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Attitudes, beliefs and self-reported competence about postoperative pain among physicians and nurses working on surgical wards

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Aims: To investigate attitudes, beliefs and self-reported competence with regard to pain management in nurses and physicians on surgical wards. Interprofessional differences between physicians and nurses were also examined.
Methods: A total of 795 physicians and nurses from different surgical departments in Norway were invited to complete a questionnaire measuring attitudes, beliefs and self-reported competence about postoperative pain.
Findings: In total, 128 physicians and 407 nurses completed the questionnaire (response rate 68%). Of these, 77% of physicians and 57% of nurses reported more than 4 years' work experience with postoperative pain. Most of the physicians (95%) and nurses (86%) reported that patients 'often' or 'very often' achieved satisfactory pain relief. Overall, 69% of the sample evaluated themselves as being highly competent or competent in treating nociceptive pain, while only 16% reported they were highly competent or competent in treating neuropathic pain. There were no statistically significant differences between the professions regarding their self-reported competence in pain management, and nurses and physicians only differed on three out of 18 conditions regarding their appraisal of conditions related to postoperative pain management after controlling for years of experience. Only 20% of respondents were satisfied with the annual updates for staff about pain relief for patients with postoperative pain.
Conclusions: Even though the majority of physicians and nurses described themselves as competent in management of nociceptive pain, and thought that patients often or very often achieved satisfactory pain relief, the respondents reported dissatisfaction with the annual updates in pain management and poor competence in treatment of neuropathic pain.

Keywords: postoperative pain, pain management, attitudes, beliefs, competence, health professionals.

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Introduction

Physicians and nurses working in surgical units should aim to give the best pain management to patients after surgery. Despite major changes in postoperative pain management, with the introduction of clinical approaches such as patient-controlled analgesia, epidural analgesia with opioids, local anaesthetic drugs and regional blocks (1), as many as 80% of postoperative patients report moderate to severe post-surgical pain (2, 3). Unrelieved postoperative pain may delay recovery, discharge and rehabilitation (2, 4, 5), interfere with sleep and general activity even after discharge (6) and is associated with persistent pain in 10–50% of individuals after common operations (7). Over the past 15–20 years, attempts have

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been made to improve postoperative pain management through the publication and dissemination of clinical practice guidelines (8).

A literature review to establish the main barriers to effective postoperative pain relief showed that time management, together with attitudes and beliefs of both patients and nurses are significant factors hampering good clinical practice (9). With regard to the treatment of various types of pain, in a study evaluating the knowledge and competence of Norwegian doctors and nurses working with patients with cancer pain or chronic pain 58% of doctors evaluated their knowledge of nociceptive pain as very good or fairly good (10). The corresponding finding for neuropathic pain was 31%. Nurses scored lower than doctors on knowledge and competence in relation to both nociceptive and neuropathic pain (32 and 18%, respectively). Previous research has shown that surgical care nurses only give patients 47% of the prescribed doses of analgesics for patients with moderate to severe pain (11), as many as 40% of the nurses do not assess pain during both rest and activity, 25% do not evaluate the effect of given analgesics (12) and only 49% of nurses achieved a passing score on a survey about knowledge and attitudes regarding pain management (13). In a study evaluating the knowledge and attitudes of different health care professionals with regard to pain issues (14), the overall 'correct' score was only 56%. Physicians scored significantly higher and pharmacists scored significantly lower than other groups (nurses, medical and nursing students). Nurses scored significantly less concordantly than physicians on 11 of the 17 items (14).

Nurses with a university education have been shown to score significantly higher on self-reported knowledge and attitudes towards acute pain than those who are not university prepared (15), while nurses who attended education sessions on pain management in the last year scored higher than those who did not. On the other hand, in a study evaluating knowledge and attitudes of different health care professionals regarding pain issues, researchers found that differences in pain knowledge and attitudes were not related to the number of years of practice after graduation (14).

