

Knowledge and Attitudes Toward Cancer Pain Management Among Nurses at Oncology Units

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Published online: 24 September 2017
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Abstract Nurses have major responsibilities to treat cancer pain in an optimal way. Their knowledge and attitudes are the key to success cancer pain management (CPM) process and impact the outcomes of pain treatment. This study aimed to evaluate the knowledge and attitudes toward CPM among Jordanian nurses working at oncology units. A cross-sectional descriptive design was used to collect data from 135 nurses who were working at four oncology units using Knowledge and Attitudes Survey Regarding Pain. The percentage of correct answers was 51.5% indicating that participants had fair knowledge and attitudes toward CPM. Nurses appeared knowledgeable about CPM guidelines but were unfamiliar regarding pharmacological management and had negative attitudes toward opioids addiction and pain assessment. Significantly, knowledge and attitudes were higher among nurses who had previous education programs ($P < .001$) and worked in a pain team ($P < .001$). Therefore, including CPM topics in nursing curricula and postgraduate educational programs is needed. Additionally, initiating pain management teams and using CPM guidelines will contribute to effective treatment of cancer pain.

Keywords Pain management · Cancer pain · Nurses · Knowledge · Attitudes · Oncology · Jordan

Introduction

Pain is the most frightening symptom in patients with cancer. Fifty-five percent of patients with cancer receiving treatment experience pain, and percentage rises in advanced cancer up to 66.4%, ranging between moderate to severe pain [1]. Cancer pain (CP) is a multidimensional syndrome with a mixture of acute and chronic pain [2]. In addition to the physical harm, CP causes psychosocial, behavioral, emotional, and spiritual problems resulting in a significant impact on patients' quality of life (QoL) [3]. Even though 80–90% of CP can be relieved by following the WHO guidelines in CPM [4], CP continues to be a worldwide issue and is still inadequately treated [5, 6].

Nurses as healthcare professionals (HCPs) are one of the most involved in CPM, and their knowledge and attitudes are the key to the success of CPM. The roles of nurses in CPM are summarized in assessing and reassessing pain, using pharmacological and non-pharmacological approaches in CPM, and educating patient and family about treatment [7].

Many barriers can make CP undertreated or untreated, which might be provider-related, system-related, or patient-related [4]. Unfortunately, poor knowledge and negative attitudes toward CPM were reported as one of the most common obstacles in CPM [8, 9]. So, obtaining baseline data regarding the level of nurses' knowledge and attitudes toward CPM has a significant step in effective CPM, resulting in enhancing QoL for patients with cancer and decreasing hospitalization period [10].

Pain management is a topic of wide interest to HCPs and healthcare institutions because of its significant effect on patients' and families' QoL, and its contribution as an

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accreditation requirement [11]. Furthermore, improving nurses' knowledge and attitudes, participating in scientific research, and keeping up to date with modern science are required to achieve optimal patient care [12]. However, pain perception is culturally and religiously sensitive which may influence nurses' behaviors and practices in PM [9, 11]. Therefore, literature recommended exploring the knowledge and attitudes of HCPs toward pain in different countries to identify their perception from different perspectives [13, 14].

Nurses have been found to have insufficient knowledge and negative attitudes toward CPM in many areas including pharmacological approach. For instance, Tufekci, Ozlu, Arslan, and Gumus (2013) found about 92% of nurses did not know that oral vicodin which is a combination of 5 mg hydrocodone and 500 mg acetaminophen equals 5–10 mg of oral morphine, and about 81% did not know that “morphine does not have dose ceiling” [15]. In Jordan, it was noted that 90% of nurses had inappropriate knowledge regarding as-needed (PRN) opioids administration [16] and 85% of them did not know that “administering oral morphine regularly is better in managing CP” [17]. Furthermore, studying nurses' knowledge and attitudes toward CPM revealed that nurses still have misbeliefs about opioids addiction, and that they still wrongly believe about the effect of using placebo [18–20]. Some studies reported nurses' knowledge deficit and negative attitudes in areas other than pharmacological management. For instance, Nega et al. (2014) found that 89% of the Ethiopian nurses incorrectly knew that patient's vital signs and body expressions are more reliable indicators to pain intensity than patient's words [19].

