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Areas of Knowledge Deficit and Misconceptions Regarding Pain among Jordanian Nurses

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ABSTRACT

Background: Nurses must be highly knowledgeable and skilled regarding pain and its management to ensure optimal pain relief. However, nurses worldwide were found to have knowledge deficits and poor attitudes toward pain. Thus identifying the major areas of knowledge deficit regarding pain and incorporating these areas in nursing undergraduate education and nursing continuing training could improve nurses' knowledge and attitude toward pain.
Aims: The purpose of this study was to assess Jordanian nurses' knowledge and attitude toward pain using the Nurses' Knowledge and Attitudes Survey (NKAS) and to identify the areas of deficit in nursing knowledge toward pain among Jordanian nurses.
Design: Cross sectional descriptive study.
Settings: Four Jordanian hospitals (governmental, private, teaching and royal medical services).
Participants/Subjects: Nurses working in intensive care units (ICUs), emergency department, and surgical, medical and oncology wards in.
Methods: This descriptive study used data from 417 nurses who completed the NKAS tool. The passing score for the NKAS survey was individually calculated for each nurse. Moreover, we examined each item to identify the percentage of correct answers for each of the 39 questions.
Results: The percentage of correct response ranged from 18% to 92%. Only four nurses achieved an overall score of 80% or greater and none of them achieved a 100% correct response. We revealed extensive knowledge deficits among Jordanian nurses, particularly in pain assessment and its pharmacotherapeutics components. Moreover, we found that Jordanian nurses held many negative attitudes and misconceptions about pain.
Conclusions: Insufficient knowledge and attitudes among nurses toward pain is a worldwide problem. However, recognizing the areas of knowledge deficit and establishing educational interventions based on these deficits could improve nurses' knowledge and attitudes regarding pain and their clinical practice.

Inadequate pain management results in many harmful physical and psychological consequences that negatively affect patients' daily activities and quality of life (Duenas, Ojeda, Salazar, Mico, & Failde, 2016; Gan, 2017). Nurses play a crucial role in the assessment and management of pain (Eti Aslan, Kula Sahin, Secginli, & Bulbuloglu, 2018; Street, Phillips, Haesler, & Kent, 2018). Thus nurses must be highly knowledgeable and skilled regarding pain assessment and management to improve the nursing quality of care and reduce the complications and cost associated with the inadequate pain treatment. However, lack of sufficient knowledge about pain and its management among nurses is a major barrier to achieving optimal pain management (Al-Khawaldeh, Al-Hussami, & Darawad, 2013; Lewthwaite et al., 2011).

Previous studies have found that nurses worldwide have an insufficient level of knowledge and negative attitudes regarding pain and pain management (Al-Khawaldeh et al., 2013; Eid, Manias, Bucknall, & Almazrooa, 2014). Similar results were also obtained from studies conducted in Jordan (Al-Khawaldeh et al., 2013; Al Qadire & Al Khalaileh, 2014). Various factors have been found to be associated with nursing knowledge and attitude toward pain. The most important factors include nurses' age, level of education,

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working experience, and history of pain training courses (Ekim & Ocakci, 2013; Ho et al., 2013; Wang & Tsai, 2010). Moreover, it has been found that pain education and training programs significantly improve nurses' knowledge and attitude toward pain (Long, 2013; Ortiz et al., 2015).

We believe that identifying questions with the highest and lowest percentage of correct scores in the Nurses' Knowledge and Attitudes Survey (NKAS) will help in determining the strengths and weaknesses in nurses' knowledge, and future educational interventions could be established and guided based on the nurses' knowledge deficits. Therefore our purpose in this study was to assess Jordanian nurses' knowledge and attitude toward pain and to identify the gap in nursing knowledge and attitude toward pain and its management among Jordanian nurses.

Methods

Participants

This is a cross-sectional descriptive study that used data from 417 Jordanian registered nurses from February to April 2017. Inclusion criteria were all nurses with at least bachelor of science degree and Jordanian nationality. Participants were prospectively enrolled in the present study after Institutional Review Board approval and written informed consent were obtained.

