]. Nurse-related barriers include inadequate pain assessment, lack of nursing time, and lack of experience and knowledge in cancer pain management [12]. Barriers associated with physicians include the lack of treatment time, lack of knowledge and experience in pain management, patients without doctors' prescriptions, and doctors who do not recognize nurses' expertise in pain management [13]. Patient-related barriers include inadequate use of opioid analgesics and

passive complaints of pain [14,15]. Healthcare system-related barriers include regulations on opioid analgesics, a lack of standardized pain management guidelines at institutions, and a lack of institutions and professionals specializing in pain control [10,12,15]. Therefore, it is necessary to examine barriers from various angles for proper cancer pain management.

Previous studies on cancer pain management among nurses found positive correlations between cancer pain management knowledge and performance [8,16,17] and between attitudes and performance [8]. Pain management knowledge was a factor that influenced the performance of pain management [8,16]. Regarding the relationship between barriers and the performance of cancer pain management, lower recognition of the level of barriers in the nursing organization with regard to cancer pain management was associated with higher performance of non-pharmacological interventions [13]. Although studies have classified knowledge, attitudes, and barriers related to the medical staff, patients, and healthcare system separately [18,19], there is a lack of studies comprehensively examining the relationship between the performance of cancer pain management and knowledge, attitudes, and barriers. In addition, as the number of cancer patients increases, there are more cases where cancer patients are hospitalized in non-oncology wards. However, as recent Korean studies involved hospitals specializing in cancer care or oncology ward nurses [8,18], it is necessary to conduct research on the performance of cancer pain management among nurses in general wards.

Therefore, in this study, we investigated 1) the cancer pain management knowledge and attitudes, barriers, and performance level among nurses; 2) differences and correlations in cancer pain management knowledge, attitudes, barriers, and performance according to general characteristics; and 3) barriers related to the performance of cancer pain management to provide basic data for developing cancer pain management education programs and guidelines for nurses.

## 2. Purpose

The purpose of this study was to investigate the knowledge, attitudes, barriers, and performance level of cancer pain management among nurses with experience in caring for cancer patients and to identify factors affecting the performance of cancer pain management. The specific objectives were as fol-

lows:

1) to Identify differences in knowledge, attitudes, barriers, and performance levels with regard to cancer pain management according to cancer pain management-related characteristics,

2) to Identify the factors that influenced nurses' cancer pain management performance.

## METHODS

### 1. Study design

This descriptive correlational study was designed to identify factors that affect nurses' cancer pain management performance.

### 2. Participants

Among nurses who had experience in cancer pain management at a tertiary general hospital located in South Gyeong-sang Province, those who understood the purpose of this study and agreed to participate in the study were selected as study participants. The specific selection criteria were as follows: ward nurses with experience in cancer pain management and nurses with a clinical career of more than 1 year. Nursing managers who did not provide direct patient care were excluded.

The sample size of this study was calculated based on a significance level ( $\alpha$ ) of 0.05, effect size of 0.15, power ( $1-\beta$ ) of 0.85, and 14 predictors using G\*Power 3.1.9.7. As a result, the minimum sample size was 148, and considering a 20% dropout rate, 177 questionnaires were distributed. Excluding two questionnaires that were lost and 22 that had multiple or missing answers, 155 questionnaires (155 participants) were included in the analysis.

### 3. Research tools

#### 1) Knowledge of cancer pain management

To assess the knowledge of cancer pain management, we obtained approval from Jho [17] who developed the Nurse's Pain Management Knowledge Measurement Tool based on the third edition of the 2008 Cancer Pain Management Guidelines. Prior to using the tool, the adequacy of the questionnaire was

confirmed by a professor at the College of Nursing, who is an expert in cancer pain management, and two clinical nurses with more than 8 years of experience in caring for cancer patients, based on the content of the 2021 Cancer Pain Management Guidelines, Sixth Edition [4]. This tool is composed of three subdomains and consists of a total of 30 questions, including five questions on the knowledge of cancer pain, 21 questions on the knowledge of pharmacological therapy, and four questions on the knowledge of non-pharmacological therapy. Each question was answered with "yes," "no," or "I don't know," and 1 point was given for a correct answer and 0 points for an incorrect answer. Scores range from 0 to 30 points, with higher scores indicating higher levels of knowledge.

