

**Original Article**

# A Pain Monitoring Program for Nurses: Effects on Nurses' Pain Knowledge and Attitude

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**Abstract**

*One of the reasons for inadequate pain treatment in hospitalized patients is that nurses have insufficient knowledge about pain and pain management. To address this problem, a Pain Monitoring Program (PMP) for nurses was developed, implemented, and evaluated. The PMP consisted of two components: educating nurses about pain, pain assessment, and pain management, and implementing daily pain assessment by means of a numeric rating scale. The effects of the PMP were measured in a one-group pretest–post-test design. The results show that nurses have knowledge deficits and prejudices with regard to pain and pain management. Age and additional pain courses in pain partly predict nurses' pain knowledge. After nurses were educated, the average score on the Pain Knowledge Questionnaire increased from 69.1% (SD = 13.2) at pretest to 75.8% (SD = 11.5) at post-test ( $P < 0.001$ ). Nurses' attitudes changed with regard to their level of knowledge and skills in relieving pain, willingness to assess pain on a daily basis, and attention to patients' pain complaints. It can be concluded that the PMP is effective in improving nurses' knowledge of pain management and focusing nurses' attention to patients' pain complaints. J Pain Symptom Manage 2000;19:457–467. © U.S. Cancer Pain Relief Committee, 2000.*

**Key Words**

*Nurses, pain knowledge, attitudes, education program, daily pain assessment*

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**Introduction**

Treatment of pain is often inadequate in hospitalized patients.<sup>1–8</sup> Deficits in nurses' knowledge and attitudes are suggested as one reason for inadequate pain treatment.<sup>2,9–15</sup> Nurses have inadequate knowledge about opi-

oid analgesic drugs, fear of addiction, and tolerance, and fail to systematically assess pain.<sup>10,16–26</sup> These deficits can be addressed through pain education.<sup>27–36</sup> Francke<sup>28</sup> showed that pain education led to an increase in nurses' knowledge of pain medication, and Weissman and Dahl,<sup>29</sup> Ferrell et al.,<sup>30</sup> Hauck,<sup>33</sup> Myers,<sup>34</sup> Sofaer,<sup>35</sup> and Westfall and Speedie<sup>36</sup> came to comparable conclusions.

For changing pain management behavior, education about pain is not enough.<sup>13,29,37</sup> According to nurses who followed the program developed by Francke,<sup>28</sup> it is easier to apply new knowledge when it is translated into a new ward policy, e.g., implementation of a standard pain rating. However, most studies simply describe the implementation of such pain management protocols,<sup>27,38–41</sup> and few studies describe how nurses' attitudes and behavior have been changed after implementation of a pain management protocol. Bookbinder et al.<sup>42</sup> implemented the American Pain Society quality assurance standards for relief of acute pain and cancer pain,<sup>43</sup> and educated nurses to ensure basic knowledge and skills in pain management. It was found that nurses' knowledge and attitudes, as well as patients' satisfaction with how caregivers treated their pain, had improved. Studies by Breitbart et al.,<sup>44</sup> Titler et al.,<sup>45</sup> and Davis<sup>46</sup> also found better knowledge and attitudes toward pain management after implementation of pain management protocols. Unfortunately, the sample sizes of these three studies<sup>44–46</sup> were rather small, and the study of Bookbinder et al.<sup>42</sup> was carried out only in cancer patients; thus, it is not clear whether these results can be generalized to other settings. It is also not clear if it is necessary to educate all nurses or only certain subgroups of nurses.

Several researchers have studied which variables correlate with nurses' pain knowledge. The following variables were examined as potential predictors of knowledge: age,<sup>42,47,48</sup> professional nursing experience,<sup>47,49–51</sup> level of education,<sup>20,21,23,42,47,51</sup> percentage of patients in pain in care,<sup>20,21,52</sup> hours spent on pain management during education and additional pain courses,<sup>20–22,48</sup> and care setting.<sup>20,47,50</sup> The results of these studies have been contradictory.

In this study, a Pain Monitoring Program (PMP) for nurses was developed and implemented. Twice-daily pain assessment by nurses

using a numeric rating scale was one of the components of the PMP,<sup>53</sup> which further consisted of educating nurses about pain and pain management. The purpose of the PMP was to improve nurses' knowledge about pain and pain treatment, to enhance their understanding of patients' pain experience, and to change their pain management behavior. In this paper, the effects of the PMP on nurses' pain knowledge and attitudes, and factors influencing nurses' pain knowledge will be addressed.

## Methods

### Sample

This multicenter study was conducted in three hospitals in the Netherlands: two general hospitals and one university hospital. In each hospital, three nursing wards participated, including one medical and two surgical wards. The unit size of the nursing wards varied from 32 beds in the university hospital to 46 beds in one of the general hospitals. The majority of patients had acute pain (67.4%) with a benign cause (62.9%). In total, 240 nurses worked in the nine wards. In the university hospital, most of the staff nurses were registered; in the general hospitals, two-thirds of the staff were registered nurses, and one-third were student nurses. To our knowledge, four wards were extremely busy and had problems with staffing due to illness. All nurses working in the nine wards were asked to participate and to attend the education program.