Health care professionals might have beliefs about pain management after surgery. Rokeach (16: 113) defines a belief as 'any simple proposition, conscious or unconscious, inferred from what a person says or does'. Beliefs can affect motives, for example about choice of analgesia and the way to treat a patient. There are conceptual boundaries between values, attitudes and beliefs (16). An attitude is defined as 'a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner' (16: 112). An attitude represents several beliefs, and each belief within an attitude comprises a cognitive component (representing a person's knowledge), an affective component (under suitable conditions the belief arouses affect about an object) and a behavioural component (the belief must lead to some action when it is suitably activated, for example to give pain relief to patients after surgery). Attitudes, such as those to pain relief, are formed by past experiences. Attitudes consist of both what is known and what is believed, and hence attitudes can be changed through knowledge. For example, health professionals with mistaken beliefs about pain management may be afraid of causing addiction by the administration of opioid analgesics (17, 18). Studies have shown that adequate knowledge and clinical experience may change attitudes and beliefs, leading nurses to believe what patients report (19, 20).

The overall aim of this study was to investigate self-reported competence, attitudes and beliefs about pain management in nurses and physicians on surgical wards. The demonstration of knowledge gaps in pain management and possible inappropriate attitudes can be the first step in improving pain management by these professional groups. The specific aims were to (1) describe attitudes and beliefs about pain relief among physicians and nurses in surgical wards, (2) describe self-reported competence in postoperative pain management, (3) describe their appraisal of conditions related to pain relief on wards after surgery and (4) evaluate interprofessional differences between physicians and nurses in the treatment of postoperative pain. It is important to reveal possible interprofessional differences because if they exist they might hamper collaboration about pain management.

Methods and design

Design

The study has a descriptive, cross-sectional survey design. Nurses and physicians from surgical departments across 17 wards in five hospitals situated in different parts of Norway (northern, central and southern Norway) completed a questionnaire (see Appendix 1). Hospitals were selected in cooperation with members of The Norwegian Pain Society. Geographical location and type of hospital were important factors in the selection process. Three out of four health regions were included, and four of the five hospitals were university hospitals. The following hospital departments were included: gynaecology, orthopaedic surgery, gastrointestinal surgery, thoracic surgery, plastic surgery, and urology. One contact person at each hospital helped with recruitment of respondents and data collection, and a contact person in each department delivered and collected the questionnaires.

Sample

In total, 795 physicians and nurses in surgical wards who were working during one randomly chosen week in spring 2008 received a questionnaire.

Table 1 Study population: professional characteristics of study participants (n = 535)

Professions	*Physicians (n = 128)*	*n*[a]	*%*	*Nurses (n = 407)*	*n*[a]	*%*
Specialization	Surgeons	78	60·9	Clinical specialist	91	22·6
	Under specialization	48	37·5	No specialization	315	77·4
	No specialization reported	2	1·6			
Type of surgical unit	Orthopaedic surgery	41	32·3	Orthopaedic surgery	105	28·2
	Gastrointestinal surgery	21	16·5	Gastrointestinal surgery	119	31·9
	Heart/lung surgery	26	20·5	Heart/lung surgery	51	13·7
	Other surgery	39	30·7	Other surgery	98	26·3
Experience with postoperative pain management	0–4 years	28	22·6	0–4 years	170	43·0
	5–45 years (Median = 10, range 0–45 years, missing = 4)	97	77·4	5–45 years (Median = 5, range 0–45 years, missing = 12)	225	57·0

[a]The numbers vary because of missing responses on given items.

Table 2 Beliefs about pain management among physicians (n = 128) and nurses (n = 407) working in surgical areas, and differences between the two groups