#### 2) Attitudes toward cancer pain management

Attitudes toward cancer pain management were assessed using a measurement tool for attitudes toward narcotic analgesics developed by Watt-Watson and Donovan [20] and translated by Kwon [21], after obtaining approval from the author. The tools of Watt-Watson and Donovan [20] and Kwon [21] use a total of five dichotomous scales and are designed to score positive questions with 1 point and negative questions with 0 points, with higher scores representing more progressive attitudes toward cancer pain management. Before using the tool, the adequacy of the questionnaire was verified by one professor who is a cancer pain management expert and two clinical nurses with more than 8 years of experience in caring for cancer patients. As a result, four duplicate questions also included in the cancer pain management knowledge tool were excluded. The reliability of the tool, as shown by Cronbach's  $\alpha$ , was 0.82 in the study of Watt-Watson and Donovan [20], 0.83 in the study of Kwon [21], and 0.50 in the current study.

#### 3) Barriers to cancer pain management

Barriers to cancer pain management were assessed using the Questionnaire for the Awareness and Utilization of Cancer Pain Management Improvement Plans and Guidelines developed by Jho et al. [12] based on a literature review in 2014, after receiving approval for use from the authors. The original tool consists of 16 items, including seven medical staff-related barrier items, six patient-related barrier items, and six

healthcare system-related barrier items. We divided the medical staff-related barriers into a physician-related factor and a nurse-related factor recognized by nurses to further specify the medical staff barriers of the original tool and added content obtained from related literature [10,11,13–15,22–24] to reflect the latest trends in pain management. The revised and supplemented preliminary items consists of 30 questions including seven nurse-related barrier items, nine physician-related barrier items, five patient-related barrier items, and nine healthcare system-related barrier items.

The content validity of the first 30 preliminary questions revised referring to a literature review was assessed by a group of six experts, including two oncology nurses, one chief nurse in the oncology ward, and three nurses who had worked in the oncology ward for at least 6 years. The cutoff point for content validity was determined as 0.80, as suggested by Polit and Beck [25], and a total of 29 items were selected after revision. In order to evaluate the adequacy of the revised 29 preliminary questions, the content validity was assessed by the same expert group as in the first round, and three questions were revised. The final tool selected to identify cancer pain management barriers after modification and supplementation of the tool developed by Jho et al. [12] in the current study included a total of 29 questions, including eight nurse-related barriers, 10 physician-related barriers, four patient-related barriers, and seven healthcare system-related barriers.

Each item of the tool was scored using a 4-point Likert scale: 1 point for “no barrier at all,” 2 points for “sometimes,” 3 points for “often,” and 4 points for “always,” with higher scores indicating a higher recognition of barriers to cancer pain management.

The original tool developed by Jho et al. [12] did not have any information reported regarding its reliability. In a previous study [18] among oncology nurses, the reliability, as shown by Cronbach’s  $\alpha$ , was 0.85, and the reliability in the current study was 0.95.

#### 4) Performance of cancer pain management

To assess the performance of cancer pain management, the tool developed by Jho [17] for nurses based on the third edition of the cancer pain management guidelines was modified referring to the sixth edition of the pain management guidelines

[4] and used after obtaining approval for use from the original developer. The revised item was “Example of patients unable to report pain on their own, time for pain reassessment.” The final tool consists of a total of 21 items, including nine items in the pain assessment section, seven items in the pain intervention section, and five items in the pain assessment section. Each item is scored using a 4-point Likert scale: 1 point for “I rarely do,” 2 points for “I don’t usually do,” 3 points for “I usually do,” and 4 points for “I always do.” The scores range from a minimum of 21 points to a maximum of 84 points, and higher scores indicate higher cancer pain management performance. In the study of Jho [17], the reliability of the tool, as shown by Cronbach’s  $\alpha$  was 0.91, and in the current study, it was 0.87.