### Design

The effects of the PMP on nurses were measured in a one-group pretest–post-test design. Before the start of the education program, nurses filled in a questionnaire about sociodemographic variables, pain, and pain management. Then, they were educated about pain and pain management, and trained how to conduct daily pain assessment. When all nurses had finalized the education program, they started to use the numeric rating scale on a daily basis. Six months after the implementation of the PMP, a questionnaire was sent to the nurses with regard to their pain knowledge and attitudes. Thus, nurses completed a questionnaire at two measurement points: just before the start of the PMP and 6 months after the start.

### *The Pain Monitoring Program*

Nurses completed a 3-hour education program. The program consisted of a formal lecture and a discussion, and focused on basic knowledge and attitudes about the current trends in pain assessment, pain treatment with analgesics, and the use of nonpharmacological pain treatment (Table 1).<sup>11,54-56</sup> Nurses were instructed in daily pain assessment by means of a numeric rating scale from 0 to 10, on which 0 means "no pain at all" and 10 "the worst possible pain." The rationale and principles of daily pain assessment were explained by means of a case study.<sup>57</sup> The implementation of daily pain assessment in nursing practice and its value for nurses and patients has been described previously.<sup>53</sup> Participants were given a book<sup>55</sup> summarizing the main topics of the program. In the first months after the education program, during the implementation of daily pain assessment, follow-up meetings were held to promote the use of the newly acquired knowledge in nursing practice.<sup>53</sup>

### *Study Measures*

At both assessment points, nurses filled in two questionnaires and a few additional questions regarding sociodemographic information. For reasons of anonymity, nurses were not asked for their names at pretest and posttest. At pretest, nurses were asked to estimate the number of hours spent on pain during their basic education, and whether they had

followed additional courses about pain after their basic education.

Nurses' pain knowledge was assessed by using a Dutch version of Ferrell's Patient Pain Questionnaire.<sup>58,59</sup> The Pain Knowledge Questionnaire was translated backward and then forward and pretested in a group of 49 patients. It demonstrated acceptable levels of validity and reliability.<sup>60</sup> Although the Dutch-language version of the Pain Knowledge Questionnaire (PKQ-DLV) was originally designed to test the knowledge of cancer patients, the questions also seemed suitable to test the basic knowledge of nurses. The PKQ-DLV includes 8 items measuring knowledge about cancer pain and pain management. Nurses were given statements that could be answered on a 5-point Likert scale ("strongly agree," "agree," "not agree/not disagree," "disagree," "strongly disagree"). Before transforming the answers into a 0-100 scale, some items were recoded. A total score was computed for overall pain knowledge.

Nurses' attitudes toward pain and pain management were assessed by means of a newly developed Pain Attitude Inventory (PAI). The PAI is a 9-item questionnaire which measures nurses' opinions about several aspects of pain and pain management. The questionnaire was especially developed for this study. Some items of the PAI were derived from the Wisconsin Pain Initiative Survey,<sup>61</sup> which has been used with medical<sup>61</sup> and nursing students,<sup>48,52</sup> as well

Table 1  
Content of 3-Hour Education Program

Part One: Introduction	Part Three: Pain Management
Welcome and introduction	WHO analgesic ladder
Pain Knowledge Questionnaire-Dutch-language version and Pain Attitude Inventory	NSAIDs and other nonopioids
Definitions of pain	Opioids
Nurses' role in pain management	Side effects of opioid analgesia
Function of pain	Constipation
Pain theories	Nausea and vomiting
Gate control theory	Sedation
Circle of Loeser	Guidelines for pain control
Classification of types of pain	Myths and misconceptions related to the use of opioids
Acute versus chronic pain	Nonpharmacological pain treatments
Benign versus malignant pain	Psychosocial interventions
Part Two: Instruction in Daily Pain Assessment	Improving comfort and rest
Assessment tools	Relaxation and distraction
Unidimensional	Massage
Multidimensional	Application of heat and cold
Numeric rating scale	
Advantages and disadvantages	
Discussion case	
Implementation of daily pain assessment	

as practicing nurses and physicians.<sup>49</sup> The Wisconsin Questionnaire includes, for example, the following items: "What percentage of patients with cancer on your ward have pain complaints?" and "Which statement is most applicable: Most patients receive more pain medication than necessary; Most patients receive less pain medication than necessary; or Most patients receive adequate pain relief?" The remaining items concerned two other areas relevant to pain: the quality of pain management (questions 4, 5, 6, and 7), and nurses' own role in pain management (questions 8 and 9). These questions were formulated as statements which could be answered on a 5-point Likert scale ("strongly agree," "agree," "not agree/not disagree," "disagree," "strongly disagree").