	Never		*Seldom*		*Sometimes*		*Often*		*Very often*		
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*p-Value*[*]
Do patients on your ward often ask for pain-relieving medication?											
Total sample	0		37	7·0	209	39·6	216	40·8	67	12·7	<0·001
Physicians	0		19	15·1	70	55·6	32	25·4	5	4·0	
Nurses	0		18	4·5	139	34·5	184	45·7	62	15·4	
Do patients with postoperative pain achieve satisfactory pain relief on your ward?											
Total sample	0		2	0·4	63	11·8	355	66·5	114	21·3	<0·001
Physicians	0		1	0·8	5	3·9	83	64·8	39	30·5	
Nurses	0		1	0·2	58	14·3	272	67·0	75	18·5	
Do nurses and physicians discuss the choice of pain treatment for patients with postoperative pain?											
Total sample	2	0·4	140	26·4	238	44·8	116	21·8	35	6·6	0·037
Physicians	1	0·8	41	32·0	44	34·4	29	22·7	13	10·2	
Nurses	1	0·2	99	24·6	194	48·1	87	21·6	22	5·5	
Will patients with postoperative pain being treated with opioids become addicted to them, and will this lead to drug abuse?											
Total sample	106	19·9	245	46·2	132	24·8	37	6·9	12	2·3	0·672
Physicians	25	19·5	55	43·0	32	25·0	12	9·4	4	3·1	
Nurses	81	20·0	190	47·0	100	24·8	25	6·2	8	2·0	
Do you evaluate patients' pain in order to provide better treatment?											
Total sample	1	0·2	8	1·5	38	7·2	228	43·0	225	48·1	<0·001
Physicians	1	0·8	4	3·2	22	17·7	73	58·9	24	19·4	
Nurses	0		4	1·0	16	4·0	154	38·0	231	57·0	

[*]p-Values were calculated using chi-squared tests.

Data collection instrument

The questionnaire consisted of three parts with a total of 57 items. Part 1 (shown in Table 1) contained background information about participants, including professional background, education, specialization, hospital and department, and years of work in postoperative pain management.

The second part (Table 2) included five questions focusing on beliefs and self-reported competence related to acute pain management. Each item was rated on a five-point categorical scale ranging from 1 'never', 2 'seldom', 3 'sometimes' and 4 'often' to 5 'very often'. The items regarding competence (Table 3) covered the questions: *How do you evaluate your competence regarding*: *nociceptive pain, neuropathic pain and the patient's total pain experience?* These items were evaluated using a five-point categorical scale ranging from 1 'incompetent', 2 'weak', 3 'basic understanding' and 4 'competent' to 5 'highly competent'. The questions related to beliefs and competence were used in an earlier study by Skauge et al. (10, 21).

The third part of the questionnaire covered conditions on the ward regarding patients' pain relief. The respondents were asked: *Regarding carrying out postoperative pain*

Table 3 Self-reported competence in pain management among physicians (n = 128) and nurses (n = 407), and differences between the two groups

	Incompetent		*Weak*		*Basic understanding*		*Competent*		*Highly competent*		
Areas of competence	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*p-Value*
Pain caused by tissue damage (nociceptive pain)											
Total sample	2	0·4	27	5·1	139	26·2	295	55·6	68	12·8	0·706
Physicians	1	0·8	5	4·0	31	24·6	75	59·5	14	11·1	
Nurses	1	0·2	22	5·4	108	26·7	220	54·3	54	13·3	
Neuropathic pain											
Total sample	16	3·0	199	37·8	226	42·9	76	14·4	10	1·9	0·195
Physicians	0		46	36·2	57	44·9	21	16·5	3	2·4	
Nurses	16	4·0	153	38·1	169	42·3	55	13·8	7	1·8	
Patients' total pain experience											
Total sample	0		11	2·1	200	37·9	287	54·4	30	5·7	0·471
Physicians	0		4	3·2	53	42·1	62	49·2	7	5·6	
Nurses	0		7	1·7	147	36·6	225	56·0	23	5·7	

Table 4 Differences between physicians (n = 128) and nurses (n = 407) in appraisal of conditions related to postoperative pain management