Instrument

The NKAS was developed in 1987 by McCaffery and Ferrell (1995) to assess knowledge and attitude toward pain and pain management. Permission to use this tool was previously obtained. The NKAS assesses four major aspects about pain: knowledge, assessment, drugs, and intervention (Machira, Kariuki, & Martindale, 2013), and it includes 39 questions distributed over three sections: The first section consists of 21 true/false questions, the second section consists of 14 multiple choice questions, and the third section consists of 2 case scenarios each with 2 questions. The NKAS has very good psychometric properties (Wang & Tsai, 2010).

Data Collection

After obtaining Institutional Review Board approval, NKAS surveys were distributed to nurses working in intensive care units, emergency departments, and surgical, medical, and oncology wards in four Jordanian hospitals (governmental, private, teaching, and royal medical services). Nurses who met the inclusion criteria were asked to participate voluntarily by signing the informed consent. After obtaining the informed consents, nurses were asked to complete the NKAS surveys and sociodemographic data sheets. Sociodemographic data included nurses' ages, genders, marital statuses, total years of work experience, levels of education, pain-related training courses, working areas, and working hospitals. Paper-based NKAS surveys were distributed by the research investigator and were returned to locked drop boxes that were placed in each department to maintain participants' confidentially. No identifying information was collected from participants.

Data Analysis

All analyses were carried out using IBM SPSS Statistics version 22 (IBM Corp., Armonk, NY, USA). Mean ± standard deviation of NKAS score was calculated. The passing score for the NKAS survey was also individually calculated for each nurse. We examined answers for each of the 39 items in the NKAS to identify the percentage of correct answers. Moreover, we identified the questions that were most commonly answered correctly and incorrectly.

Results

Sociodemographic Characteristics of the Sample

A total of 417 nurses were enrolled in this study. The majority of nurses were male (52.5%) with a mean age of 27.81 ± 3.51 years, held a bachelor's degree in nursing (86.80%), and had 5.29 ± 3.80 years of experience. Sociodemographic characteristics of the sample are further described in Table 1.

Mean Knowledge Scores and Percentage of Correct Response Obtained on the NKAS

Our analysis of NKAS surveys revealed a low level of knowledge and inappropriate attitudes toward pain management among Jordanian nurses, with an NKAS total mean of raw score of 19.15 ± 4.23. The percentage of correct response ranged from 18% to 92%. None of the nurses achieved a 100% correct response, and only four nurses (1% of the total sample) achieved an overall score of 80% or better. The overall distribution of the nurses' percentage of correct response is presented in Fig. 1.

Examining the Items of the NKAS Tool

We determined the percentage of correct/incorrect scores for each of the 39 individual items on the NKAS. The three sections of the NKAS (true/false, multiple choice, and case studies) were analyzed separately and are presented in Tables 2–4, respectively. Only questions that were answered correctly by 60% or more or 40% or less will be discussed in this section (Table 5).

Question 21, a true/false question, had the highest number of correct responses, in which 66.9% of the nurses correctly defined

Table 1
Sociodemographic Characteristics for Study Participants (N = 417)

Variables	Descriptive Statistics
Age	27.81 ± 3.51
Gender	
Male	219 (52.5)
Female	198 (47.5)
Hospital Sector	
Private	103 (24.7)
RMS	101 (24.2)
Governmental	106 (25.4)
Teaching	107 (25.7)
Area of Practice	
ICU	117 (28.1)
ED	66 (15.8)
Medical	70 (16.8)
Surgical	90 (21.6)
Oncology	74 (17.7)
Marital Status	
Single	206 (48.9)
Married	211 (51.1)
Educational Level	
Bachelor's	362 (86.8)
Master	55 (13.2)
Years of Experience	5.29 ± 3.80
Attending Training Courses	
Yes	171 (41.0)
No	246 (59.0)

RMS = Royal Medical Service; ICU = intensive care unit; ED = emergency department.
Descriptive statistics reported in cell are expressed as mean ± standard deviation for continuous variables and n (%) for categorical variables.