## 4. Data collection

This study was conducted with the review and approval of the G Hospital Institutional Review Board (GNUH 2021-08-020-002). The data collection period for this study was from October 18, 2021 to October 25, 2021. The researchers explained and distributed the questionnaires to those who agreed to participate in the study. A gift was distributed as a token of appreciation. Completed questionnaires were placed in opaque and sealed envelopes and placed in a designated place in the ward to ensure anonymity. The researchers visited the designated place in person to collect the questionnaires. The survey took about 20 minutes.

## 5. Data analysis

The data collected in this study were analyzed using SPSS for Windows version 25.0 (IBM Corp., Armonk, NY, USA) as follows:

1) Participants’ general characteristics, cancer pain management-related characteristics, cancer pain management knowledge, attitudes, barriers, and performance were analyzed using descriptive statistics such as frequency, percentage, mean, and standard deviation.

2) Differences in cancer pain management knowledge, attitudes, barriers, and performance according to general characteristics of the participants were analyzed using the t-test and analysis of variance, and correlations were analyzed using Pearson correlation coefficients.

3) Hierarchical regression analysis was performed to analyze the influence of variables affecting the participants' cancer pain management performance.

## RESULTS

### 1. Participants' general characteristics and characteristics related to cancer pain management

The participants' average age was 28.69 ( $\pm 4.33$ ) years, including 36 (23.2%) who were 25 years of age or under, 83 (53.5%) between the ages of 26 and 30 years, and 36 (23.2%) 31 years of age or over. The majority of the participants ( $n=119$ ; 76.8%) were unmarried, while 36 (23.2%) were married. The highest academic degree was a two-year college bachelor's degree for 27 participants (17.4%), a four-year college bachelor's degree for 118 (76.1%), and a master's degree or higher for 10 (6.5%). The participants' average clinical experience was 6.10 ( $\pm 4.62$ ) years, including 41 (26.5%) with 1~3 years, 39 (25.2%) with 3~5 years, 53 (34.2%) with 5~10

years, and 22 (14.2%) with 10 years or longer. Fifty-eight (37.4%) participants worked in the internal medicine ward, 51 (32.9%) in the surgical ward, and 46 (29.7%) in the oncology ward. Forty-five (29.0%) participants had experience of cancer pain management and 110 (71.0%) did not (Table 1).

### 2. Participants' cancer pain management knowledge, attitudes, barriers, and performance

The mean score for cancer pain management knowledge assessed using 30 questions was  $20.19 \pm 2.98$  out of 30, and the correct answer rate was 67%. The percentage of correct answers in the cancer pain management subdomains was 66% for cancer pain, 66% for pharmacological therapy, and 73% for non-pharmaceutical therapy. The mean cancer pain management attitude score was  $3.21 \pm 1.30$  out of 5 total points. The average score for all cancer pain management barriers was  $2.54 \pm 0.54$  out of 4 points. The score for the subdomain of barriers was  $2.39 \pm 0.50$  points for the nurse-related factor,  $2.56 \pm 0.65$  points for the physician-related factor,  $2.71 \pm 0.71$  points for the patient-related factor, and  $2.59 \pm 0.63$  points for the healthcare system-related factor. The average score for cancer pain management performance was  $3.05 \pm 0.38$  out of

