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Pain Knowledge and Attitudes Among Nurses in Cancer Care in Norway

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Abstract
The purpose of this study was to survey knowledge on, and attitudes to, pain and pain management among a cohort of Norwegian Nurses in cancer care, and to explore whether there is any association between various demographic variables and knowledge level. This is a web-based survey and nurses were recruited from the Forum for Cancer Nursing. Nurses completed the questionnaire "Nurses' Knowledge and Attitudes Survey Regarding Pain (NKAS)". Univariate and multivariate linear regression analysis were used to evaluate the association between knowledge and attitudes and demographic variables. Nurses from all over Norway answered. The majority were women and most had education above bachelor level. Mean NKAS total score was 31 points (75%). Significant associations were found between NKAS total score and pain management course ($p = 0.01$) and workplace ($p = 0.04$). Nurses in cancer care in Norway have relatively good pain knowledge. The potential for improvement is the greatest with regard to pharmacology and nurses' attitudes to how patients express pain. Our findings suggest that an extensive pain management course with patient histories may result in more theoretical knowledge being applied to the patients. In a time with large migration among nurses, our findings indicate that pain management courses should be aware of cultural differences in the educational training.

Keywords Pain · Oncology · Nurses attitudes · Nurses knowledge · Survey questionnaire

Introduction

Pain is one of the most feared and burdensome symptoms in cancer patients [1]. An updated prevalence study from 2016 shows that pain is present in close to 40% of cancer patients following curative treatment, in 55% of patients undergoing treatment, and in as many as two thirds of patients with late stage cancer [1]. According to the WHO, pain management should be achievable to up to 90% of all cancer patients [2]. A study among cancer patients in Norway reports that more than half the patients experience pain when they are in the hospital, and that one third of patients with severe pain do not use opioids [3].

Nurses play a key role in the treatment of cancer patients with pain. They spend more time with the patient than any other health care professionals [4] and meet the cancer patient in the home, in the hospital, and in the nursing home. The nurse is thus often the one to identify any need for, and evaluate the effect of, pain management efforts [4]. Nurses are suited to make recommendations to the prescribing doctors, and to suggest if non-pharmacological options are appropriate. Pain in cancer patients is often complex and may have several causes [5]. This complexity poses particular demands to nurses' knowledge of, and attitudes to, pain and pain management in cancer care [4, 6].

Pain relief medication is at the very foundation of cancer pain management [5]. Nurses need updated knowledge on which medication to use for the various types of pain, what side effects to expect, and how these may be prevented [5]. At moderate to severe pain, opioids are the most important group of medications [2, 5, 7]. Inadequate pain management may lead to unnecessary suffering and reduced quality of life [1, 5, 8].

One cause of inadequate cancer pain management is barriers in health personnel [5, 9]. The principal health personnel related barriers are inadequate pain assessment and inadequate knowledge with regard to pain management [9]. Other identified barriers are nurses' fear of side effects and opioid dependence, as well as nurses' reluctance to administer opioids [9].

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A series of international studies among nurses in cancer care show that nurses have inadequate knowledge and negative attitudes to choice of medication, preferred route of administration, equianalgesic dose, and the likelihood of dependence. Nurses also tend to overestimate the likelihood of respiratory depression, underestimate the patient's pain intensity, and administer less pain relief medication than necessary [10–19]. All these studies have used the questionnaire survey "Nurses' Knowledge and Attitudes Survey Regarding Pain" (NKAS) to survey knowledge and attitudes [20]. No similar study from cancer care in Norway has been found.

Several of the studies find an association between demographic variables and increased knowledge and more positive attitudes [10–15, 17, 18, 21]. The two most frequently reported associations are whether the nurses have taken a pain management course [10–14, 17] and have experience from cancer care [12, 17, 18]. Prior studies find a positive association between advanced education in oncology and knowledge score [15, 21], and a study from Malaysia [17] reports positive association with age. The studies that have examined whether knowledge score is associated with gender [10–12, 17] and nursing experience [10, 17, 18], report no such association. There is, however, great variation in the studies' response rate, sample size, and methodological quality.