		Ordinal logistic regression	
Conditions	*p-Value*	*OR*	*p-Value**
Use of relaxation techniques	**<0·001**	1·71	0·013
Annual update of staff knowledge about pain relief for patients with postoperative pain	**0·003**	1·13	0·541
Educated in the use of tools/equipment (VAS/NRS scale/ standardized questions)	**0·006**	**1·86**	**0·002**
Provide information about side effects associated with pain treatment	0·080	1·34	0·148
Establishing a pain contact person on the ward with special responsibility for knowledge about pain alleviation	**<0·001**	**0·45**	**<0·001**
Information about the effects of pain alleviation is given to patients before they are discharged	0·068	1·56	0·033
Observation of side effects caused by pain treatment	0·165	1·11	0·621
Giving the patient emotional support	0·783	0·94	0·781
Staff have the necessary knowledge about postoperative pain and different analgesics	**0·006**	**2·11**	**<0·001**
Preparing the patient by having an informative preoperative conversation	0·018	1·52	0·062
Regular evaluations of pain intensity by asking the patient	0·598	0·63	0·032
Responsibility for pain treatment is given to the physician or nurse	0·048	1·64	0·045
Observation of the effects of pain treatment	0·421	1·30	0·258
Combined use of paracetamol and NSAIDS	0·092	1·68	0·030
Additional pain alleviation treatment when mobilizing the patient	0·030	0·77	0·276
Listening to patients' own experience of suffering from pain	0·798	0·71	0·171
Combined use of opioid and non-opioid analgesics	0·210	1·53	0·154
Physician/nurse initiates pain treatment	0·631	1·33	0·292

All ordinal logistic regression models were adjusted for years of experience with postoperative pain management.
*ORs with p-value <0·01 are highlighted in bold. Nurses are used as the reference group.

management, how do you assess the following conditions on your ward? The 18 statements (outlined in Table 4) were related to pain management. Treatment and service were rated on a five-point scale from 1 'unsatisfactory' to 5 'satisfactory'. These items were selected from the survey by Skauge et al. (10, 21), but because acute pain was the focus in the present study additional items were included and items were changed and updated to reflect advances in pain management since Skauge and colleagues' studies. The original five-category variables were recoded by collapsing them into three categories (1–2, 3, 4–5) for analytical purposes because of small numbers in some of the original categories.

Researchers and experts in pain management participated in developing the instrument and assessed the face validity of the items (22).

Statistical analysis

Statistical analyses and data management were performed using SPSS 16·0 (SPSS, Inc., Chicago, IL, USA). Categorical data were described using proportions and percentages, while median scores and ranges were used for continuous variables.

Differences between nurses and physicians regarding (1) beliefs about pain management, (2) competence in pain management and (3) appraisal of conditions affecting postoperative pain management were assessed using chi-squared tests. To adjust for possible confounding effects of years of employment and appraisal of conditions affecting postoperative pain management (Table 4), ordinal logistic regression models were fitted and the results expressed as odds ratios (OR) using profession (nurse or physician) as the dependent variable. Nurses were used as the reference group. Because of multiple comparisons, p values <0·01 were considered statistically significant. All tests were two-tailed.

Ethical considerations

The study was reported to the Norwegian Social Science Data Services and the local research committee at each of the five hospitals. An instruction letter accompanied each questionnaire and emphasized the ethical principles of confidentiality and autonomy.

Results

Of the 795 questionnaires that were distributed, 537 questionnaires were completed, giving a response rate of 67·5%. Two participants did not report their professional background and they were not included in the analyses.

Study population

Of the total 535 respondents, 128 were physicians and 407 were nurses. Of the physicians, 61% had completed specialist training as surgeons, while 23% of nurses had a clinical specialization (Table 1). Physicians had a median of 10 years' experience with postoperative pain management, while nurses had a median experience of 5 years. For both groups combined, the length of experience ranged from 0 to 45 years. In total, 77% of the physicians and 57% of the nurses had been working with postoperative pain management for 5 years or more (Table 1).

Beliefs about pain management

As outlined in Table 2, there was a statistically significant difference between physicians and nurses in three of the five items regarding beliefs about pain relief. Most of the respondents, 95% of physicians and about 86% of nurses, reported that patients 'often' or 'very often' achieved satisfactory pain treatment on their ward. About 53% of the total sample reported that patients 'often' or 'very often' asked for pain-relieving medication. Nurses scored significantly higher than physicians on this item.

Approximately half the total sample, 57% of nurses and about 19% of physicians, reported that they evaluated pain very frequently in order to provide better treatment. Similar percentages of nurses and physicians (22 and 23%, respectively) reported frequent discussions about the choice of pain treatment. Finally, there were no statistically significant differences between the two professional groups concerning beliefs and attitudes towards opioid addiction and drug abuse, and 25% of both professions reported that this happened 'sometimes'.