### Statistical Analysis

Data were analyzed using the Statistical Package for the Social Science for Windows (SPSS) version 7.5. Descriptive statistics were used to evaluate nurses' sociodemographic characteristics. Because nurses could not be matched at an individual level, comparability between pretest and post-test groups needed to be checked. This was analyzed using Chi-square and Student's *t*-test. Differences between pretest and post-test scores on the Pain Knowledge Questionnaire–Dutch-language version were analyzed using Student's *t*-test, and on the Pain Attitude Inventory by means of a nonparametric test. To evaluate which variables predict total score on the Pain Knowledge Questionnaire–Dutch-language version, correlations

were computed between the total scores from the pretest with age, years of professional nursing experience, level of education, percentage of patients in pain in care, hours spent on pain management during education, additional pain courses, hospital and care setting. The variables that correlated significantly were analyzed in a forward multiple regression model.

## Results

### Nurses' Characteristics

Participation in the program was mandatory and 240 nurses from nine wards were invited for the education program. Ninety percent of the nurses participated ( $N = 216$ ). Six months later, the number of nurses employed had changed and 252 nurses were surveyed, of whom 90.1% ( $N = 227$ ) returned the questionnaire. Of these nurses, 31 registered nurses (13.7%) had not followed the education program and the participation of two nurses (0.9%) was unknown. For reasons of comparability, it was decided to exclude all student nurses from the analysis at pretest ( $N = 41$ ) and post-test ( $N = 50$ ). Thus, 175 nurses at pretest and 144 nurses at post-test were included in the analysis.

The majority of nurses were female (81.3%), the mean age was 34 years ( $SD = 8.9$ ), and the mean professional nursing experience was 10 years ( $SD = 8.2$ ). There were no differences between the nurses at pretest and at post-test with regard to age, years of professional nursing experience, level of education, percentage of patients in pain in care, hours spent on pain management during education, additional pain courses, hospital and care setting.

Table 2  
Nurses' Sociodemographic Characteristics

	Pretest ( $N = 175$ )	Post-test ( $N = 144$ )	<i>P</i> -value
Gender, $N$ (%)			
Male	—	27 (18.8%)	—
Female	—	117 (81.3%)	—
Age, yr, mean (SD)	34.2 (8.9)	34.6 (8.9)	NS
Years of professional nursing experience, mean (SD)	10.8 (8.3)	10.5 (8.2)	NS
Educational level, $N$ (%)			NS
Registered nurse	137 (78.3%)	100 (69.4%)	
Registered nurse with specialized continuing education	38 (21.7%)	44 (30.6%)	
Care setting, $N$ (%)			NS
Medical wards	56 (32%)	46 (31.9%)	
Surgical wards	119 (68%)	98 (68.1%)	
Hospital, $N$ (%)			NS
Hospital A	63 (36%)	48 (33.3%)	
Hospital B	66 (37.7%)	54 (37.5%)	
Hospital C	46 (26.3%)	42 (29.2%)	

NS = not significant.

ing experience, educational level, care setting and the hospital for which they were working (Table 2).

At pretest, nurses were asked about previous pain education and courses they attended (Table 3). A majority of nurses indicated that they had received no or little training in the management of pain during their basic education (mean = 3.4 hours, SD = 2.4): 8.5% of the nurses did not receive any training in pain management at all, 32% spent 1 to 2 hours on pain management, and 26.3% spent 3 or 4 hours. After having finished their basic education, only 31.4% had followed a course in which pain management was included.

### *Nurses' Pain Knowledge*

The overall scores on the PKQ-DLV before the start of the PMP ranged from 37.5% to 100%, with a mean percentage of 69.1% (SD = 13.2). The questions were also analyzed separately and Table 4 contains the list of items. The item with the lowest score was: "giving the lowest amount of medicine possible" (mean = 48.5%, SD = 34.8); the items with the highest score were: "pain medications should be given around the clock rather than only when needed" (mean = 84.2%, SD = 20.9) and "treatments other than medications can be effective" (mean = 82.2%, SD = 17.5).

To estimate the amount of knowledge gained during the PMP, the results of the pretest and the post-test were compared by means of a Student's *t*-test. The mean pretest score was 69.1% (SD = 13.2) on the 8-item questionnaire. At post-test, the mean score was 75.8% (SD = 11.5) (min = 43.8; max = 96.9), representing a 6.7% increase ( $P < 0.001$ ) (Table 4).

Item analysis showed improved knowledge on the items: "psychological addiction is inevitable over time" (61.3% versus 81.3%,  $P < 0.001$ ); "giving the lowest amount of medicine possible" (48.5% versus 63.2%,  $P < 0.001$ ); "patients are often overmedicated" (60.4% versus 69.9%,  $P < 0.001$ ), and "medication only for severe pain" (78.9% versus 85.0%,  $P < 0.05$ ).

At pretest, there were no differences in the total score among the nurses from the three hospitals. At post-test, nurses from hospitals B and C (general hospitals) showed a significantly increased level of knowledge ( $P < 0.05$  respectively  $P < 0.001$ ), whereas this was not significantly increased for nurses from the university hospital.