On the other hand, nurses appeared knowledgeable and had positive attitudes toward CPM in many areas. Abed El-Rahman et al. (2013) reported in a study that included 124 oncology nurses and 93 non-oncology nurses that oncology nurses strongly believed that patients had the right to relieve their pain as well as treat their disease, and they recognized morphine as the best choice to treat CP [16]. Additionally, another study found that a high percent of nurses had good knowledge in many areas such as knowing that opioids dose adjustment should be obtained according to pain intensity (92%), and knowing that encouraging patients to tolerate pain before administering analgesics is a wrong attitude (93%) [21].

To our knowledge, limited studies were found in Jordan that measured nurses' knowledge and attitudes toward CPM especially in oncology units; two studies assessed knowledge and attitudes of nurses regarding pain in general [9, 17], a study assessed nurses' knowledge and attitudes regarding postoperative pain [22], and two studies compared the oncology and non-oncology nurses' knowledge and attitude regarding pain [16, 23]. In the last two studies, the authors included only one oncology unit with limited sample size, which was acknowledged as a limitation in both studies. Also, while Omran et al. [23] utilized the NKAS, the other study [16]

utilized a Likert scale to measure knowledge, which was inappropriate. Further, none of the studies were found to assess nurses' knowledge and attitudes regarding CPM at all oncology units in Jordan. So, it is worthy to fill this gap in literature, which would establish baseline information about nurses' knowledge and attitudes toward CPM at oncology units.

Moreover, King Hussein Cancer Center (KHCC) is the only specialized cancer center in Jordan and is one of the best comprehensive oncology centers in the Middle East. This specialized center started in the last decade giving attention to improve PM among patients with cancer by initiating an active PM team, developing palliative and home care program, using valid guidelines in clinical practice for acute and chronic PM, and conducting formal and informal PM education courses that aim to improve HCPs' knowledge and practices in PM. However, it is unknown to how extent the oncology nursing training regarding CPM got disseminated from KHCC to other oncology centers in Jordan. So, it is important to compare the level of nurses' knowledge and attitudes toward CPM in this oncology center with other healthcare institutions that do not use these strategies. Therefore, this study aimed to evaluate knowledge and attitudes toward CPM among Jordanian nurses working at oncology units. Specifically, this study aimed to answer the following research questions:

1. What knowledge and attitudes do Jordanian nurses have toward CPM?
2. Are there significant differences in Jordanian nurses' knowledge and attitudes toward CPM based on their demographic characteristics?

Methodology

Design

This study utilized a descriptive cross-sectional design.

Sample and Setting

The target population for this study included Jordanian registered nurses working at oncology units in Jordanian hospitals. There are four main healthcare sectors in Jordan: publicly owned and operated, academic, private, and military. Among these healthcare sectors, there are only three oncology units and one specialized oncology center. The total bed capacity of these oncology units is about 300 beds with a total of 155 registered nurses (RNs) distributed among the four oncology units; publicly owned and operated (15), academic (15), military (41), and the specialized oncology center (80) RNs in medical and surgical wards, noting that other departments in

this specialized oncology center such as pediatric floors, intensive care units, and emergency department were excluded because patients in these areas need special and different care regarding pain assessment and management. Thus, purposefully, all nurses in these oncology units were invited to participate in this study.

The sample of the study comprised of only RNs because they are the HCPs who are engaged in assessing and managing CP. Inclusion criteria included being a RN in the selected oncology units, being able to write and read English language, and have experience at the oncology unit for at least 3 months, because this period is enough to make nurses well oriented about the new work. Licensed practical and assistant nurses were excluded because CPM is not included in their job description.

Instrument

The study instrument included two parts. The first part contained nurses' demographic sheet developed by the researchers, and had eight items: age, gender, education level, hospital setting, years of experience in nursing, years of experience in oncology units, any previous formal/informal education in CPM, and previous experience in a pain team. The second part included the modified version of the Knowledge and Attitudes Survey Regarding Pain (KAS) that was originally developed by Ferrell and McCaffery (1987), and updated with recent PM guidelines [24]. The authors reported the psychometric properties for KAS including test-retest reliability ($r > .80$) and internal consistency reliability (alpha $r > .70$). The instrument was utilized in the studies conducted in Jordan [9], Sweden [25], and Turkey [18].

The KAS consists of 39 items classified in three sections, where section one has 21 True/False items, section two has 14 multiple-choice items, and section three has two patients case scenarios (each followed by two multiple choice-questions). The correct answer was scored one while the wrong answer was scored zero, with a possible range between 0 and 39. A score less than 50% means that the participants have poor knowledge and negative attitudes toward CPM. If it ranged between 50 and 75%, it means that the participants have fair knowledge and attitudes toward CPM and if they received a score above 75%, it means that they have good knowledge and positive attitudes toward CPM [13].