Self-evaluation of competence regarding pain management

Responses to the item evaluating competence about different kinds of pain are outlined in Table 3. About 56% of the total sample evaluated themselves as competent and 13% as highly competent in managing nociceptive pain. However, for neuropathic pain only 14% of the total sample reported being competent and 2% highly competent. Even so, more than half of the sample (54%) also reported being competent and 6% highly competent in handling patients' total pain experience. There were no statistically significant differences between the professions regarding their self-reported competence in pain management.

Assessment of different conditions regarding postoperative pain management

The assessment of conditions related to pain management on wards revealed that for the total sample only 9% reported the use of relaxation techniques as satisfactory (scores of 4 or 5, where 5 is satisfactory) on the ward and 20% reported the annual updates of staff knowledge as satisfactory. Members of both professions were most satisfied with the combined use of opioid and non-opioid analgesics (80% scored 4 or 5), physician/nurse-initiated pain treatment (79% scored 4 or 5) and listening to the patients' own experiences of suffering from pain (74% scored 4 or 5).

There were differences between physicians and nurses in five of the 18 conditions before controlling for years of experience (Table 4). In general, physicians tended to be more satisfied than nurses, but nurses were more satisfied than physicians with procedures for establishing a pain contact person on the ward with special responsibility for knowledge about pain alleviation. Results from ordinal logistic regression analyses adjusted for years of experience are also listed in Table 4. Statistically significant differences were found between physicians and nurses on three items after controlling for years of experience with pain management. This means that, when adjusting for years of

experience, the differences between professions regarding use of relaxation techniques and annual staff updates about pain relief for patients with postoperative pain were no longer significant. Physicians were more than twice as likely to be satisfied with the item 'staff have the necessary knowledge about postoperative pain and different analgesics'. On the other hand, nurses were almost twice as likely to score higher on the item about establishing a pain contact person on the ward.

Discussion

The main finding in the present study is that 95% of physicians and 86% of nurses reported that patients on their wards achieved satisfactory pain relief often or very often (Table 2). This is in contrast to a European survey from 1998, covering 17 nations, which showed 55% of anaesthesiologists were dissatisfied with postoperative pain management on surgical wards (1). There is little reason to believe that pain management has improved much in relieving these patients pain in the time since this study, and another recent Norwegian study showed that 38% of patients reported pain intensity at or above level 4 on a numeric rating scale (NRS) the first day after surgery (23). The fact that such a large percentage of respondents thought that pain management was satisfactory while pain is often shown to be high in surgical patients might indicate that health care professionals underestimate patients' pain. The fact that physicians were more satisfied with pain management than nurses may reflect the fact that the latter group carry out most postoperative observations and are closer to patients. Another possible explanation is that the professions have different standards for pain management in patients after surgery. Further research is needed to learn more about discrepancies between patients' self-reported levels of pain and health professionals' views on pain management.

The majority of the physicians and nurses had 5 years' or more experience with postoperative pain relief. It is therefore surprising that 84% of the sample reported low competence in managing neuropathic pain relief and 31% reported low competence in treating nociceptive pain. Lower ratings for self-reported competence with respect to neuropathic pain were also shown in earlier research (10), and may be because neuropathic pain is difficult to diagnose and harder to treat than nociceptive pain (24, 25), or because it is less prevalent after surgery (26). However, such a high rate of low self-reported competence needs to be taken seriously considering the importance of optimal postoperative pain management. It is also worth mentioning that only 20% of respondents reported that they found the annual staff updates about pain relief for patients with postoperative pain satisfactory.

In the present study, there were no statistically significant differences between physicians and nurses for self-reported competence in pain management. This is in contrast to the 1998 study by Skauge et al. (10) where nurses rated themselves less competent than doctors in relation to nociceptive and neuropathic pain (32% of doctors and 18% of nurses rated themselves as competent), but more competent in the treatment of the psychological and social aspects of pain (44% of nurses and 36% of doctors rated themselves as competent). This might indicate that changes in pain management have occurred during the past 10 years, or the fact that Skauge et al. (10) also included staff treating cancer patients in their survey. Furthermore, no differences were found between physicians and nurses on satisfaction with the annual staff updates about pain relief for patients when controlling for years of experience.