**Table 1.** General Characteristics of Participants (N=155).

Characteristics	n (%)	Mean $\pm$ SD	Range
Age (yr)			
≤25	36 (23.2)	28.69 $\pm$ 4.33	23~48
26~30	83 (53.5)		
≥31	36 (23.2)		
Marital status			
Single	119 (76.8)		
Married	36 (23.2)		
Education level			
College	27 (17.4)		
University	118 (76.1)		
Graduate	10 (6.5)		
Total clinical career (yr)		6.10 $\pm$ 4.62	1.00~26.17
1 to <3	41 (26.5)		
3 to <5	39 (25.2)		
5 to <10	53 (34.2)		
≥10	22 (14.2)		
Work department			
Internal medicine ward	58 (37.4)		
Surgical ward	51 (32.9)		
Oncology ward	46 (29.7)		
Experience of cancer pain management education			
Yes	45 (29.0)		
No	110 (71.0)		

**Table 2.** The Level of Cancer Pain Management Knowledge, Attitude, Barriers, and Performance (N=155).

Variables	Range	Mean $\pm$ SD	Correct answer rate (%)
Knowledge*			
Non pharmacotherapy	0~4	2.92 $\pm$ 1.08	73
Cancer pain	0~5	3.32 $\pm$ 1.06	66
Pharmacotherapy	0~21	13.95 $\pm$ 2.16	66
Total	0~30	20.19 $\pm$ 2.98	67
Attitude	0~5	3.21 $\pm$ 0.30	
Barriers			
Nurse-related	8~32	2.39 $\pm$ 0.50	
Physician-related	10~40	2.56 $\pm$ 0.65	
Patient-related	4~16	2.71 $\pm$ 0.71	
Related to the health care system	7~28	2.59 $\pm$ 0.63	
Total	29~116	2.54 $\pm$ 0.54	
Performance			
Assessment	9~36	3.07 $\pm$ 0.43	
Intervention	7~28	2.92 $\pm$ 0.46	
Evaluation	5~20	3.20 $\pm$ 0.40	
Total	21~84	3.05 $\pm$ 0.38	

\*Knowledge=Knowledge of pain management.

4 points. The score for cancer pain management performance by subdomain was 3.07±0.43 points for pain assessment, 2.92±0.46 points for pain intervention, and 2.92±0.46 points for pain assessment (Table 2).

### 3. Differences in cancer pain management knowledge, attitudes, barriers, and performance according to participants' characteristics

The characteristics that showed significant differences in cancer pain management knowledge were age (F=4.61, P=0.011), work department (F=6.99, P=0.001), and experience in cancer pain management education (t=2.57, P=0.011). The post-hoc analysis showed that nurses aged 31 years or older had higher knowledge of cancer pain management than those aged 25 years or under. Nurses working in the oncology ward had a higher knowledge of cancer pain management than those working in the surgical ward.

The characteristics that showed differences in attitudes to-

ward cancer pain management were age (F=10.11, P<0.001), marital status (t=-3.57, P<0.001), education level (F=8.07, P<0.001), and clinical career (F=8.22, P<0.001). The post-hoc analysis showed that the score for attitudes toward cancer pain management was highest among those aged 31 years or older, followed in descending order by those between 26 and 30 years of age and those who were 25 years of age or younger. Higher scores for attitudes toward cancer pain management were observed among those with a master's degree than among those with a two-year or four-year college bachelor's degree. Participants with a clinical career of 10 years or longer had more positive cancer pain management attitudes than those with clinical careers of 1~3 years, 3~5 years, or 5~10 years. No characteristics of participants showed differences according to the barriers to cancer pain management. However, cancer pain management education experience showed a difference in the performance of cancer pain management (t=2.76, P=0.007). Specifically, cancer pain management performance was higher

**Table 3.** Differences in Cancer Pain Management Knowledge, Attitude, Barriers, and Performance According to Participants' Characteristics.