As pain remains a great challenge to cancer patients, and that one of the causes may be that nurses who work in cancer care have barriers against pain management, the purpose of this study is to survey knowledge on, and attitudes to, pain and pain management among a cohort of Norwegian nurses in cancer care. We also want to explore whether there are any associations between selected demographic variables and knowledge level.

Method

Sample

In this cross-sectional study, members of Forum for kreftsykepleie (FKS) [forum for cancer nursing] were invited to participate in a web-based survey. Members who were registered with an e-mail address with Norsk Sykepleieforbund (NSF) [Norwegian Nurses Organisation] received the questionnaire. FKS had a total of 1704 members as of June 2017.

Instruments

The Norwegian version of the questionnaire NKAS was used to survey the nurses' knowledge and attitudes to pain [20]. The questionnaire is updated in accordance with new research and is based on McCaffery's definition of pain as a subjective experience and on accepted standards of pain management [20]. The survey consists of 41 questions; 22 have response alternatives true/false, 15 are multiple choice questions with 3 to 5 response alternatives, and 4 relate to two patient stories. Each correct answer yields one point and the highest possible score is 41. The survey measures various aspects of pain assessment, pharmacological and non-pharmacological pain management, as well as attitudes to pain. The instrument is used in studies from various countries, including Norway. Satisfactory reliability and validity have been reported [13–15, 18, 20, 22].

The demographic data supplied by the nurses were age, gender, place of residence, level of education (bachelor/advanced training/master), pain management course of a minimum 10 ECTS, workplace, employment fraction, years of nursing experience, and of cancer care nursing experience.

Data Collection

NKAS was converted to a web-based form by using the service Nettskjema [web form] at the University of Oslo (UiO). A link to the questionnaire was distributed to the members of FKS by e-mail via NSF. Advance notification of the survey was given by e-mail and on the website and Facebook page of FKS. Data were collected over the period June 8th to 23rd 2017. The respondents were notified that they were free to send in their response without having answered all questions. NSF policy would not allow us to send a reminder in case of no response, but the board of FKS posted encouragement to respond on their Facebook page.

Research Ethical Considerations

All participants received information with the questionnaire and the invitation to participate, emphasising that participation was voluntary. The responses were returned electronically to Nettskjema at UiO, and the process made us as researchers unable to access the respondents' names or e-mail addresses. Returning the questionnaire was considered consent to participate. The study was approved by the Data Protection Official for Research at Norwegian Centre for Research Data (NSD), project number 53441.

Statistical Analyses

The statistical analyses were carried out using SPSS, version 24 [23]. Descriptive statistics were used to describe the nurses' background information. Normally, distributed continuous variables are described with mean and standard deviation (SD), and categorical data as percentages. Following recommendations from the developers of the form, the results were analysed as mean total score for the whole sample in addition to individual analyses of each question [20].

Possible associations between the dependent variable "total score" and the selected independent background variables

were first analysed using univariate regression analysis. The variable gender was left out as few men participated. Background variables with $p < 0.1$ were subsequently included in a multivariate linear regression analysis. The level of significance was set to 5%, and all tests were two-sided. The study was considered an exploratory analysis so no correction for multiple testing was applied.

Result

Description of Sample

Of the invited nurses, 312 (18.3%) responded. All 19 counties in Norway were represented. The majority were women (98.4%), and they were educated beyond bachelor level. Oncology nurses made up more than 80% of the sample. See Table 1 for further demographic characteristics.

Knowledge and Attitudes to Pain

Mean NKAS total score for the total sample was 31 points (75%), with a variation between 21 and 40 (51–97%). A correct answer was most often given to questions that to a great extent contained an aspect of attitude. All respondents answered two questions (questions 10 and 11) correctly, and 99% answered that the patient was the most accurate judge of the patient's pain intensity (question 31).

Seven questions were answered correctly by less than 50% (questions 5, 16, 28, 33, 35, 37 and 38b). Questions dealing with effect and side effects of medication were most frequently answered incorrectly. More than 10 respondents did not answer questions 22, 26, 28 and 37. For responses to individual questions, see Table 2.