Ethical Considerations

Ethical approvals were obtained from the Scientific Research Committee at the School of nursing in The University of Jordan and the Institutional Review Boards of the participating hospitals. Participants' privacy was reserved by ensuring that they have the right whether to participate in this study or not and to withdraw at any time. No form of personal

identification was incorporated into the study, therefore, confidentiality and anonymity of the respondents were guaranteed.

Data Collection Procedure

After obtaining the required ethical approvals, the primary investigator frequently visited the selected units and asked head nurses for the list of nurses who meet the eligibility criteria. Visits were done during different shifts, and it was arranged accordingly to invite all nurses to participate in the study during their work hours.

At the interview, the researcher provided full explanation regarding the study, noting that there are no risks or benefits to participants from taking part in the study, a part from enriching nursing research on the topic of CPM. Eligible participants were invited to participate in the study by asking them to complete the questionnaire after carefully read the instructions given in the cover letter and signing the consent form. The researcher was available during filling out the questionnaires and participants were given the opportunity to ask questions regarding the study. In addition, participants were asked and worked individually on their questionnaires. After that, the questionnaires were returned to researcher.

Data Analysis

Data analysis was performed using Statistical Package for the Social Sciences (SPSS version-19). Descriptive statistics including means and standard deviations were used to describe sample characteristics and the level of nurses' CPM knowledge and attitudes. To evaluate the differences in the mean scores of nurses' CPM knowledge and attitudes based on their demographic characteristics, a series of independent sample *t* test was used for variables contained two groups including gender, level of education, having previous formal or informal education in pain management, and have working experience in a pain team or no. In addition, analysis of variance (ANOVA) test was used to examine the differences in the mean score of KAS among hospital setting variable that contains four groups. *P* value less than 0.05 was considered in all statistical analyses.

Results

Sample Characteristics

A total of 152 nurses were invited to complete the questionnaire. Response rate was high (91.4%). Four questionnaires were excluded due to missing data, thus, the final number of participants was 135 nurses. Participants' age ranged from 23 to 50 years ($M = 28.1$, $SD = 4.09$). Nurses' experience at

oncology units ranged from 5 months to 14 years ($M = 3.7$, $SD = 2.6$). The majority of the sample were male (54.8%) and had bachelor degree (92.6%). When asked about having educational pain course, only one third of them ($n = 46$) answered yes. Remarkably, only one nurse had a formal pain education course and the other nurses who had educational pain course reported that the course was informal including lectures in general nursing orientation program or in a master program. Regarding working in a pain team, only eight nurses (5.9%) reported working in a pain team. Table 1 presents detailed description of nurses' demographic characteristics.

Nurses' Knowledge and Attitudes toward CPM

Descriptive statistics were used to evaluate nurses' knowledge and attitudes toward CPM. Data revealed that the total of correct answers ranged from 11 to 37 out of 39, with a mean of 20.08 ($SD = 4.8$) which equals 51.5% of the total score. Nineteen questions (48.7%) reached the passing score. However, results revealed that the most correctly answered questions were about *opioids dose modification according to patient's response* (item-15) (81.5%), *using a combination of different analgesics to get more pain relief effect* (item-7) (80.7%), and *the best judgmental person for the patient's pain severity* (item-30) (74.1%). On the other hand, the most questions that were incorrectly answered included the questions regarding *the PRN morphine dose for patient who has acute*

severe pain and looks comfortable (item-37) (23%), *symptoms of opioids physical dependency* (item-35) (28.1%), and *the most appropriate route of opioids administration to manage the chronic CP* (item-22) (31.9%). The frequency and percentage of correct answers were summarized in Table 2.

Examining the mean score of total correct answers according to nurses' demographics revealed many differences. Significantly, scores were higher among nurses who had pain education course ($M = 22.1$, $SD = 5.8$) than those who did not ($M = 19.1$, $SD = 3.8$) ($t = -3.6$, $df = 133$, $P < .001$). Similarly, results showed that scores were significantly higher among nurses who worked in a pain team ($M = 30.23$, $SD = 5.5$) than those who did not ($M = 19$, $SD = 4.1$) ($t = -7.15$, $df = 133$, $P < .001$). On the other hand, female nurses and nurses who worked in the oncology center had higher scores but no significant differences were found between those groups. Furthermore, Pearson's correlation test revealed that there was no statistical significance between nurses' CPM knowledge and attitudes score with the continuous variables including age ($r = 0.089$), total years of experience ($r = 0.16$), and oncology experience ($r = 0.07$). Table 3 presents the differences in nurses' CPM knowledge and attitudes scores based on their demographics.