Characteristics	Knowledge			Attitude			Barriers			Performance		
	Mean ± SD	t/F	P Scheffé	Mean ± SD	t/F	P Scheffé	Mean ± SD	t/F	P Scheffé	Mean ± SD	t/F	P Scheffé
Age (yr)												
≤25 <sup>a</sup>	0.64±0.10	4.61	0.011	0.51±0.31	10.11	<0.001	2.50±0.56	0.36	0.702	3.02±0.30	0.70	0.500
26~30 <sup>b</sup>	0.67±0.10		c>a	0.64±0.22		c>b>a	2.58±0.54			3.04±0.40		
≥31 <sup>c</sup>	0.71±0.08			0.77±0.24			2.51±0.52			3.12±0.39		
Marital status												
Single	0.67±0.10	0.05	0.963	0.60±0.26	-3.57	<0.001	2.55±0.51	0.19	0.850	3.04±0.36	-0.92	0.362
Married	0.67±0.09			0.77±0.23			2.53±0.62			3.10±0.43		
Education level												
College <sup>a</sup>	0.66±0.11	2.43	0.092	0.66±0.29	8.07	<0.001	2.35±0.51	2.33	0.100	3.01±0.34	1.69	0.188
University <sup>b</sup>	0.67±0.10			0.61±0.25		c>a, b	2.57±0.52			3.05±0.37		
Graduate <sup>c</sup>	0.74±0.06			0.94±0.13			2.68±0.71			3.26±0.51		
Total clinical career (yr)												
1 to <3 <sup>a</sup>	0.65±0.09	2.02	0.113	0.55±0.28	8.22	<0.001	2.58±0.58	0.18	0.910	3.04±0.35	0.74	0.528
3 to <5 <sup>b</sup>	0.68±0.09			0.63±0.25		d>a, b, c	2.50±0.48			3.01±0.38		
5 to <10 <sup>c</sup>	0.67±0.11			0.63±0.24			2.54±0.54			3.05±0.37		
≥10 <sup>d</sup>	0.71±0.07			0.86±0.19			2.55±0.57			3.16±0.46		
Work department												
Internal medicine ward <sup>a</sup>	0.67±0.10	6.99	0.001	0.61±0.28	2.55	0.082	2.54±0.54	0.71	0.494	3.08±0.37	2.65	0.074
Surgical ward <sup>b</sup>	0.64±0.10		c>b	0.62±0.24			2.60±0.51			2.96±0.36		
Oncology ward <sup>c</sup>	0.71±0.09			0.71±0.24			2.47±0.56			3.12±0.40		
Experience of cancer pain management education												
Yes	0.70±0.10	2.57	0.011	0.67±0.28	0.91	0.364	2.66±0.58	1.82	0.070	3.18±0.41	2.76	0.007
No	0.66±0.10			0.63±0.25			2.49±0.51			3.00±0.36		

among nurses with experience of cancer pain management education than among those without such experience (Table 3).

#### 4. Relationships among knowledge, attitudes, barriers, and performance of cancer pain management

Cancer pain management performance was significantly positively correlated with cancer pain management knowledge ( $r=0.26, P=0.001$ ) and barriers to cancer pain management ( $r=0.30, P<0.001$ ), but there was no correlation with attitudes ( $r=-0.01, P=0.809$ ) (Table 4).

#### 5. Factors affecting performance of cancer pain management

Hierarchical regression analysis was performed to analyze the influence of cancer pain management knowledge and barriers on cancer pain management performance. In model 1, experience of cancer pain management education, which showed a significant difference in cancer pain management performance, was used as an independent variable, whereas in model 2,

cancer pain management knowledge and barriers were additionally used.

Before the analysis, the Durbin-Watson statistic was used to identify whether there was autocorrelation between the error terms: the result was 1.858, which was close to 2, indicating no presence of autocorrelation between the error terms. As a result of examining whether the distribution of error terms could be assumed to be normal through standardized residuals, all values were within  $\pm 3$ , meaning that the distribution of error terms could be assumed to be normal. The examination of whether multicollinearity was present between the entered independent variables through the tolerance limit and the variance expansion factor showed that the tolerance limit was 0.940~0.979, which was higher than 0.10, and the variance expansion factor was 1.022~1.064, which was lower than 10, indicating there was no collinearity among the independent variables.