Association Between Knowledge Score and Demographic Variables

As shown in Table 3, the univariate analyses revealed four demographic variables associated with the total score with $p < 0.1$ (workplace, experience as nurse, experience with cancer patients, pain management course). Age, place of residence, and job fraction were not significantly associated with the total score. These variables were therefore not controlled for in the multivariate analysis. The variable education was explored no further as there were too few respondents in some of the subgroups.

The multivariate analysis shows that nurses with a pain management course of a minimum of 10 ECTS had significantly higher total score than those with no such course ($p = 0.01$). They scored more than 2 points higher than nurses without such additional training ($b = 2.14$; 95% CI 0.53–3.76). Nurses working in the specialist health services had a significantly higher score than nurses working in the primary health services ($p = 0.04$). Nurses working in the specialist health services had almost 1 point higher total score ($b = 0.88$; 95% CI – 1.72–− 0.03) compared to those working in the primary health services.

Table 1 Demographic characteristics of responding nurses ($N = 312$)

Characteristics	*N*	(%)
Gender		
Female	307	(98.4)
Male	5	(1.6)
Age (years)		
25–34	48	(16.1)
35–44	83	(27.9)
45–54	88	(29.5)
55–65	79	(26.5)
County		
Nord Norge and Trøndelag	60	(19.5)
Vest- and Sørlandet	107	(34.7)
Østlandet	141	(45.8)
Education level**		
Bachelor	15	(4.8)
Advanced Program		
Palliation 30 ECTS	41	(13.1)
Cancer nursing 60 ECTS	254	(81.4)
Other advanced program	69	(22.1)
Master	21	(6.7)
Pain management course min.10 ECTS	24	(7.7)
Job fraction		
75–100%	279	(89.4)
50–74.9%	22	(7.1)
< 50%	9	(2.9)
Not given	2	(0.6)
Workplace**		
Specialist health services	185	(59.3)
Primary health services	117	(37.5)
Other	14	(4.5)
	Mean (SD)	Variation
Work experience		
Experience as nurse (years)	19 (10.0)	3–41
Experience with cancer patients (years)	15 (9.0)	1–40

The answers do not always add up to 312 as not all respondents answered all questions

**The percentage does not total 100% as the respondents may have several degrees and workplaces

Discussion

This study is the first to survey knowledge on, and attitudes to, pain and pain management among nurses in cancer care in

Table 2 Result of individual items and total score for «Nurses' Knowledge and Attitudes Regarding Pain»