Total scores from the pretest were correlated with age, years of professional nursing experience, level of education, percentage of patients in pain in care, hours spent on pain management during education, additional pain courses, hospital and care setting. Significant correlations were found for years of professional nursing experience ( $r = -0.29$ ,  $P < 0.001$ ), age ( $r = -0.28$ ,  $P < 0.001$ ), and additional pain courses ( $r = 0.25$ ,  $P < 0.05$ ). A forward regression analysis indicated that age ( $R^2 = 0.08$ ,  $P < 0.001$ ) and additional pain courses ( $R^2 = 0.06$ ,  $P < 0.01$ ) were predictors for pain knowledge.

### *Nurses' Attitudes Toward Pain and Pain Management*

Table 5 presents the results of the PAI. There is considerable variance in responses regarding the proportions of patients experiencing pain. At pretest, a majority of nurses (60.6%) indicated that 80% to 100% of the patients on their wards experience pain. The prevalence of pain in cancer patients is almost as high: according to 53.2% of the nurses more than 80% of the cancer patients on their wards suffer from pain. Nurses were pessimistic about the pain medication given to patients: 53.7% of the nurses felt that most patients receive less pain medication than necessary. This is in contrast with the finding that 71.4% of nurses evaluated the quality of pain management on their ward as good. The need for pain education was confirmed in this study: only 57.7% of the nurses felt that nurses have sufficient knowledge and skills to relieve pain. Nurses were

Table 3  
Level of Training About Pain at Pretest

Total	175
Hours spent on pain education	
0 hour	15 (8.5%)
1-2 hours	56 (32%)
3-4 hours	46 (26.3%)
5-8 hours	35 (20%)
More than 8 hours	11 (6.3%)
Missing or unknown	12 (6.9%)
Additional pain courses	
None	119 (68%)
Cancer nursing course	30 (17.1%)
Clinical lesson	19 (10.9%)
Other	6 (3.4%)
Missing or unknown	1 (0.6%)

Table 4  
Results of Pain Knowledge Questionnaire–Dutch-Language Version

	Pretest Mean (SD)	Post-test Mean (SD)	P-value
Cancer pain can be effectively relieved.	77.5 (17.9) <sup>a</sup>	78.3 (17.4)	NS
Pain medication should be given only when pain is severe.	78.9 (25.1)	85 (20.4)	<0.05
Most cancer patients who take pain medication will become addicted over time.	61.3 (29.8)	81.3 (23.7)	<0.001
It is important to give the lowest amount of medicine possible to save larger doses for later when the pain is worse.	48.5 (34.8)	63.2 (33.4)	<0.001
It is better to give pain medications around the clock (on a schedule) rather than only when needed.	84.2 (20.9)	87.7 (19)	NS
Treatments other than medications (such as massage, heat, relaxation) can be effective for relieving pain.	82.2 (17.5)	79 (20.8)	NS
Patients are often prescribed too much pain medicine.	60.4 (24.2)	69.9 (22.8)	<0.001
Prescriptions for the use of pain medicine can be adjusted by the patient, without consulting the general practitioner/specialist/ (district) nurse.	60.2 (30.4)	61.1 (29.4)	NS
Total score	69.1 (13.2)	75.8 (11.5)	<0.001

<sup>a</sup>Higher scores indicate better pain knowledge.

NS = not significant.

more positive about the other aspects of pain management: 98.3% thought that nurses play an important role in pain relief, 87.4% thought that pain should be registered by nurses on a daily basis, and 78.3% thought that nurses pay enough attention to patients' pain complaints. Nurses were less positive about the attention that doctors pay to patients' pain: according to 45.7% of the nurses, doctors pay enough attention to patients' pain.

After implementation of the PMP, the proportion of nurses who believed that they had sufficient knowledge and skills to relieve pain increased from 57.7% to 73.6% ( $P < 0.01$ ). At pretest, 78.3% of the participants felt that nurses pay enough attention to patients' pain complaints. Six months after completion of the PMP, 84.7% agreed with this statement ( $P < 0.05$ ). At pretest, 87.4% of nurses felt that pain should be assessed on a daily basis, whereas at post-test this percentage had significantly decreased to 77.1% ( $P < 0.05$ ). This decrease was primarily caused by the surgical nurses: at pretest 83.9% of the nurses from surgical wards agreed with daily pain assessment, whereas at post-test only 68% were still in favor of this ( $P < 0.01$ ).

## Discussion

The quality of pain treatment depends on the knowledge, attitudes, and skills of those who provide the treatment. Nurses play a crucial role in this process: they often act as mediator between the doctor and the patient, and

are the ones to monitor the pain and comfort of the patient. However, the question is whether nurses are equipped to fulfill this role: do they have the necessary knowledge, attitudes, and skills? Pritchard<sup>62</sup> reported that nurses receive no or only little training in pain management, and a lack of pain education was also found in this study. Therefore, we used an integrated program to enhance nurses' knowledge and attitudes by educating nurses and implementing daily pain assessment.