Experience of cancer pain management education ( $\beta=0.22, P=0.007$ ), which was used in model 1, was found to have a significant effect on cancer pain management performance. In other words, more experience in cancer pain management education was associated with higher cancer pain management performance. The explanatory power of model 1 was 4.7% ( $F=7.60, P=0.007, R^2=0.047, \text{Adj-}R^2=0.041$ ).

Cancer pain management knowledge ( $\beta=0.21, P=0.006$ ) and barriers ( $\beta=0.28, P<0.001$ ), which were added to model 2, had significant effects on cancer pain management performance. That is, higher awareness of the barriers and higher

**Table 4.** Correlations among Cancer Pain Management Knowledge, Attitude, Barriers, and Performance (N=155).

Variables	Knowledge	Attitude	Barriers
	r (P)	r (P)	r (P)
Attitude	0.26 (0.001)		
Barriers	0.04 (0.596)	-0.11 (0.171)	
Performance	0.25 (0.001)	-0.01 (0.809)	0.30 (<0.001)

**Table 5.** Factors Affecting Cancer Pain Management Performance (N=155).

	Step 1					Step 2				
	B	SE	$\beta$	t	P	B	SE	$\beta$	t	P
(Constant)	3.00	0.04	-	84.82	<0.001	1.98	0.23	-	8.56	<0.001
Education experience (No=1)										
Yes	0.18	0.07	0.22	2.76	0.007	0.11	0.06	0.13	1.75	0.082
Barrier						0.19	0.29	0.27	3.63	<0.001
Knowledge						0.82	0.05	0.21	2.82	0.006
Adj-R <sup>2</sup>			0.041					0.149		
R <sup>2</sup>			0.047					0.166		
R <sup>2</sup> change			-					0.118		
F (P)			7.60 (0.007)					9.99 (<0.001)		
F change (P)			-					10.70 (<0.001)		

Durbin-Watson=1.858, F=9.99, P<0.001, R<sup>2</sup>=0.166, Adj-R<sup>2</sup>=0.149. Tolerance=0.940~0.979, VIF=1.022~1.064.

knowledge of cancer pain management were associated with a higher degree of cancer pain management performance. The proportion of variance additionally explained by the cancer pain management knowledge and cancer pain management barriers entered in model 2 was 11.8% ( $R^2=0.118$ ), and the total explanatory power of model 2 was 16.6% ( $F=9.99$ ,  $P<0.001$ ,  $R^2=0.166$ ,  $Adj-R^2=0.149$ ) (Table 5).

## DISCUSSION

The purpose of this study was to identify cancer pain management knowledge, attitudes, barriers, and performance, relationships between variables, and factors that affect cancer pain management among ward nurses working in a tertiary general hospital in South Gyeongsang Province. Higher levels of cancer pain management performance were found in nurses with more experience in cancer pain management education, higher knowledge of cancer pain management, and higher recognition of cancer pain management barriers.

The number of participants who had no experience in cancer pain management education ( $n=110$ , 71.0%) was somewhat lower, but similar to that reported in a previous study (80.2%) [8].

The score for knowledge of cancer pain management in this study was 20.19 out of 30 points, which was relatively high compared to the score of 17.34 points in Kim and Lee's study [8] among nurses in the cancer ward of a general hospital specializing in cancer care and 19.21 points in Jang and Jung's study [16] among general hospital nurses, both of which used the same tool as we used in the current study. This higher score can be attributable to the fact that the participants of our study had many opportunities to care for cancer patients as nurses working at a tertiary general hospital, and the Ministry of Health and Welfare and the National Cancer Center established cancer pain management guidelines and distributed educational materials [4]. The subdomains of the tool used to assess the knowledge of cancer pain management in this study consisted of knowledge of cancer pain, pharmacological therapy, and non-pharmacological therapy. Among them, the subdomain with the lowest score in this study was knowledge of cancer pain. For persisting or worsening cancer pain, administration of opioid analgesics in 50~100% increments 2~3

times until the pain subsides is recommended instead of using a placebo [4]. Therefore, the cancer pain management education for nurses should include that the use of a placebo is not appropriate and that sufficient doses of opioid analgesics should be administered.