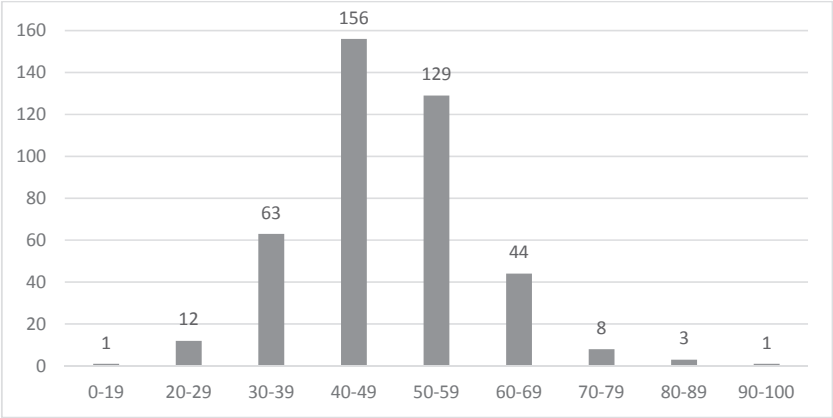

Fig. 1. Frequency distribution of the percentage of correct responses on the Nurses' Knowledge and Attitude Survey (NKAS).

narcotic/opioid addiction. Approximately 66% of the nurses correctly answered question 11 by disagreeing with the statement "elderly patients cannot tolerate opioids for pain relief." Question 20, which is also a true/false question, was correctly answered by 64.3% of the nurses, who agreed that "benzodiazepines are not effective pain relievers unless the pain is due to muscle spasm." Moreover, question 9 was answered correctly by 60.4% of the nurses, who disagreed with the statement "research shows that promethazine (Phenergan) is a reliable potentiator of opioid analgesics." Sixty percent of the nurses correctly answered question 30 by stating that the patient is the most accurate judge of the intensity of the patient's pain.

Question 22 had the lowest number of correct responses; only 30.9% of the nurses knew that the oral route is the recommended route of administration of opioid analgesics for patients with persistent cancer-related pain. Both of questions 36-B and 37-B are case study questions where the nurse is being asked about the dose of morphine that should be given for a patient with pain score of 8/

Table 2
Percentage of Correctly and Incorrectly Answered Items on T/F Section of the NKAS

NKAS Item No.	Question Content for True/False Statements	Correct Answer	Correct Answer Rate (%)	Incorrect Answer Rate (%)
1.	Vital signs are always reliable indicators of the intensity of a patient's pain.	F	54.9	45.1
2.	Because their nervous system is underdeveloped, children under 2 years of age have decreased sensitivity and limited memory of painful experiences.	F	56.4	43.6
3.	Patients who can be distracted from pain usually do not have severe pain.	F	43.9	56.1
4.	Patients may sleep in spite of severe pain.	T	42.2	57.8
5.	Aspirin and other nonsteroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases.	F	51.1	48.9
6.	Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months.	T	54.4	45.6
7.	Combining analgesics that work by different mechanisms may result in better pain control with fewer side effects than using a single analgesic agent.	T	55.4	44.6
8.	The usual duration of analgesia of 1-2 mg of morphine intravenous IV is 4-5 hourly.	F	46.8	53.2
9.	Research shows that promethazine (Phenergan) is a reliable potentiator of opioid analgesics.	F	60.4	39.6
10.	Opioids should not be used in patients with a history of substance abuse.	F	46.8	53.2
11.	Elderly patients cannot tolerate opioids for pain relief.	F	66.2	33.8
12.	Patients should be encouraged to endure as much pain as possible before using an opioid.	F	46.0	54.0
13.	Children less than 11 years old cannot reliably report pain so nurses should rely solely on the parent's assessment of the child's pain intensity.	F	52.5	47.5
14.	Patient's spiritual beliefs may lead them to think pain and suffering are necessary.	T	58.0	42.0
15.	After an initial dose of an opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response.	T	55.6	44.4
16.	Giving patients sterile water by injection (placebo) is a useful test to determine if the pain is real.	F	54.0	46.0
17.	Vicodin (hydrocodone 5 mg + acetaminophen 300 mg) PO is approximately equal to 5-10 mg of morphine PO.	T	43.2	56.8
18.	If the source of the patient's pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to diagnose the cause of pain.	F	46.3	53.7
19.	Anticonvulsant drugs such as gabapentin (Neurontin) produce optimal pain relief after a single dose.	F	48.2	51.8
20.	Benzodiazepines are not effective pain relievers unless the pain is due to muscle spasm.	T	64.3	35.7
21.	Narcotic/opioid addiction is defined as chronic neurobiologic disease, characterized by behaviors that include one or more of the following: impaired control over drug use, continued use despite harm and craving.	T	66.9	33.1

NKAS = Nurses' Knowledge and Attitudes Survey; IV = intravenous; PO = orally.