In this paper, we have described the effects of the PMP on nurses' pain knowledge and attitudes. The implementation of daily pain assessment and its value for nurses and patients is described elsewhere.<sup>53</sup>

The results of this study showed that nurses improved their knowledge about pain and pain management after the PMP was implemented. Nurses' scores on the Pain Knowledge Questionnaire–Dutch-language version increased from 69.1% to 75.8% ( $P < 0.001$ ), and more nurses felt they had sufficient knowledge and skills to relieve pain. A 7% increase may seem rather moderate, but it should be noted that summary scores of 8 items can be misleading. On important issues there was a substantial increase in knowledge. Nurses scored better on the items: "medication only for severe pain," "psychological addiction is inevitable over time," "taking as low a dose as possible," and "patients are overmedicated."

The outcomes of this study are consistent with the work of other researchers, who have found that pain management protocols con-

Table 5  
Results of Pain Attitude Inventory

	Pretest N (%)	Post-test N (%)	Pvalue
1. What percentage of patients on your ward have pain complaints?			NS
20%	2 (1.1%)	3 (2.1%)	
40%	16 (9.1%)	17 (11.8%)	
60%	50 (28.6%)	42 (29.2%)	
80%	90 (51.5%)	75 (52.1%)	
100%	16 (9.1%)	7 (4.9%)	
Missing or unknown	1 (0.6%)	0	
2. What percentage of patients with cancer on your ward have pain complaints?			NS
20%	16 (9.1%)	14 (9.7%)	
40%	20 (11.4%)	15 (10.4%)	
60%	42 (24%)	44 (30.6%)	
80%	68 (38.9%)	61 (42.4%)	
100%	25 (14.3%)	10 (6.9%)	
Missing or unknown	4 (2.3%)	0	
3. Which statement is applicable:			NS
Most patients receive more pain medication than necessary	9 (5.2%)	3 (2.1%)	
Most patients receive adequate pain treatment	66 (37.7%)	60 (41.6%)	
Most patients receive less pain medication than necessary	94 (53.7%)	79 (54.9%)	
Missing or unknown	6 (3.4%)	2 (1.4%)	
4. What is your opinion about the quality of pain management on your ward?			NS
Good	125 (71.4%)	106 (73.6%)	
Not good/not poor	42 (24%)	33 (22.9%)	
Poor	6 (3.4%)	5 (3.5%)	
Missing or unknown	2 (1.2%)	0	
5. Doctors pay enough attention to patients' pain complaints.			NS
Agree	80 (45.7%)	75 (52.1%)	
Not agree/not disagree	34 (19.4%)	28 (19.4%)	
Disagree	60 (34.3%)	40 (27.8%)	
Missing/unknown	1 (0.6%)	1 (0.7%)	
6. Nurses pay enough attention to patients' pain complaints.			<0.05
Agree	137 (78.3%)	122 (84.7%)	
Not agree/not disagree	20 (11.4%)	20 (13.9%)	
Disagree	17 (9.7%)	2 (1.4%)	
Missing/unknown	1 (0.6%)	0	
7. Nurses have sufficient knowledge and skills to relieve pain.			<0.01
Agree	101 (57.7%)	106 (73.6%)	
Not agree/not disagree	41 (23.4%)	21 (14.6%)	
Disagree	31 (17.7%)	15 (10.4%)	
Missing/unknown	2 (1.2%)	2 (1.4%)	
8. Nurses play an important role in pain relief.			NS
Agree	172 (98.3%)	141 (97.9%)	
Not agree/not disagree	2 (1.1%)	2 (1.4%)	
Disagree	0	1 (0.7%)	
Missing/unknown	1 (0.6%)	0	
9. Pain should be assessed by nurses on a daily basis.			<0.05
Agree	153 (87.4%)	111 (77.1%)	
Not agree/not disagree	15 (8.6%)	13 (9%)	
Disagree	5 (2.9%)	19 (13.2%)	
Missing/unknown	2 (1.1%)	1 (0.7%)	

NS = not significant.

tribute to nurses' pain knowledge and attitudes.<sup>42,44-46</sup> Although no differences were observed at pretest in pain knowledge between nurses working in general versus university hospitals, it appeared that nurses from the general hospitals profited more from the PMP than nurses from the university hospital.

De Wit et al.<sup>63</sup> used the PKQ-DLV in cancer patients with chronic pain. The lowest scores of patients and nurses were on the same items:

"giving the lowest amount of medicine possible," "patients are often overmedicated," and "psychological addiction is inevitable over time." The highest score was also on the same item: "treatments other than medications can be effective." Because patients and nurses have the same deficits in knowledge, educating nurses is very important in order to address misconceptions and myths about pain management. Further studies are needed to determine

whether better pain knowledge in nurses will lead to better pain knowledge in patients.