Discussion

This study evaluated the knowledge and attitudes toward CPM among Jordanian nurses working at oncology units. Managing CP adequately is a patient's right as the right to receive the treatment for the cancer itself. The results indicated that nurses who worked at oncology units had fair knowledge and attitudes regarding CPM with a mean score of 20 out of 39 which is equal to 51.5%. Comparing this result with the other two studies conducted in Jordan, using the same tool among general nurses, indicates that the participants of this study have better knowledge and attitudes than previous studies [17, 23] (48.2 and 42.7%, respectively). This variation could refer to the inclusion of non-oncology units in their studies which may indicate that nurses who work with patients with cancer pay more attention to PM and provide them with better knowledge and better attitudes toward CPM [23].

Although nurses in this study had fair level of knowledge and attitudes toward CPM, it is still considered less than optimal. It is suggested that the low level of Jordanian nurses' knowledge and attitudes toward CPM could be related to lack of pain education in nursing baccalaureate curricula, as well as lack of interest of the Jordanian hospitals to conduct pain education program for employed nurses [17, 23]. Only one study was found in Jordan that examined the effectiveness of education program on nurses' knowledge and attitudes toward postoperative pain, which found a significant effect of education program in improving nurses' knowledge and attitudes

Table 1 Descriptive analysis of nurses' demographics ($N = 135$)

Variable	Mean (SD)	Number (%)
Age (years)	28.1 (4.09)	
Total experience in nursing (years)	5.4 (4.1)	
Oncology experience (years)	3.7 (2.6)	
Hospitals		
Public		15 (11.1%)
Private		71 (52.6%)
Educational		15 (11.1%)
Military		34 (25.2%)
Nurses' educational level		
Bachelor		125 (92.6%)
Master		10 (7.4%)
Gender		
Male		74 (54.8%)
Female		61 (45.2%)
Pain management training		
Yes		46 (34.1%)
No		89 (65%)
Working in a pain team		
Yes		8 (5.9%)
No		127 (94.1%)

Table 2 Percentage of nurses' correctly answered questions of the KAS ($N = 135$)

No.	Question	Number (%)
1.	Vital signs are always reliable indicators of...	52 (38.5%)
2.	Because their nervous system is underdeveloped, ...	75 (55.6%)
3.	Patients who can be distracted from pain ...	73 (54.1%)
4.	Patients may sleep in spite of severe pain	52 (38.5%)
5.	Aspirin and other non-steroidal anti-inflammatory ...	52 (38.5%)
6.	Respiratory depression rarely occurs in patients ...	93 (68.9%)
7.	Combining analgesics that work by different ...	109 (80.7%)
8.	The usual duration of analgesia of 1–2 mg ...	70 (51.9%)
9.	Research shows that antihistamine drugs	70 (51.9%)
10.	Opioids should not be used in patients with ...	62 (45.9%)
11.	Elderly patients cannot tolerate opioids for pain relief	89 (65.9%)
12.	Patients should be encouraged to endure as ...	62 (45.9%)
13.	Children less than 11 years old cannot reliably report ...	63 (46.7%)
14.	Patients' spiritual beliefs may lead them to think ...	94 (69.6%)
15.	After an initial dose of opioid analgesic is given, ...	110 (81.5%)
16.	Giving patients sterile water by injection (placebo) ...	73 (54.1%)
17.	Revacod (hydrocodone 5 mg + acetaminophen 500 mg) ...	68 (50.4%)
18.	If the source of the patient's pain is unknown, ...	56 (41.5%)
19.	Anticonvulsant drugs such as gabapentin ...	63 (46.7%)
20.	Benzodiazepines are not effective pain relievers ...	96 (71.1%)
21.	Narcotic/opioid addiction is defined as a chronic ...	89 (65.9%)
22.	The recommended route of administration of ...	43 (31.9%)
23.	The recommended route of administration of ...	84 (62.2%)
24.	Which of the following analgesic medications is ...	98 (72.6%)
25.	Which of the following IV doses of morphine ...	64 (47.4%)
26.	Analgesics for cancer pain should be given...	52 (38.5%)
27.	The likelihood of the patient developing clinically ...	45 (33.3%)
28.	The most likely reason a patient with pain would ...	62 (45.9%)
29.	Which of the following is useful for treatment of ...	59 (43.7%)
30.	The most accurate judge of the intensity of the ...	100 (74.1%)
31.	Which of the following describes the best ...	57 (42.2%)
32.	How likely is it that patients who develop pain ...	56 (41.5%)
33.	The time to peak effect for morphine given IV is (15 min)	70 (51.9%)
34.	The time to peak effect for morphine given orally	61 (45.2%)
35.	Following abrupt discontinuation of an ...	38 (28.1%)
36.	Patient A: Andrew is 25 years old, and this is his ...	75 (55.6%)
37.	Your assessment, above, (smiling patient) ...	31 (23%)
38.	Patient B: Robert is 25 years old, and this is his ...	93 (68.9%)
39.	Your assessment, above, (grimacing patient) ...	52 (38.5%)