Questions	Correct answer	Correct answer *n* (%)	Missing answers (*n*)
1. Vital signs (such as respiratory frequency, pulse, blood pressure) are always reliable indicators of the intensity of a patient's pain.	False	243 (78)	2
2. Because their nervous system is underdeveloped, children under 2 years of age have decreased pain sensitivity and limited memory of painful experiences.	False	270 (87)	2
3. Patients who can be distracted from pain usually do not have severe pain.	False	285 (91)	0
4. Patients may sleep in spite of severe pain.	True	211 (68)	0
5. NSAIDs (nonsteroidal anti-inflammatory agents), such as e.g., ibuprofen, are NOT effective analgesics for painful bone metastases.	False	133 (43)	6
6. Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months.	True	281 (91)	3
7. Combining analgesics that work by different mechanisms (e.g., combining an NSAID with an opioid) may result in better pain control with fewer side effects than using a single analgesic agent.	True	290 (93)	1
8. The usual duration of analgesia of 1–2 mg morphine IV is 4–5 h.	False	272 (88)	3
9. Opioids should not be used in patients with a history of substance abuse.	False	293 (94)	2
10. Elderly patients cannot tolerate opioids for pain relief.	False	312 (100)	0
11. Patients should be encouraged to endure as much pain as possible before using an opioid.	False	312 (100)	0
12. Children less than 11 years old cannot reliably report pain so clinicians should rely solely on the parent's assessment of the child's pain intensity.	False	301 (97)	1
13. Patients' spiritual beliefs may lead them to think pain and suffering are necessary.	True	276 (89)	3
14. After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response.	True	288 (93)	3
15. Giving patients sterile water by injection (placebo) is a useful test to determine if the pain is real.	False	298 (96)	2
16. Paralgin Forte (codeine phosphate 30 mg + paracetamol 400 mg) PO is approximately equal to 5 mg of morphine PO.	True	144 (47)	3
17. 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 correctly diagnose the cause of pain.	False	228 (74)	5
18. Anticonvulsant drugs, such as gabapentin (Neurontin) produce optimal pain relief after a single dose.	False	297 (96)	2
19. Benzodiazepines are not effective pain relievers and are rarely recommended as part of an analgesic regiment.	True	165 (53)	3
20. Narcotic/opioid addiction is defined as a chronic neurobiologic disease, characterised by behaviours that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.	True	235 (78)	9
21. The term «equianalgesia» means approximately equal analgesia and is used when referring to the doses of various analgesics that provide approximately the same amount of pain relief.	True	275 (91)	9
22. Sedation assessment is recommended during opioid pain management because excessive sedation precedes opioid-induced respiratory depression.	True	156 (52)	13
23. The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is:	Oral	218 (70)	1
24. 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	273 (88)	1
25. 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	277 (90)	3
26. A 30 mg dose of oral morphine is approximately equivalent to which intravenous dose?	10 mg	207 (69)	13
27. Analgesics for postoperative pain should initially be given:	On a fixed schedule	264 (85)	0
28. A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months. Yesterday, the patient was receiving morphine 200 mg/h intravenously. Today, he has been receiving 250 mg/h intravenously. The likelihood of the patient developing respiratory depression in the absence of new comorbidity is:	Less than 1%	83 (28)	12
29. The most likely reason a patient with pain would request increased doses of pain medication is:	Experiences increased pain	302 (97)	0
30. Which of the following is useful for treatment of cancer pain? (ibuprofen, morphine and gabapentin)	All three	216 (69)	1

Table 2 (continued)

Questions	Correct answer	Correct answer *n* (%)	Missing answers (*n*)
31. The most accurate judge of the intensity of the patient's pain is:	The patient	309 (99)	1
32. Which of the following describes the best approach for cultural considerations in caring for patients in pain:	The patient should be individually assessed	296 (95)	2
33. How likely is it that patients who develop pain already have an alcohol and/or drug abuse problem?	5–15%	75 (24)	3
34. The time to peak effect for morphine given IV is:	15 min	285 (91)	0
35. The time to peak effect for morphine given orally is:	1.5–2 h	151 (48)	0
36. Following abrupt discontinuation of an opioid, physical dependence is manifested by the following:	Sweating, yawning, diarrhoea, agitation	183 (60)	5
37. Which statement is true regarding opioid-induced respiratory depression?	Obstructive sleep apnea is a risk factor	85 (30)	27
38. Patient 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 from 0 to 10 (0 = no pain/discomfort, 10 = worst pain/discomfort), he rates his pain as 8.	8	227 (73)	0
A. 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:			
B. Your assessment, above, is made 2 h after he received morphine 2 mg 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.	149 (48)	0
39. Patient B: 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 assessments reveal 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.*	8	271 (87)	0
A. 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:			
B. Your assessment, above, is made 2 h after he received morphine 2 mg 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.	188 (60)	0
Total score, mean (%)		31 (75)	

Norway. Oncology nurses make up more than 80% of the sample, and they had a mean NKAS total score of 75%, indicating a relatively high level of knowledge and good attitudes. Decisive for the nurses' score is whether or not they have attended an extensive pain management course.

Compared to nurses in cancer care in other countries, the levels of knowledge and attitudes in Norway are good. Turkey reports the lowest total score (35%) [18], Jordanian nurses 52% [19], and two studies from USA the highest of around 80% [15, 21]. The differences in the level of knowledge may possibly be explained by dissimilar levels of education between the countries. As only 15 of the respondents in our study reported a bachelor degree as their highest completed degree, there was no basis for investigating whether there are differences in the levels of knowledge between nurses with different levels of education. In addition, as suggested by Darawad and colleagues [19], the variation in knowledge between the Western and the Middle East countries could be due to cultural and religious beliefs. According to them, Muslims believe that suffering is a test from God and a person should tolerate his/her pain and hide it from others. In a time with large migration among nurses working in cancer care, this indicates that it is important to be aware of cultural differences in the educational training.