In the literature, several predictors of pain knowledge are described. As Kopchak Sheehan,<sup>48</sup> Brunier et al.,<sup>20</sup> Vortherms et al.,<sup>21</sup> and McCaffery et al.,<sup>22</sup> we found age and additional pain courses to be predictors of pain knowledge at pretest. Attendance at a pain course positively affected the total score on the PKQ-DLV, whereas age inversely affected the total score. The overall  $R^2$  indicated that only 14% of the variation in the total score was accounted for by these background variables. So besides age and attendance at a pain course, many other variables affect nurses' pain knowledge and one can not distinguish subgroups.

It can be concluded from the PAI that pain is a frequent problem on nursing wards: more than half of the nurses believed that 80% to 100% of the patients on their wards, either with or without cancer, were suffering from pain. Nurses were positive about the quality of pain management on their ward and their role in pain management. When they were asked to choose between three statements about pain management, 53.7% of the nurses believed that most patients receive less pain medication than necessary; 37.7% believed that most patients receive adequate pain treatment; and 5.2% believed that most patients receive more pain medication than necessary. Although this is congruent with the findings of other researchers,<sup>48,49,52</sup> there seems to be a paradox. On the one hand, nurses are positive about the quality of pain management on their ward, while on the other hand, they believe that most patients receive less pain medication than necessary. This may be explained by the fact that the majority of patients are satisfied about their pain management despite high pain levels.<sup>42,64,65</sup> This situation might give nurses the idea that the quality of pain management on their ward is good.

After implementation of the PMP, nurses believed that they pay more attention to patients' pain and have better knowledge and skills to relieve pain. Six months after the education program and implementation of daily pain assessment, the percentage of nurses who were willing to register pain on a daily basis had decreased significantly from 87.4% to 77.1%. After 6 months of assessing pain on a daily basis, nurses from surgical wards were less enthusias-

tic about daily pain assessment. According to surgical nurses, patients had difficulty with expressing their pain in a number, daily pain assessment took additional time, and physicians did not make adequate use of the pain assessment.<sup>53</sup> It is encouraging that only 10% of the nurses were not willing to assess pain on a daily basis any more. The majority of nurses (77.1%) wanted to continue the daily pain assessment.

Although the results of this study are promising, several limitations should be mentioned. First, there was no control group in this study. With a lack of control group it is possible that the increase in pain knowledge is caused by other factors than the education program. On the other hand, nurses from nine wards in three hospitals were included in this study, so one can assume that other factors are neutralized. Secondly, for reasons of anonymity, we did not ask for the nurses' names at pretest or at post-test. Consequently, pretest and post-test data could not be matched at an individual level. Third, 31 nurses in the pretest were not included in the post-test. However, when testing for differences between pretest and post-test, no differences were found with regard to age, years of professional working experience, educational level, care setting, and hospital. Fourth, the education program was very brief. Nurses were educated for only 3 hours, and a more extended program may have a greater impact on nurses' pain knowledge. Finally, the Pain Knowledge Questionnaire-Dutch-language version is originally designed to measure patients' pain knowledge and the PAI has not been used before. It is possible that neither of the questionnaires is suitable or precise enough for measuring nurses' pain knowledge and attitudes. However, effects of the PMP were found with these two questionnaires.

It can be concluded from this study that nurses have knowledge deficits and prejudices with regard to pain and pain management. The study also shows that the PMP is effective in improving nurses' knowledge of pain management and in focusing nurses' attention to patients' pain complaints.