[22]. Actually, efforts that aim to improve nurses' knowledge and attitudes regarding CPM can benefit from the KHCC, which has been playing an effective role in improving nursing students' curricula regarding palliative care and PM for patients with cancer. Recently, it became an education center that trains oncology and palliative care for nursing master students from different Jordanian universities, in addition to its role in conducting palliative care and PM courses certified from the American Nursing Credentialing Center as a continuous

education program for nurses from the KHCC and other Jordanian hospitals. This, could explain why the participating nurses in this study from this specialized cancer center were found to have higher knowledge and better attitudes toward CPM. Therefore, it is recommended to continuously focus on formally educating students and employed nurses regarding CPM, knowing that education is the most effective method in improving Jordanian nurses' knowledge as reported in different Jordanian studies [26–28].

Table 3 Differences of nurses’ CPM knowledge and attitudes scores based on their demographics (*N* = 135)

Variable	<i>M</i> (SD)	<i>t</i>	Df	<i>P</i> *
Gender		−0.3	133	.7
Male	19.9 (5.06)			
Female	20.2 (4.6)			
Pain management training		−0.3	133	< .001
Yes	22.1 (5.8)			
No	19 (3.8)			
Working in a pain team		−7.1	133	< .001
Yes	30.2 (5.5)			
No	19.4 (4)			
Nurses’ educational level		−1.7	133	.08
Bachelor	19.8 (4.5)			
Master	22.6 (7.4)			
	<i>M</i> (SD)	df	<i>F</i>	<i>P</i> **
Hospitals		3	0.65	.58
Public	19.6 (5.4)			
Privat	20.6 (5.6)			
Educational	18.8 (2.3)			
Military	19.8 (3.3)			
	<i>r</i> (<i>P</i>)***			
Age	0.089 (.3)			
Total experience	0.16 (.052)			
Oncology experience	0.07 (.38)			

P* value significant at ≤ 0.05 using *t* test, *P* value significant at ≤ 0.05 using ANOVA, ****P* value significant at ≤ 0.05 using Pearson’s correlation

The KAS was used to evaluate oncology nurses’ knowledge and attitudes toward CPM in numerous countries, and results were found to be inconsistent. For instance, the score was 53.8% in Italy [21] and 54.1% in Turkey [15], but was lower (37.1%) in Ethiopia [19] and (35.4%) in another Turkish study [18]. This variation could be related to the cultural differences regarding the concepts of pain assessment and management [29], or due to the availability of certified oncology nurses in some countries than others [15]. However, this difference with literature keeps the contradiction about this issue inviting more studies to confirm or decline such relationship.

The four top scores that nurses correctly answered were for questions that asked about main recommendations in CPM that were mentioned in several valid guidelines [30–32]. In this study, the highest correct answer was regarding modifying the dosage of opioid according to patient’s response (81.5%). This result was approximately similar to the other two studies conducted in Turkey [18] and Italy [21]. Also, this is consistent with the WHO (1996) CPM guidelines that highlight individualized dose of opioids considering patient’s response to PM regimen [32].

The majority of nurses (74.1%) correctly knew that the patient is the most reliable person to judge the severity of his/her pain. Surprisingly, nurses in the current study obtained the highest percent for the correct answer in this regard compared to several studies [15, 23]. Actually, having this positive attitude toward patient’s self-report of pain goes with McCaffery’s (1968) definition of pain stating that pain exists whenever the patient reports it does [33].