Table 3
Percentage of Correctly and Incorrectly Answered Items on Multiple Choice Section of the NKAS

NKAS Item No.	Question Content for Multiple Choice Questions	Correct Answer	Correct Answer Rate (%)	Incorrect Answer Rate (%)
22	The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is	Oral	30.9	69.1
23	The recommended route of administration of opioid analgesics for patients with brief, severe pain of sudden onset such as trauma or postoperative pain is	Intravenous	53.2	46.5
24	Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients?	Morphine	51.1	48.9
25	Which of the following IV doses of morphine administered over a 4-hour period would be equivalent to 30 mg of oral morphine given q 4 hours	Morphine 10 mg IV	38.6	61.4
26	Analgesics for post-operative pain should initially be given	Around the clock on fixed schedule	47.2	52.8
27	A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months. Yesterday the patient was receiving morphine 200 mg/hour intravenously. Today he has been receiving 250 mg/hour intravenously. The likelihood of the patient developing clinically significant respiratory depression in the absence of new comorbidity is	Less than 1%	43.2	56.8
28	The most likely reason a patient with pain would request increased doses of pain medication is	The patient Is experiencing increased pain	45.6	54.4
29	Which of the following is useful for treatment of cancer pain?	All of the above; ibuprofen, hydromorphone and gabapentin	51.6	48.4
30	The most accurate judge of the intensity of the patient's pain is:	The patient	60	40
31	Which of the following describes the best approach for cultural considerations in caring for patients in pain?	Patient should be individually assessed to determine cultural influences	49.6	50.4
32	How likely is it that patients who develop pain already have an alcohol and/or drug abuse problem?	5%-15%	43.9	56.1
33	The time to peak effect for morphine given IV is	15 minutes	49.6	50.4
34	The time to peak effect for morphine given orally is	1-2 hours	39.3	60.7
35	Following abrupt discontinuation of an opioid, physical dependence is manifested by the following:	Sweating, yawing, diarrhea, and agitation with patients when the opioid is abruptly discontinued	37.4	62.6

NKAS = Nurses' Knowledge and Attitudes Survey; IV = intravenous.

10 who smiles and looks relaxed with no signs of pain (36-B) and another patient with same level of pain but looks distressed and grimaces as he turns in bed (37-B). Only 34% and 36% of the nurses correctly stated that they would give the patients a 3-mg dose of morphine in questions 36-B and 37-B, respectively. The clinical manifestations of physical dependence after abrupt discontinuation of an opioid were only known by 37.4% of the nurses who correctly answered question 35. In question 25, just 38.6% of nurses knew that 30 mg of oral morphine is equivalent to 10 mg of morphine intravenously. Lastly, 60.7% of the nurses did not know that the time to peak effect for morphine given orally is 1-2 hours.

Discussion

The passing score for the NKAS was previously determined as 80% or better, which reflects a good knowledge and attitudes of nurses regarding pain management (McCaffery & Robinson, 2002). Among 417 nurses who enrolled in this study, only 4 nurses passed the NKAS by achieving an overall score of 80% or better. These findings indicated that Jordanian nurses have low knowledge and inappropriate attitude toward pain management, which is consistent with the results of prior studies in Jordan (Al Qadire & Al Khalaileh, 2014; Demeh, Yacoub, Darawad, Haider Al-Badawi, & Shahwan, 2016; Omran, Al Qadire, Ali, & Al Hayek, 2014). In 2014, Al Qadire and Al Khalaileh and Omran et al. reported that the rate of correct answers of NKAS tool among Jordanian nurses were ranged from 10% to 72% and 10.5% to 75%, respectively (Al Qadire & Al Khalaileh, 2014; Omran et al., 2014). In 2016, Demeh et al. reported a range of correct answers from 25.0% to 65.6% (Demeh et al., 2016). Although we reported a higher range of correct answers (18%-92%), there is still no obvious improvement in Jordanian nursing knowledge and attitude regarding pain over the last 4 years.