The nurses in our study scored on average four percentage points higher, measured with the same instrument, compared to nurses in surgical wards in Norway [22]. Ten percent of the nurses in the surgical wards had completed an advanced program, while almost all participants in our study had completed one. The difference between the findings in these two

Norwegian studies may indicate that nurses with advanced education have a higher level of knowledge within pain and pain management than nurses with no such education. The association between education level and increased level of knowledge is also seen internationally [15, 21].

International studies show that nurses in cancer care who have attended a pain management course have increased knowledge of, and more positive attitudes to, pain management [10–14, 17]. This also emerges from our study. A pain management course of a minimum of 10 ECTS, independent of education level, was associated with a positive outcome. Despite the very modest increase in the total score, this significant finding may indicate that an extensive pain management course increases the nurse's skill competence. A pain management course, which also includes simulation in relevant clinical situations, may help the nurse acquire knowledge and skills and develop attitudes that ensure competence in pain management.

According to the developers of the instrument, the nurses must have at least 80% correct answers to be able to carry out competent pain management [25]. In our study, only 36% attained this level. Even if nurses in cancer care have good knowledge on, and attitudes to, pain management, the results indicate that there is potential for improvement in certain areas. As with findings in earlier studies, the potential for improvement is the greatest with regard to effects and side effects of medication [10–12, 15–18].

Considering that pain relief medication is the foundation of cancer pain management [5], and that opioids are frequently administered, it is interesting to note that some of the questions that deal with the effect of medication (question 5, 16 and 35) and their side effects (questions 22, 28 and 37) are the ones to which the nurses most frequently give incorrect answers or refrain from answering. The nurses overestimate the danger that patients may develop respiratory depression. The low number of correct answers and the high number of missing answers may indicate that this is an area where the nurses experience great uncertainty. This type of knowledge is for instance very important to nurses who administer opioids for breakthrough pain. If the nurse does not know that there is less than 1% chance that a cancer patient treated with opioids develops respiratory depression, this may cause the nurse to administer suboptimal pain relief to the patient. That nurses in cancer care in Norway need more knowledge on medication is also found in a study that deals with breakthrough pain [8]. This study shows that 25% do not know that there is special medication for breakthrough pain, and as many do not feel competent in handling such pain issues. The relatively low knowledge level regarding medication in our study may be due to the wide variation in our sample. Members of FKS do work in different oncology settings and we may assume that some of the nurses do not administer medication on a daily basis. One may still ask, however, whether nurses in cancer care in particular ought to have knowledge of pain relief medication. Especially considering that pain is present throughout the whole disease trajectory [1], and that the nurses meet the patient in all these phases [4].

Almost all respondents considered the patient to be the most accurate judge of his or her own pain intensity (question 31), but more than one fourth, in a patient history, nevertheless assess the patient's pain intensity to be different from what the patient expresses (question 38a). Discrepancies between what the nurses say and what they do are less than what is reported from other countries [10–14, 17, 18]. That there is discrepancy between what nurses say and do regarding pain management has also emerged in a qualitative study among nurses in surgical wards in Norway [24]. The nurses claimed that they evaluated and assessed pain in collaboration with the patient, but observation of the same nurses revealed that they did not do so. The difference between what nurses say they do and what they in fact do, may indicate that theoretical knowledge

Table 3 Association between NKAS total score and demographic variables

Variable	Univariate analysis			Multivariate analysis		
	B	95% CI	*p* value	*B*	95% CI	*p* value
Age	− 0.00	− 0.04–0.04	0.92			
Place of residence	0.21	− 0.33–0.75	0.44			
Workplace	− 0.80	− 1.60–0.00	0.05	− 0.88	− 1.72–− 0.03	0.04*
Years as nurse	0.45	− 0.03–0.92	0.06	0.57	− 0.22–1.36	0.16
Years with cancer patients	0.40	− 0.04–0.83	0.07	− 0.03	− 0.75–0.69	0.93
Pain management course	2.24	0.73–3.75	0.01*	2.14	0.53–− 3.76	0.01*
Job fraction	− 0.23	− 1.22–0.76	0.65			

CI confidence interval

*Level of significance set to < 0.05

is insufficient for changing practice as it is also affected by our attitudes, which are difficult to change [25].