In a study by Kim and Lee [8], the cancer pain management attitude score was 3.21 out of 5 points. It is difficult to compare the score directly with our result because of the difference in the number of items, but in that study, cancer pain management attitudes were found to influence cancer pain management performance. The discrepancy between those results and the results of our study might be explained by the fact that their study was conducted among nurses in the oncology ward of a general hospital specializing in cancer care, who had more experience in pain management education than those in our study.

The average score for cancer pain management performance in the current study was 3.05 out of 4 points, which was lower than that of previous studies [8,18]. It was slightly lower than the performance score of 3.15 reported by Kim and Lee [8] among nurses in the oncology ward of a general hospital specializing in cancer care. This discrepancy is attributable to the difference in the pain education experience of the participants: the participants of our study consisted of both oncology ward nurses and general ward nurses, whereas the participants in the previous study were all oncology ward nurses. The performance rate by subdomain of cancer pain management in our study was the lowest for pain interventions, unlike the results of previous studies in which the pain assessment had the lowest scores [8,17,18]. For interventions targeting pain in cancer patients, nurses should be educated to correct misunderstandings about opioid analgesics among patients and their families, and patients and their families should be educated to self-report changes in pain patterns and the occurrence of pain [4,22].

In the current study, age was significantly associated with knowledge of cancer pain management; specifically, the knowledge of cancer pain management was higher in nurses aged 31 years or older than those aged 25 years or younger. This could be because older nurses had richer experiences of caring for cancer patients and had accumulated knowledge on cancer pain through these experiences. In addition, nurses who worked in the oncology ward had higher knowledge of cancer

pain management than those working in the surgical ward. Similar results were reported in previous studies [21,26], where oncology ward nurses had higher levels of pain management knowledge than general ward nurses.

In the current study, nurses with a higher level of cancer pain management knowledge had a higher performance level of cancer pain management. Previous studies also reported a positive correlation between the knowledge and performance of cancer pain management [8,16]. In the current study, there was no correlation between the attitudes and performance of cancer pain management. In contrast, a previous study reported that attitudes were correlated with performance of cancer pain management [8]. Nurses' attitudes toward cancer pain management are difficult to change through educational interventions alone. According to the literature, an appropriate role model for cancer pain management or continuing education by pain management specialists is helpful in changing nurses' attitudes toward pain management [27]. In order for nurses' appropriate attitudes toward cancer pain to lead to higher pain management performance, further research is needed to clarify the relationship between the attitudes toward cancer pain management and performance.

In this study, experience of cancer pain management education was a factor affecting cancer pain management performance. Specifically, performance was higher in nurses who had received cancer pain management education. Similar results were also reported in previous studies that involved clinical nurses [8,16]. According to a study by Kim et al. [18], nurses reported that theory-based cancer pain education was not particularly helpful because it was difficult to apply in practice. Therefore, for effective pain management, education focusing on practicality rather than theories is necessary [18]. In addition, educational programs including specific content [4], such as how to calculate the dosage of equivalent analgesics and select appropriate analgesics, are needed.

In this study, cancer pain management barriers were found to be the second factor influencing cancer pain management performance. Specifically, higher perceptions of cancer pain management barriers were associated with higher cancer pain management performance. Barriers to cancer pain management need to be approached comprehensively, considering not only patient-related and medical staff-related factors, but also

systemic factors of healthcare institutions. It is important to assess the patient's knowledge level of pain management and the patient's attitude toward expression of pain before cancer pain management. According to previous studies, patients tend not to talk about pain frankly because they think that saying they have pain would offend their doctors [14]. Before the administration of opioid analgesics, it is necessary to lessen patients' reluctance or stigma against opioids and to help patients express their pain appropriately. Systemic factors such as opioid management regulations are also important factors that reduce the effectiveness of cancer pain management. In a previous study, the strict and thorough management of opioid analgesics was found to be an obstacle to the management of cancer pain [18]. Opioid analgesics should be stored and managed according to stringent regulations, but these restrictions should not be too strict to hamper nurses from conducting timely pain control. In departments that frequently use opioids, it is necessary to establish drug storage facilities in the ward. For this purpose, systemic support is required, such as a device for safe storage of drugs, careful drug management by nurses in the ward, cooperation of pharmacies for proper drug management, and safe and efficient transport of opioids.