Further analysis of the case-scenario questions demonstrated that nurses had inconsistent attitudes with their clinical practices regarding CP assessment. Despite most of nurses relied on patient’s self-report of pain severity, only 55% of them accepted patients’ rating of their pain “8” if they seemed comfortable (smiling and talking with others) and had normal vital signs, while about 69% accepted the uncomfortable (grimacing and turning in bed) patients’ rating of their pain. Same results were found by many studies [15, 19], where rating pain severity should not be affected by patients’ vital signs and expressions because patients’ words remain truer. To our knowledge, no local studies compared nurses’ pain assessment with patients’ assessment. So, conducting such studies in Jordan is recommended for effective CPM.

Globally, morphine is known to be as the best choice for CPM, and this is recommended in several CPM guidelines [30, 32]. In this study, the majority of nurses (73%) were able to identify morphine as the best drug to treat CP. The Jordan Pain Society (2010) reported that the total real use of morphine per year in Jordan is 10 kg which is much less than the global consumption [34]. This low consumption could be due to the policy restrictions in using opioids or its unavailability rather than lack of knowledge regarding its use as the results of this study have showed.

Despite two thirds of the participants were able to define opioid addiction correctly, they had negative attitudes toward addiction when they wrongly believed in promoting patient to tolerate their pain and delay using opioid, disagreement to administer opioids for those complaining from substance abuse, and inability to recognize that addiction only develops in a very low percentage of patients. These findings were similar to other studies [15, 23]. However, having good knowledge regarding the definition of opioid addiction could be related to including this topic in some courses in baccalaureate curricula that aims to make nursing students able to recognize the definition of addiction. This encourages including other pain-related topics in nursing curricula. However, having negative attitudes toward addiction may be due to some cultural and religious misbeliefs and lack of knowledge among Jordanian population regarding using opioids that prevents its use, such as fear from developing addiction and possible legal consequences. In addition, illicit use of narcotics is forbidden in Islamic religion and allowed for treatment under certain conditions. This makes patients hesitant to use opioids and endure pain thinking that this notion will bring them closer to God [9].

Nurses' lack of knowledge has clearly appeared and now was in the questions that asked about pharmacology in CPM and this was consistent with earlier studies [15, 17, 18]. In the current study, the item with the lowest score was regarding choosing the proper PRN dose of morphine for a patient who reports pain and looks comfortable. Similar results were found in previous studies [21, 23], with one exception in Turkey where 95.2% of nurses answered this question correctly [15]. On the other hand, the percentage of correct answers regarding PRN morphine dose reached 38.5% if the patient seemed uncomfortable. It seemed that nurses' use of PRN morphine dose was affected by the patient's condition.

Nurses' knowledge and attitudes toward CPM were variant based on participants' demographics. For instance, nurses who received pain education course had significantly higher scores than their counterparts. Different studies were consistent with this result [17, 23]. Therefore, conducting educational programs regarding CPM in hospitals is needed to improve nurses' knowledge and attitudes. Also, it is recommended for the policy-makers and in-service offices to initiate special CPM policy that is derived from the updated guidelines and apply them in their hospitals.

In the current study, nurses who had working experience in a pain team significantly had higher score than those who did not. Actually, working in a pain team makes nurses' clinical practices more confined in PM, which gives them the opportunity to improve their knowledge and attitudes and to become more expert in this filed. Unfortunately, most of our hospitals in Jordan lack pain teams, thus, it is recommended to draw the attention of the decision-makers to the importance of initiating PM teams because it is highly effective in relieving patients' pain and improving their QoL [35]. Up to the authors' knowledge, no previous studies measured the effect of having a work experience in pain team on nurses' CPM knowledge and attitudes score. So, such study is recommended in future research.

Strengths and Limitations

The high response rate of participants that represented all oncology units in Jordan is considered as a strength point, which enhances the generalizability of the results among nurses working at oncology units in Jordan. Also, utilizing the KAS that is a valid and reliable tool adds to the strengths of this study in establishing a baseline of knowledge and attitudes toward CPM among Jordanian nurses. Conversely, data were obtained from nurses who were working at oncology units, thus, generalizing the results to other nurses working in other departments could be limited. So, conducting such studies considering larger sample from other departments is highly recommended. Another limitation includes using self-reporting questionnaire in obtaining data, which might reduce the validity and accuracy of the information [36]. So, bias in

reporting some attitudes could be possible in this data collection method and the participants may answer some questions randomly without recognizing the meaning.