One explanation for the insufficient nurses' knowledge of pain could be the lack of emphasis on pain assessment and management in their undergraduate nursing curriculum (Latchman, 2014; Mackintosh-Franklin, 2017). Others found that teaching methods used to deliver pain knowledge are inappropriate and limited only to content covered in lectures. However, studies found that interactive learning and simulation-based training improved student knowledge about pain (Alvarez & Dal Sasso, 2011; Evans & Mixon, 2015). Indeed, prior studies investigating the knowledge and attitude toward pain among nursing students found poor levels of knowledge and negative attitudes toward pain at the bachelor level (Al-Khawaldeh et al., 2013; Duke, Haas, Yarbrough, & Northam, 2013). This also explain why graduate students have a higher level of pain knowledge compared with undergraduates (Demeh et al., 2016; Wang & Tsai, 2010). Lack of continuing pain education for nurses could be another explanation, although training programs have been found to improve nurses' knowledge and attitudes toward pain (Long, 2013; Ortiz et al., 2015). Thus both undergraduate education and continuing education for nurses must be reviewed to ensure that pain is appropriately and sufficiently integrated within the nursing education. Yet it is crucial and optimal to identify the areas of deficit in nursing knowledge regarding pain and its management and seriously incorporate these areas in nursing education.

It is obvious from our analysis that nurses performed badly in pain assessment and the pharmacotherapeutics components of the NKAS. Inaccurate pain assessment is one of the most problematic barriers to achieving effective pain management and can result in

Table 4
Percentage of Correctly and Incorrectly Answered Items on Case Studies Section of the NKAS

NKAS Item No.	Question Content for Case Studies	Correct Answer	Correct Answer Rate (%)	Incorrect Answer Rate (%)
36-A	Andrew is 25 years old and this is his first day following abdominal surgery. As you enter his room, he smiles at you and continues talking and joking with his visitor. Your assessment reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort; 10 = worst pain/discomfort) he rates his pain as 8. On the patient's record, you must mark his pain on the scale below. Circle the number that represents your assessment of Andrew's pain.	8	42.2	57.8
36-B	Your assessment, above, is made 2 hours after he received 2 mg morphine IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician's order for analgesia is "morphine IV 1-3 mg q1h PRN pain relief." Check the action you will take at this time.	administer morphine 3 mg IV now	34.1	65.9
37-A	Robert is 25 years old and this is his first day following abdominal surgery. As you enter his room, he is lying quietly in bed and grimaces as he turns in bed. Your assessment reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort; 10 = worst pain/discomfort) he rates his pain as 8. On the patient's record, you must mark his pain on the scale below. Circle the number that represents your assessment of Robert's pain.	8	45.6	54.4
37-B	Your assessment, above, is made 2 hours after he received 2 mg morphine IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician's order for analgesia is "morphine IV 1-3 mg q1h PRN pain relief." Check the action you will take at this time.	administer morphine 3 mg IV now	36	64

NKAS = Nurses' Knowledge and Attitudes Survey; BP = blood pressure; HR = heart rate; R = respirations; IV = intravenous; PRN = as needed.

many negative effects that affect patients' health (Dequeker, Lancker, & Hecke, 2018). In this study, 60% of the nurses correctly identified the patient as the most accurate judge of his or her pain. However, when the nurses were asked to assess the pain level of two patients (smiling vs. grimacing) who both rated their pain as 8, less than half of the nurses recorded pain as reported by the patients. These findings are consistent with the evidence that nurses were still not considering patients' verbal report of pain, which has been validated as the most reliable source of pain assessment (Deldar, Froutan, & Ebadi, 2018). Moreover, more nurses correctly rated the pain of grimacing patient compared with smiling patients, indicating that nurses depend more on the patients' nonverbal indicators of pain rather than the patients' self-report during their pain assessment. Similar findings were also reported in previous research studies (Rahimi-Madiseh, Tavakol, & Dennick, 2010; Yava et al., 2013). Another barrier for accurate pain assessment is the nurses' belief that changes in vital signs are an accurate reflection of patients' pain (Huth, Gregg, & Lin, 2010; Rahimi-Madiseh et al., 2010). Around 45% of the nurses in this study mistakenly believed that vital signs are always reliable indicators of the intensity of the patients' pain, although pain may not be necessarily associated with changes in physical signs (Linton & Shaw, 2011). Moreover, more than half of nurses incorrectly believed that patients who have severe pain cannot be distracted or cannot sleep. This finding also reflects the work of other researchers who found that nurses held the belief that patients with severe pain are unable to sleep or to be distracted (Samarkandi, 2018; Wang & Tsai, 2010). However, it has been reported that many patients use different coping strategies as a means of distraction from their pain, which may cause them to appear to have no pain (Allen & Leary, 2010). These findings correlate to similar studies that have explained why nurses underestimate the intensity of patients' pain (Dequeker et al., 2018; Hirsh, Jensen, & Robinson, 2010; Wang & Tsai, 2010).