The nurses who participated in this study cited an absence of prescriptions from doctors as one of the barriers to proper pain management. According to the literature, physician-related barriers include the lack of knowledge and experience in pain management and absence of prescriptions for painkillers [11,15]. Prescribing painkillers is a unique role of physicians, which is important for proper cancer pain management. For cancer pain management, the appropriate type, dosage, and timing of administration are important [4]. It is necessary for both physicians and nurses to keep track of the pain of cancer patients so that the right amount of analgesics can be administered at the right time. The participants of this study cited a lack of cooperative relationship between the attending physician and nurses as one of the barriers to cancer pain management. When nurses have a friendly relationship with physicians, they can work freely and efficiently and have their decision-making valued [23]. To improve the quality of life of cancer patients through appropriate pain control, both physicians and nurses need to communicate and collaborate closely to perform constant pain assessment and adjust drug effects

and side effects based on accurate knowledge of cancer pain control.

Considering the multidimensional characteristics of pain and the multifaceted aspects of pain management barriers, multidisciplinary interventions by professional pain management teams are crucial for effective pain control [15]. For effective and safe administration of opioid analgesics, it is necessary to facilitate systematic improvement involving a team specializing in pain control.

In the present study, cancer pain management knowledge was found to be the third influencing factor on cancer pain management performance. Cancer pain management knowledge was found to be an important factor influencing cancer pain management performance in a study by Kim and Lee [8] involving nurses in cancer specialty hospitals and in a study by Jang and Jung [16] involving hospital nurses. The prevalence of cancer has recently been increasing, and in tertiary general hospitals, cancer patients are not limited to only the oncology ward, but are often hospitalized in the general ward [28]. Educational interventions for patients and healthcare providers will enable successful pain management [15]. As more accurate cancer pain management knowledge among nurses will enable more aggressive pain management [8], it is necessary to provide cancer pain management education not only to oncology ward nurses, but also to all nurses in the hospital. Based on the results of the current study, we suggest that cancer pain management education based on the latest cancer pain management guidelines should be introduced and educational programs applicable in practice should be developed.

The explanatory power of the influencing factors of cancer pain management performance in this study was 16.6%, which is slightly lower than the values of 25.4~38.6% reported in previous studies [8,17,18]. In the future, based on previous studies [8,18], a diverse range of variables, such as work department, knowledge of the latest cancer pain management guidelines, and patient-centered nursing, should be added and repeatedly studied in further research.

The reliability of attitudes toward cancer pain management, as shown by Cronbach's  $\alpha$ , was as low as 0.50 in this study. The reliability of the original tool was 0.83, and it was 0.89 in a previous study [8] involving oncology ward nurses and 0.71 in another study [13] involving hospital nurses. According to

the literature, the Likert scale is widely used in tools designed to measure the opinions, attitudes, and beliefs of participants for each item [29]. The tool developed by Watt-Watson and Donovan [20] and translated by Kwon [21] used in the current study is based on a dichotomous scale. As such, it could have been difficult to fully reflect the respondents' intentions regarding cancer pain management attitudes, resulting in poor reliability. In future research, we suggest that this tool be tested repeatedly using a Likert scale.

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## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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## AUTHOR'S CONTRIBUTIONS

Conception or design of the work: all authors. Data collection: MK. Data analysis and interpretation: all authors. Critical revision of the article: all authors. Final approval of the version to be published: all authors.

## SUPPLEMENTARY MATERIALS

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