Conclusion

The results of the current study revealed that working at oncology unit plays an important role in improving nurses' knowledge and attitudes toward CPM principles. Nurses in this study had fair CPM knowledge and attitudes, and seemed knowledgeable in questions regarding the major principles of CPM. On the other hand, they were less knowledgeable in the pharmacological-related questions and case-scenario questions. However, the authors of this study suggest that conducting PM educational programs for students and employed nurses' curricula, formulating PM teams, and applying CPM policy in clinical areas will contribute to better knowledge and attitudes for nurses regarding CPM.

Acknowledgements The authors acknowledge the University of Jordan for funding this study. Also, sincere thanks to the participants and to the directors of nursing within the participating hospitals.

Compliance with ethical standards Ethical approvals were obtained from the Scientific Research Committee at the School of nursing in The University of Jordan and the Institutional Review Boards of the participating hospitals. Participants' privacy was reserved by ensuring that they have the right whether to participate in this study or not and to withdraw at any time. No form of personal identification was incorporated into the study, therefore, confidentiality and anonymity of the respondents were guaranteed

References

1. van den Beuken-van MH, Hochstenbach LM, Joosten EA, Tjan-Heijnen VC, Janssen DJ (2016) Update on prevalence of pain in patients with cancer: systematic review and meta-analysis. *J Pain Symptom Manag* 51(6):1070–1090
2. Prize JLE (2014) The challenges of cancer pain assessment. *Ulster Med J* 83(1):44–46
3. Rustøen T, Geerling JI, Pappa T, Rundström C, Weisse I, Williams SC et al (2013) How nurses assess breakthrough cancer pain, and the impact of this pain on patients' daily lives—Results of a European survey. *Eur J Oncol Nurs* 17(4):402–407
4. Oldenmenger WH, SilleviusSmitt PA, van Dooren S, Stoter G, van der Rijt CC (2009) A systematic review on barriers hindering adequate cancer pain management and interventions to reduce them: a critical appraisal. *Eur J Cancer* 45(8):1370–1380
5. Al-Qadire M, Tubaishat A, Aljezawi M (2013) Cancer pain in Jordan: prevalence and adequacy of treatment. *Int J Palliat Nurs* 19(3):125–130
6. Darawad M, Al-hussami M, Saleh A, Al-sutari M (2012) Jordanian patients' pain management satisfaction. *Pain Manag Nurs* 15(1): 116–125
7. Vallerand AH, Musto S, Polomano RC (2011) Nursing's role in cancer pain management. *Curr Pain Headache Rep* 4:250–262