The finding that 60% of nurses reported that patients often or very often asked for pain relief could indicate that patients received sufficient preoperative information about their responsibility to ask for analgesia. It could also mean that pain evaluation was inadequate, and therefore patients frequently had to ask for extra medication. It is reported that both physicians and nurses give higher priority to patients asking for pain relief (21, 24). More research is needed about the patient's role in pain management. Patients may have difficulty asking for pain relief, and frequent requests may indicate that they have severe pain.

In the present study, physicians and nurses both recorded low scores when they assessed their satisfaction with the use of relaxation techniques and the annual updates of staff knowledge on their wards. Without adjusting for years of experience, physicians scored more highly than nurses on these two items (Table 4). There may be a relationship between the items, in that an update can also give more information about non-pharmacological treatments. Other studies have demonstrated poor knowledge of non-pharmacological methods in pain management (21, 26). Touch and listening to music may, for instance, provide clinically meaningful pain relief (27, 28). Considering that pain is not only a sensory but also an emotionally related phenomenon, health care professionals should be updated on these non-pharmacological methods. Of note in the present study is that as many as 40% of respondents did not feel competent or highly competent in managing patients' total pain experience.

A total of 66% of respondents reported that patients with postoperative pain seldom or never become addicted or develop drug abuse (Table 2). This could reflect either that staff were educated in a more liberal approach to opioid use, or that personnel on short-term surgical wards had limited experience with chronic pain conditions and the risk of developing opioid abuse. The low percentage that was afraid of addiction is promising, because recent recommendations emphasize the use of multi-modal treatment including opioids for successful pain management after surgery (29).

The results from the present survey indicate a need for more training in modern pain management, including

non-pharmacological methods. Only approximately half the sample, 20% of physicians and 57% of nurses, reported that they were interested in providing better treatment (Table 2). This is a disappointing finding given the large number of patients who experience pain. Pain management education programmes are found to increase knowledge of pain management and documentation among nurses (30), but even so, working environments and practical knowledge are shown to have an influence on the practical implementation of skills (20, 31). The ward culture has to be such that new and scientifically based methods for pain assessment and management are accepted. Knowledge and experience among health care providers should be integrated into a culture involving the acquisition of attitudes, skills and behavioural patterns to improve clinical pain practice (30, 32). This is a challenge for leaders in all hospitals, and the most immediate solutions to improving the quality of pain management may be at an organizational level (29). Furthermore, the importance of the Acute Pain Service (APS) in improving postoperative pain management is emphasized by many authors (5, 33–36), and an ongoing educational programme for patients and health care providers seems to be a key factor for success (33). Another important matter is to develop evidence-based clinical practice guidelines involving information on goals of pain treatment, assessment of pain, education of patients and structure of an APS (8).

Strengths and limitations

The strengths of the present study are the coverage of the sample drawn from different wards at five hospitals throughout Norway, the relatively large sample size and the relatively high response rate (68%). This might indicate that the results are representative of postoperative management throughout Norway. On the other hand, one possible limitation is that we included four university hospitals and only one local hospital in the present study. Attitudes and competence might differ between smaller and larger hospitals, so our sample choice might suffer from some bias when we try to generalize the results.

Another limitation is that the questionnaire was partly developed by the researchers themselves. Studies using this questionnaire have been published in Norway (10, 21), but because it is a self-developed questionnaire the results cannot easily be compared with results from other countries (18). Further testing of the questionnaire is recommended, using other samples of patients with acute pain. Although the psychometric properties of the questionnaire were not fully tested, it was found to have acceptable face validity. The low number of missing items suggested it was easy to understand and complete.

Conclusion

Physicians and nurses should be aware of their responsibility to keep their knowledge updated about effective pain relief after surgery. Based on the findings that 31% of the total sample reported only low or basic understanding of postoperative pain management and 81% reported only low or basic understanding of neuropathic pain, there appears to be a need to improve basic education and increase the focus on pain management among health professionals on surgical wards.