Our findings also revealed extensive knowledge deficits in the pharmacologic treatment of pain among Jordanian nurses. Opioid dosing, equivalents, and conversions as well as route of administration were major areas of pain knowledge deficit. Nurses should be knowledgeable about the pharmacology of opioid preparation and administration, which includes accurate opioid equianalgesic

Table 5
Best and Worst Answered Questions

Best Answered Questions		Worst Answered Questions	
Question No.	% of Correct Answers	Question No.	% of Correct Answers
21	66.9%	22	30.9%
11	66.2%	36-B	34.1%
20	64.3%	37-B	36%
9	60.4%	35	37.4%
30	60%	25	38.6%
		34	39.3%

Table includes questions that were answered correctly by 60% or more or 40% or less of the nurses.

calculations (Murnion & Gnjidic, 2010). However, only 38.6% of nurses in the present study correctly indicated the equianalgesic dosage of intravenous to oral morphine and only 43.2% of nurses correctly converted oral hydrocodone/acetaminophen (Vicodin) to oral morphine. Many previous studied have also revealed significant weaknesses in calculating equianalgesic doses among nurses (Bonkowski, De Gagne, Cade, & Bulla, 2018; Samarkandi, 2018). Opioid titration was also an issue in the present study; when nurses were asked to select opioid dosages for two case scenarios of smiling and grimacing patients who both rated their pain as 8 out of 10, only 34.1% and 36% of the nurses correctly indicated that they would administer the correct dosage of morphine for both patients, respectively. These findings are consistent with prior studies that found that nurses chose incorrect dosages of analgesics to relieve pain (Huth et al., 2010; Wang & Tsai, 2010). Inadequate nursing knowledge regarding appropriate opioid titration is a problematic issue in pain management and is highly associated with opioid undertreatment or overtreatment (Oliver et al., 2012; Paschkis & Potter, 2015).

Several negative attitudes and misconceptions about pain and its management among Jordanian nurses were revealed in this study. For instance, more than half of the nurses (54%) believed that patients should be encouraged to endure as much pain as possible before using an opioid. Moreover, 42% of the nurses did not believe that the spiritual beliefs of patients may lead them to think pain and suffering are necessary. Moreover, only 45.6% of the nurses related the reason for a patient requesting more pain medication to the fact that the patient is experiencing increased pain, whereas more than half of them (54.4%) indicated the reason was other patient-related factors like the patient experiencing increased anxiety or depression, requesting more staff attention, or suffering from addiction. In terms of cultural considerations in caring for patients in pain, only 49.6% of the nurses believed that patients should be individually assessed to determine cultural influences. Similar findings were also obtained from the previous studies, indicating that nurses still have misconceptions about pain despite the advancement in pain management guidelines, education, and research (Abdalrahim, Majali, Stomberg, & Bergbom, 2011; Al-Khawaldeh et al., 2013; Al Qadire & Al Khalaileh, 2014; Eid et al., 2014; Wang & Tsai, 2010).

The findings of this study support the recommendations of prior studies regarding the need for appropriate and effective educational interventions to improve nurses' knowledge and attitudes toward pain and pain management (Al Qadire & Al Khalaileh, 2014; Demeh et al., 2016; Lewthwaite et al., 2011; Rahimi-Madiseh et al., 2010). Identification of the key areas of knowledge deficit can be used as a framework for the development of those educational interventions at both undergraduate and postgraduate levels. The deficits in pain-related knowledge, negative beliefs, and misconceptions found in the present study existed in a number of key areas, mainly including inaccurate pain assessment and incorrect estimation of patients' pain, particularly in the absence of pain-related behavioral and physiologic manifestations, and improper decision making regarding opioid dosing, equivalents, and conversions as well as routes of administration.

Conclusions

This study found that Jordanian nurses have extensive knowledge deficit and inappropriate attitudes toward pain. Knowledge deficit was obvious in certain aspects of pain assessment and its pharmacologic treatment. Considering the areas of knowledge deficit among nurses and integrating them into nursing undergraduate education and nursing continuing education and training would be beneficial.

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