8. Al-Khalaileh M, Al-Qadire M (2012) Barriers to cancer pain management: Jordanian nurses' perspectives. *Int J Palliat Nurs* 18(11):535–540
9. D'emeh W, Yacoub M, Darawad M, Al-Badawi T, Shahwan B (2016) Pain-related knowledge and barriers among Jordanian nurses: a national study. *Health* 8(06):548
10. Adam R, Bond C, Murchie P (2015) Educational interventions for cancer pain. A systematic review of systematic reviews with nested narrative review of randomized controlled trials. *Patient Educ Couns* 98(3):269–282
11. Darawad M, Al-hussami M, Saleh A, Al-sutari M, Mostafa W (2014) Predictors of ICU patients' pain management satisfaction. *Aust Crit Care* 28(3):129–133
12. Jordanian Nursing Council (2010) Professional standards. Retrieved June 5, 2015, from <http://www.jnc.gov.jo/english/publications/professional%20stander.pdf>
13. Al-Khawaldeh OA, Al-hussami MO, Darawad MW (2013) Knowledge and attitudes regarding pain management among Jordanian nursing students. *Nurse Educ Today* 33(4):339–345
14. Yava A, Cicek H, Tosun N, Özcan C, Yildiz D, Dizer B (2013) Knowledge and attitudes of nurses about pain management in Turkey. *Int J Caring Sci* 6(3):494–505
15. Tufekci FG, Ozlu ZK, Arslan S, Gumus K (2013) Knowledge and attitudes regarding pain management of oncology and non-oncology nurses in Turkey. *Glob Adv Res J Nurs Midwifery* 2(1):1–8
16. Abed El-Rahman M, Al Kalaldehy T, Muhbes F (2013) Knowledge and attitude towards pain management. A comparison between oncology and non-oncology nurses in Jordan. *Int J Adv Nurs Stud* 2(2):95–100
17. Al-Qadire M, Al-Khalaileh M (2014) Jordanian nurses knowledge and attitude regarding pain management. *Pain Manag Nurs* 15(1):220–228
18. Yıldırım YK, Cicek F, Uyar M (2008) Knowledge and attitudes of Turkish oncology nurse about cancer pain management. *Pain Manag Nurs* 9:17–25
19. Nega R, Tachbele E, Kassa GM (2014) Cancer pain and its management: Knowledge of nurses at selected health institutions, offering cancer treatment in Addis Ababa, Ethiopia. *J Pain Relief* 3:131–137
20. Shahnazi H, Saryazdi H, Sharifirad G, Hasanazadeh A, Charkazi A, Moodi M (2012) The survey of nurse's knowledge and attitude toward cancer pain management: application of Health Belief Model. *J Educ Health Promot* 1:15
21. Bernardi M, Catania G, Lambert A, Tridello G, Luzzani M (2007) Knowledge and attitudes about cancer pain management: a national survey of Italian oncology nurses. *Eur J Oncol Nurs* 11:272–279
22. Abdalrahim MS, Majali SA, Stomberg MW, Bergbom I (2011) The effect of postoperative pain management program on improving nurses' knowledge and attitudes toward pain. *Nurse Educ Pract* 11(4):250–255
23. Omran S, Al-Qadire M, AL-Ali N, Al-Hayek M (2014) Knowledge and attitudes about pain management: A comparison of oncology and non-oncology Jordanian nurses. *Nurs Health* 2(4):73–80
24. Ferrell B, McCaffery M (2012) Knowledge and attitudes survey regarding pain. Retrieved October 12, 2015, from City of Hope Pain & Palliative Care Resources Center web site: <http://prc.coh.org>
25. Gustafsson M, Borglin G (2013) Can a theory-based educational intervention change nurses' knowledge and attitudes concerning cancer pain management? A quasi-experimental design. *Biomed Cent Health Serv Res* 19:13–32
26. Al-hussami M, Darawad M (2012) Compliance of nursing students with infection prevention precautions: effectiveness of a teaching program. *Am J Infect Control* 41(4):332–336
27. Toubasi S, Alosta M, Darawad M, Demeh W (2015) Impact of simulation training on Jordanian nurses' performance of basic life support skills: a pilot study. *Nurse Educ Today* 35:999–1003
28. Yacoub M, Demeh W, Darawad M, Saleh M, Saleh A (2015) Outcomes of diabetes educational program for registered nurses caring for persons with diabetes. *J Contin Educ Nurs* 46(3):129–133
29. Al-Atiyyat H, Mohammed N (2009) Cultural diversity and cancer pain. *J Hosp Palliat Nurs* 11(3):154–164
30. Ripamonti C, Santini D, Maranzano E, Berti M, Roila F, ESMO Guidelines Working Group (2012) Management of cancer pain: ESMO clinical practice guidelines. Management of cancer pain: ESMO Clinical Practice Guidelines. *Ann Oncol* 23(7):39–54
31. Caraceni A, Hanks G, Kaasa S, Bennett MI, Brunelli C, Cherny N, Haugen DF (2012) Use of opioid analgesics in the treatment of cancer pain: evidence-based recommendations from the EAPC. *Lancet Oncol* 13(2):e58–e68
32. World Health Organization (1996) Cancer pain relief. Second edition. Retrieved July 20, 2013, from tiny.cc/WHO/cancer-ain
33. McCaffery M (1968) Nursing practice theories related to cognition, bodily pain, and man-environment interactions. University of California at Los Angeles Students' Store, Los Angeles
34. Jordan Pain Society (2010) Jordan initiative for pain management. Retrieved February 16, 2016, from Jordan Pain Society website: http://www.jordanpainsociety.org/userfiles/file/pain_1.pdf
35. Gatchel R, McGeary D, McGeary C, Lippe S (2014) Interdisciplinary chronic pain management: past, present, and future. *Am Psychol Assoc* 69(2):119–130
36. Polit DF, Beck CT (2010) Essentials of nursing research: appraising evidence for nursing practice, 7th edn. Wolters Kluwer Health, Lippincott Williams & Wilkins, Philadelphia