References

1 Rawal N, Allvin R. Acute pain services in Europe: a 17-nation survey of 105 hospitals. The EuroPain Acute Pain Working Party. *Eur J Anaesthesiol* 1998; 15: 354–63.

2 Popping DM, Zahn PK, Van Aken HK, Dasch B, Boche R, Pogatzki-Zahn EM. Effectiveness and safety of postoperative pain management: a survey of 18 925 consecutive patients between 1998 and 2006 (2nd revision): a database analysis of prospectively raised data. *Br J Anaesth* 2008; 101: 832–40.

3 Apfelbaum JL, Chen C, Mehta SS, Gan TJ. Postoperative pain experience: results from a national survey suggest postoperative pain continues to be undermanaged. *Anesth Analg* 2003; 97: 534–40.

4 Vadivelu N, Mitra S, Narayan D. Recent advances in postoperative pain management. *Yale J Biol Med* 2010; 83: 11–25.

5 Rawal N. Organization, function, and implementation of acute pain service. *Anesthesiol Clin North America* 2005; 23: 211–25.

6 Leegaard M, Rustoen T, Fagermoen MS. Interference of postoperative pain on women's daily life after early discharge from cardiac surgery. *Pain Manag Nurs* 2010; 11: 99–107.

7 Kehlet H, Jensen TS, Woolf CJ. Persistent postsurgical pain: risk factors and prevention. *Lancet* 2006; 13: 1618–25.

8 Rustoen T, Miaskowski C. The use of guidelines, standards, and quality improvement initiatives in the management of postoperative pain. In *Textbook of Clinical Pain Management*, 2nd edn (Rice ASC ed.), 2008, Hodder Arnold, London, 665–77.

9 Bell L, Duffy A. Pain assessment and management in surgical nursing: a literature review. *Br J Nurs* 2009; 8: 153–6.

10 Skauge M, Borchgrevink PC, Kaasa S. Vurdering av egen kunnskap og kompetanse om behandling av smerter (Self-evaluation of knowledge and competence with regard to the treatment of pain). *Tidsskr Nor Laegeforen* 1998; 10: 536–40.

11 Watt-Watson J, Stevens B, Garfinkel P, Streiner D, Gallop R. Relationship between nurses' pain knowledge and pain management outcomes for their postoperative cardiac patients. *J Adv Nurs* 2001; 36: 535–45.

12 Ene KW, Nordberg G, Bergh I, Johansson FG, Sjostrom B. Postoperative pain management—the influence of surgical ward nurses. *J Clin Nurs* 2008; 17: 2042–50.