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## References

1. Lin CC, Ward SE. Patient-related barriers to cancer pain management in Taiwan. *Cancer Nursing* 1995;18:16–22.
2. Juhl IU, Christensen BV, Bülow HH, Wilbek H, Dreijer NC, Egelund B. Postoperative pain relief, from the patients' and the nurses' point of view. *Acta Anaesthesiol Scand* 1993;37:404–409.
3. Coyle N, Adelhardt J, Foley KM, Portenoy RK. Character of terminal illness in the advanced cancer patient: pain and other symptoms during the last four weeks of life. *J Pain Symptom Manage* 1990;5:83–93.
4. Kuhn S, Cooke K, Collins M, Jones JM, Mucklow JC. Perceptions of pain relief after surgery. *Br Med J* 1990;300:1687–1690.
5. Spross JA, McGuire DB, Schmitt RM. Oncology Nursing Society position paper on cancer pain: Part I. *Oncol Nursing Forum* 1990;17:595–614.
6. Dorrepaal KL. Pijn bij patiënten met kanker. Thesis. Amsterdam: Free University, 1989.
7. McGuire DB. The multidimensional phenomenon of cancer pain. In: McGuire DB, Yarbro CH, eds. *Cancer pain management*. Orlando, FL: Grune & Stratton, 1987.
8. Bonica JJ. Treatment of cancer pain: current status and future needs. In: Fields HL, Dubner F, Cervero F, eds. *Advances in pain research and therapy*. New York: Raven Press, 1985:589–616.
9. Sullivan LM. Factors influencing pain management: a nursing perspective. *J Post Anesth Nurs* 1994;9:83–90.
10. Rawal N, Hylander J, Arnér S. Management of terminal cancer pain in Sweden: a nationwide survey. *Pain* 1993;54:169–179.
11. Ad Hoc Committee on Cancer Pain of the American Society of Clinical Oncology. Cancer pain assessment and treatment of curriculum guidelines. *J Clin Oncol* 1992;10:1976–1982.
12. Ferrell BR, Eberts MT, McCaffery M, Grant M. Clinical decision making and pain. *Cancer Nursing* 1991;14:289–297.
13. Edwards WT. Optimizing opioid treatment of postoperative pain. *J Pain Symptom Manage* 1990;5:S24–S36.
14. Lander J. Clinical judgments in pain management. *Pain* 1990;42:15–22.
15. Dahl JL, Joranson DE, Engber D, Dosch J. The Cancer Pain Problem: Wisconsin's Response. *J Pain Symptom Manage* 1988;3:S2–S20.
16. Ferrell BR, McCaffery M. Nurses' knowledge about equianalgesia and opioid dosing. *Cancer Nursing* 1997;20:201–212.
17. McCaffery M, Ferrell BR. Nurses' knowledge of pain assessment and management: how much progress have we made? *J Pain Symptom Manage* 1997;14:175–188.
18. Grant MM, Rivera LM. Pain education for nurses, patients and families. In: McGuire DB, Yarbro CH, Ferrell BR, eds. *Cancer pain management*. Boston: Jones and Bartlett, 1995:289–319.
19. McCaffery M, Ferrell BR. Nurses' knowledge about cancer pain: a survey of five countries. *J Pain Symptom Manage* 1995;10:356–369.
20. Brunier G, Carson MG, Harrison DE. What do nurses know and believe about patients with pain? Results of a hospital survey. *J Pain Symptom Manage* 1995;10:436–445.
21. Vortherms R, Ryan P, Ward S. Knowledge of, attitudes toward, and barriers to pharmacologic management of cancer pain in a statewide random sample of nurses. *Res Nursing Health* 1992;15:459–466.
22. McCaffery M, Ferrell B, O'Neil-Page E, Lester M, Ferrell B. Nurses' knowledge of opioid analgesic drugs and psychological dependence. *Cancer Nursing* 1990;13:21–27.
23. Watt-Watson JH. Nurses' knowledge of pain issues: a survey. *J Pain Symptom Manage* 1987;2:207–211.
24. Weis OF, Sriwatanakul K, Alloza JL, Weintraub M, Lasagna L. Attitudes of patients, housestaff, and nurses toward postoperative analgesic care. *Anesth Analg* 1983;62:70–74.
25. Fox LS. Pain management in the terminally ill cancer patient: an investigation of nurses' attitudes, knowledge, and clinical practice. *Military Med* 1992;147:455–460.
26. Charap AD. The knowledge, attitudes, and experience of medical personnel treating pain in the terminally ill. *Mount Sinai J Med* 1978;45:561–580.
27. Dalton JA, Blau W, Carlson J, Mann JD, Bernard S, Toomey T, Pierce S, Germino B. Changing the relationship among nurses' knowledge, self-reported behavior, and documented behavior in pain management: does education make a difference? *J Pain Symptom Manage* 1996;12:308–319.
28. Francke AL. Continuing pain education: the impact on nursing practice. Thesis. Maastricht: University of Maastricht, 1996.
29. Weissman DE, Dahl JL. Update on the Cancer Pain Role Model Education Model. *J Pain Symptom Manage* 1995;10:292–297.