Moreover, our results show that the nurses are to a greater extent willing to give adequate doses of pain relief medication to a patient who expresses pain with grimacing than to one who smiles (question 38b, 39b). According to McCaffery and colleagues, the patient's self-report is the most reliable indicator of pain intensity, and thus, behavior and vital signs shall not be decisive in measuring pain [26]. In our multi-cultural society, it is particularly important to trust the patients' self-report as cancer pain is expressed differently in various cultures [5, 27]. The consequence of the nurse doubting both the patient's pain intensity and need for analgesics may be that the patient receives inadequate pain relief [26].

The cancer patients' fear of opioid dependence is the greatest patient related barrier to pain treatment [28]. If nurses are to contribute to better pain management, they must have knowledge and express attitudes that may help lessen this fear. As in earlier studies [11, 13–15, 18], we also find that the nurses have inadequate knowledge of opioid dependence. In our study, close to 80% recognise signs of psychological dependence (question 20) and 60% physical dependence (question 36). The issues surrounding opioid dependence have recently become more nuanced. Even though few cancer patients with pain develop a problem with opioid dependence [7], the subject has gained relevance lately, not the least because young cancer survivors with chronic pain may represent a particularly vulnerable group [29]. Nurses in cancer care must be prepared to meet this complexity [30].

It is encouraging that our findings show that the knowledge level is the same all over the country, considering that in Norway we aim to treat cancer patients where they live [31]. The municipal health and care services will also receive a greater number, and more seriously ill, cancer patients [31]. It is thus important to notice that the primary health services had a significantly lower score than the specialist health services, even though the difference was small. As a greater part of cancer care in the future will be performed in the patient's home or in the municipal health services [31], further studies are needed to gain knowledge of whether this finding is clinically relevant. It is essential that nurses in the municipal health services have sufficient competence in pain management as an increasing number of nurses in the municipalities have independent and specialised tasks that require both solid and extensive competence and advanced clinical skills [32].

Strengths and Weaknesses in this Study

Eighteen percent of the members of FKS participated in this study. The response rate may be somewhat higher as there is no information available on how many of the members have registered their e-mail addresses. Compared to similar web-based studies among cancer nurses, our response rate is higher [33, 34]. One weakness, however, is that due to anonymization we have no way of telling whether our sample is representative of the members. Participation was also voluntary, and we cannot rule out that nurses with a special interest in, and knowledge of, the subject have responded. Another weakness is that the majority of respondents in this study are oncology nurses, and thus not representative for all nurses who work in cancer care.

The strength of this study is that the sample represents all counties in the country. The nurses work within many different sections of cancer care, and the range in age and work experience is rather large.

Conclusion

This study is the first Norwegian national study to address nurses' knowledge of, and attitudes to, pain and pain management in cancer care, and our findings show that nurses in cancer care do possess an adequate level of knowledge.

The potential for improvement is the greatest with regard to knowledge on medication and the nurses' attitudes to how patients express pain. Our findings indicate that an extensive pain management course with patient histories from different cultures may result in more theoretical knowledge being applied to the patients.

As it is current national policy to increase the supply of nurses with specialisation in cancer care [31], the educational institutions that educate oncology nurses should incorporate an extensive pain management course. The services offered to the patients should be evidence-based. Advanced education or specialisation for nurses is crucial to providing the patient with safe, modern and effective treatment [32]. Nurses in cancer care, especially in the municipal health services, should be encouraged to attend an extensive pain management course. Further research should assess whether such pain management course has any effect of the cancer patient's experienced pain.

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