13 Lewthwaite BJ, Jabusch KM, Wheeler BJ, Schnell-Hoehn KN, Mills J,

Estrella-Holder E, Fedorowicz A. Nurses' knowledge and attitudes regarding pain management in hospitalized adults. *J Contin Educ Nurs* 2011; 10: 1–7.
14 Lebovits AH, Florence I, Bathina R, Hunko V, Fox MT, Bramble CY. Pain knowledge and attitudes of healthcare providers: practice characteristic differences. *The Clin J Pain* 1997; 13: 237–43.
15 Brunier G, Carson MG, Harrison DE. What do nurses know and believe about patients with pain? Results of a hospital survey. *J Pain Sympt Manag* 1995; 10: 436–45.
16 Rokeach M. *Beliefs, Attitudes and Values: A Theory of Organization and Change*. 1968, Jossey-Bass, San Francisco.
17 Watt-Watson J, Garfinkel P, Gallop R, Stevens B, Streiner D. The impact of nurses' empathic responses on patients' pain management in acute care. *Nurs Res* 2000; 49: 191–200.
18 McCaffery M, Ferrell BR, Pasero C. Nurses' personal opinions about patients' pain and their effect on recorded assessments and titration of opioid doses. *Pain Manag Nurs* 2000; 1: 79–87.
19 Nash R, Edwards H, Nebauer M. Effect of attitudes, subjective norms and perceived control on nurses' intention to assess patients' pain. *J Adv Nurs* 1993; 18: 941–7.
20 Lui LY, So WK, Fong DY. Knowledge and attitudes regarding pain management among nurses in Hong Kong medical units. *J Clin Nurs* 2008; 17(15): 2014–21.
21 Skauge M, Borchgrevink PC, Kaasa S. Pasienter med kreftrelaterte og andre kroniske smerter. (Patients with cancer-related pain and other chronic pain. Priorities and assessment). *Tidsskr Nor Laegeforen* 1996; 116: 473–7.
22 Polit DF. *Data Analysis & Statistics for Nursing Research*. 1996, Appleton & Lange, Stamford, CT.
23 Fredheim OM, Kvarstein G, Undall E, Stubhaug A, Rustøen T, Borchgrevink PC. Postoperativ smerte hos pasienter innlagt i norske sykehus1763 (Postoperative pain in patients in Norwegian hospitals). *Tidsskr Nor Laegeforen* 2011; 131: 1763–7.
24 Green CR, Wheeler JR. Physician variability in the management of acute postoperative and cancer pain: a quantitative analysis of the Michigan experience. *Pain Med* 2003; 4: 8–20.
25 Hayes C, Brown S. Neuropathic pain in the acute pain service: a prospective study. *Acute Pain* 2002; 4: 45–48.
26 Matthews E, Malcolm C. Nurses' knowledge and attitudes in pain management practice. *Br J Nurs* 2007; 16(3): 174–9.
27 Cepeda MS, Carr DB, Lau J, Alvarez H. Music for pain relief. *Cochrane Database Syst Rev* 2006; CD004843.
28 So PS, Jiang Y, Qin Y. Touch therapies for pain relief in adults. *Cochrane Database Syst Rev* 2008; CD006535.
29 White PF, Kehlet H. Improving postoperative pain management: what are the unresolved issues? *Anesthesiology* 2010; 112(1): 220–5.
30 Abdalrahim MS, Majali SA, Stomberg MW, Bergbom I. The effect of postoperative pain management program on improving nurses' knowledge and attitudes toward pain. *Nurse Educ Pract* 2011; 11: 250–5.
31 Wilson B. Nurses' knowledge of pain. *J Clin Nurs* 2007; 16: 1012–20.
32 Merton RK, Reader GG, Kendall PL. *The Student Physician. Introductory Studies in the Sociology of Medical Education*. 1957, Harvard University Press, Cambridge, MA.
33 Breivik H. How to implement an acute pain service. *Best Practice & Research* 2002; 16: 527–47.
34 Breivik H, Stubhaug A. Management of acute postoperative pain: still a long way to go! *Pain* 2008; 137: 233–4.
35 Counsell D, Mcacintyre P, Breivik H. Organization and role of acute pain services. In *Textbook of Clinical Pain Management*, 2nd edn (Rice ASC ed.), 2008, Hodder Arnold, London, Chapter 176.
36 Barton J, Don M, Foureur M. Nurses' and midwifes' pain knowledge improves under the influence of an acute pain service. *Acute Pain* 2004; 6: 47–51.

Appendix 1

Number of physicians and nurses working in each of the departments of the included hospitals that received questionnaires*

Permanent position.

Hospital	*Department of gastrointestinal surgery*	*Department of orthopaedic surgery*	*Department of thoracic surgery*	*Department of gynaecology*	*Department of urology*	*Department of plastic surgery*
University hospital A	Physicians: 9 Nurses: 20	Physicians: 8 Nurses: 19	Physicians: 8 Nurses: 26	Physicians: 7 Nurses: 18		
University hospital B	Physicians: 20 Nurses: 83	Physicians: 15 Nurses: 98		Physicians: 13 Nurses: 47		
Hospital C	Physicians: 7 Nurses: 18	Physicians: 9 Nurses: 19				
University hospital D	Physicians: 21 Nurses: 35	Physicians: 10 Nurses: 20	Physicians: 8 Nurses: 17		Physicians: 20 Nurses: 33	
University hospital E	Physicians: 13 Nurses: 35	Physicians: 16 Nurses: 30	Physicians: 9 Nurses: 24			Physicians: 26 Nurses: 34

*In total, in 2008 in Norway there were seven university hospitals and 28 hospitals not connected to universities.