30. Ferrell BR, Grant M, Ritchey KJ, Ropchan R, Rivera LM. The pain resource nurse training program: an unique approach to pain management. *J Pain Symptom Manage* 1993;8:549-556.
31. Weissman D, Dahl JL, Beasley JW. The Cancer Pain Role Model Program of the Wisconsin Cancer Pain Initiative. *J Pain Symptom Manage* 1993;8:29-35.
32. Camp-Sorrell D, O'Sullivan P. Effects of continuing education: pain assessment and documentation. *Cancer Nursing* 1991;14:49-54.
33. Hauck SL. Pain: problem for the person with cancer. *Cancer Nursing* 1986;9:66-76.
34. Myers JS. Cancer pain: assessment of nurses, knowledge and attitudes. *Oncol Nursing Forum* 1985;12:62-66.
35. Sofaer B. The effect of focused education for nursing teams on post-operative pain of patients. Unpublished PhD thesis. Edinburgh: University of Edinburgh, 1984.
36. Westfall LK, Speedie SM. The effect of inservice education provided by consultant pharmacists on the behavior of nurses in long-term care facilities. *Drug Intell Clin Pharm* 1981;15:777-781.
37. Max MB. Improving outcomes of analgesic treatment: is education enough? *Ann Intern Med* 1990;113:885-889.
38. Campese C. Development and implementation of a pain management program. *AORN J* 1996;64:931-940.
39. Howell SL, Foster RL, Hester NO, Vojir CP, Miller KL. Evaluating a pediatric pain management research utilization program. *Canadian J Nursing Res* 1996;28:37-57.
40. Elliott TE, Murray DM, Oken MM, Johnson KM, Elliott BA, Post-White J. The Minnesota Cancer Pain Project: design, methods, and education strategies. *J Cancer Educa* 1995;10:102-112.
41. Ferrell B, Whedon M, Rollins B. Pain and quality assessment/improvement. *J Nursing Care Quality* 1995;9:69-85.
42. Bookbinder M, Coyle N, Kiss M, Goldstein ML, Holritz K, Thaler H, Gianella A, Derby S, Brown M, Racolin A, Ho MN, Portenoy RK. Implementing national standards for cancer pain management: program model and evaluation. *J Pain Symptom Manage* 1996;12:334-347.
43. Committee on Quality Assurance Standards, American Pain Society. American Pain Society quality assurance standards for relief of acute pain and cancer pain. In: Bond MR, Charlton JE, Woolf CJ, eds. *Proceedings of the VI World Congress on Pain*. Amsterdam: Elsevier, 1991:185-189.
44. Breitbart W, Rosenfeld B, Passik SD. The Network Project: a multidisciplinary cancer education and training program in pain management rehabilitation, and psychosocial issues. *J Pain Symptom Manage* 1998;15:18-26.
45. Titler MG, Moss L, Greiner J, Alpen M, Jones, G, Olson K, Hauer M, Phillips C, Megivern K. Research utilization in critical care: an exemplar. *Clin Issues* 1994;5:124-132.
46. Davis PS. Changing nursing practice for more effective control of post operative pain through a staff initiated educational program. *Nurse Education Today* 1988;8:325-331.
47. Clarke EB, French B, Bilodeau ML, Capasso VC, Edwards A, Empoliti J. Pain management knowledge, attitudes and clinical practice: the impact of nurses, characteristics and education. *J Pain Symptom Manage* 1996;11:18-31.
48. Kopchak Sheehan DK, Webb A, Bower D, Einsporn R. Level of cancer pain knowledge among baccalaureate student nurses. *J Pain Symptom Manage* 1992;7:478-484.
49. Fife BL, Irick N, Painter JD. A comparative study of the attitudes of physicians and nurses toward the management of cancer pain. *J Pain Symptom Manage* 1993;8:132-139.
50. Fothergill-Bourbonnais F, Wilson-Barnett J. A comparative study of intensive therapy unit and hospice nurses' knowledge on pain management. *J Advanced Nursing* 1992;17:362-372.
51. Hamilton J, Edgar L. A survey examining nurses' knowledge of pain control. *J Pain Symptom Manage* 1992;7:18-26.
52. Diekmann JM, Wassem RA. A survey of nursing students' knowledge of cancer pain control. *Cancer Nursing* 1991;14:314-320.
53. De Rond MEJ, De Wit R, Van Dam FSAM, Van Campen BThM, Den Hartog YM, Klievink MA, Niewig MB, Noort AM, Wagenaar MJ, Van Campen BA. Daily pain assessment: value for nurses and patients. *J Advanced Nursing* 1999;29:436-444.
54. Dingemans WA, Groenman N, Van Kleef M, Krijgsman MJ. *Pijn en pijnbehandeling, een basaal onderwijscurriculum*. Maastricht: Universitaire Pers Maastricht, 1993.
55. Francke AL. *Pijn als verpleegprobleem*. Dwingeloo: KAVANAH, 1992.
56. McCaffery M, Beebe A. *Pain: clinical manual for nursing practice*. St. Louis: Mosby, 1989.
57. McCaffery M, Ferrell BR. How would you respond to these patients in pain? *Nursing* 1991;21:34-37.
58. Ferrell BR, Ferrell BA, Ahn C, Tran K. Pain management for elderly patients with cancer at home. *Cancer Suppl* 1994;74:2139-2146.
59. Ferrell BR, Rhiner MR, Rivera LM. Development and evaluation of the family pain questionnaire. *J Psychosoc Oncol* 1993;10:21-35.
60. De Wit R. Development of the Dutch language version of Ferrell's Pain Knowledge Questionnaire. Unpublished report. Amsterdam: The Netherlands

Cancer Institute/Antoni van Leeuwenhoek Hospital, 1995.

61. Weissman DE, Dahl JL. Attitudes about cancer pain: a survey of Wisconsin's first-year medical students. *J Pain Symptom Manage* 1990;5:345-349.

62. Pritchard AP. Management pain and nursing attitudes. *Cancer Nursing* 1988;11:203-209.

63. De Wit R, Van Dam F, Zandbelt L, Van Buuren A, Van Der Heijden K, Leenhouts G, Loonstra S. A pain education program for chronic cancer pain pa-

tients: follow-up results from a randomized controlled trial. *Pain* 1997;73:55-69.

64. Miaskowski C, Nichols R, Brody R, Synold T. Assessment of patient satisfaction utilizing the American Pain Society's Quality Assurance Standards on acute and cancer-related pain. *J Pain Symptom Manage* 1994;9:5-11.

65. Ward SE, Gordon D. Application of the American Pain Society quality assurance standards. *Pain* 1994;56:299-306.