

Measuring postoperative pain

Jacqueline van Dijk



Brain Center
Rudolf Magnus

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Measuring postoperative pain

Het meten van postoperatieve pijn

(met een samenvatting in het Nederlands)

Proefschrift

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Jacqueline Francina Maria van Dijk

geboren op 25 juni 1962
te Vleuten-De Meern

Promotoren: Prof. dr. C.J. Kalkman
Prof. dr. M.J. Schuurmans

Copromotor: Dr. A.J.M. van Wijck

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Chapter 1

General introduction



Introduction

Many patients experience pain after surgery. According to national guidelines, patients should be asked to score their pain on a Numeric Rating Scale (NRS) where “0” is no pain and “10” is the worst imaginable pain at least three times a day.

During one of my rounds as an acute pain nurse, I asked a patient on the gynecology ward the day after surgery what her pain score was at that moment. She answered, “I give my pain a score of 7.” I asked her if she would like to receive any additional analgesics. “No,” she answered, “I do not want more painkillers; I consider my pain bearable now.” Her reply was not in line with how I was taught to consider NRS scores, where a pain score higher than 3 indicates a need for additional interventions. I then tried to explain to her that an NRS score of “0” means “no pain at all” and “10” means the “worst imaginable” pain. I also told her that pain scores higher than 3 were seen as unacceptable, requiring interventions to reduce them. Therefore, I asked her again, “What is your pain score right now?” “OK, in that case, my pain score is a 6,” she answered. After this visit, I was confused. Did my patient, a well-educated young woman, not understand NRS scores, or could there possibly be something wrong with how we interpret the scores that our patients tell us? I decided to study pain and pain assessment in detail.

What is pain?

Pain is a complex perceptual experience involving all domains of an individual’s life. While pain is universal, it is at the same time strictly individual. It is a subjective phenomenon that is uniquely experienced by each person. A definition of pain developed by the International Association for the Study of Pain describes it as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.¹ Another way of looking at pain is to consider the individual suffering the pain as the expert in their pain. This is an approach first advocated by Margo McCaffery in 1968,² and her definition of pain provides a useful philosophy for pain management: “Pain is whatever the experiencing person says it is and exists whenever he says it does.” There is a difference between acute (e.g., postoperative pain) and chronic pain. As this thesis is focused on postoperative pain, chronic pain will not be discussed further.

Postoperative pain

Acute postoperative pain is due to inflammation from tissue damage or direct nerve injury. Pain after surgery can occur after both major surgery and even relatively minor surgery. The day after surgery, pain scores of patients undergoing different types of surgery are often high, as indicated by NRS scores > 4.³ Previous studies have reported that many patients suffer from pain after surgery; on the first postoperative day, 30–43% of patients

report moderate or severe pain (NRS > 4).^{4, 5} Unrelieved postoperative pain has been shown to increase the rate of postoperative complications (e.g., atelectasis, pneumonia, thromboembolism, depressed immune function, prolonged hospital stay) and the risk of developing chronic postoperative pain.⁶⁻⁸ Consider the following example: A 60-year-old male patient experienced considerable postoperative pain after lung surgery but did not report his pain to the nurse. As a result, he did not receive adequate pain treatment. The pain was so severe as to preclude adequate coughing. Since he was unable to sufficiently clear the lungs, he developed pneumonia.

On the other hand, improved pain control should not jeopardize patient safety. Unnecessary use of analgesics, especially opioids, increases patients' discomfort because of the side effects, such as nausea, vomiting, and pruritus. Moreover, unnecessary administration or overdosing of opioids increases the probability of adverse events, particularly sedation and potentially fatal respiratory depression.^{9,10}

Postoperative pain treatment

Most postoperative pain can be adequately treated. Several analgesics, each with different modes of action (e.g., acetaminophen, non-steroidal anti-inflammatory drugs (NSAIDs), opioids) can be prescribed to the patient. The patient's self-reported NRS score is now the leading indicator in the postoperative pain treatment. Many pain management guidelines recommend prescription of analgesics based on the patients' NRS pain scores,¹¹⁻¹³ and the threshold for prescribing analgesics is typically an NRS score higher than 4.^{11,13}

In 2000, new pain standards were implemented by the Joint Commission on Accreditation of Health Organizations (JCAHO). These standards made adequate pain management a clinical performance measure.¹⁴ Pain care should be integrated into the patient's treatment plan, and pain ratings should be treated as the fifth vital sign.¹⁵ Many institutions implemented treatment policies guided by patient pain-intensity ratings indexed with a numerical scale, which resulted in specific cut-off scores for prescribing analgesics.¹⁶ Consequently, the Dutch guideline for postoperative pain management suggested NRS > 3 as a cut-off for pain treatment,¹² as the Dutch Healthcare Inspectorate maintained that only few patients should have high postoperative NRS scores. No recommendations were given to monitor postoperative patients who are prescribed opioids. An increased rate of opioid over-sedation was reported after the implementation of the new Joint Commission standards.¹⁷ Moreover, some cases of over-sedation and respiratory events after postoperative pain management were reported in the Netherlands.

Acute Pain Services (APSs)

To provide surgical patients with the appropriate acute pain management modalities, Acute Pain Services (APSs) have been developed. The goal of an APS is to improve

postoperative pain management by applying effective methods of analgesic control. In addition, the APS provides education for residents and nursing staff on the treatment of acute pain. An APS minimally consists of an anesthesiologist and a pain nurse who make daily rounds checking complex pain techniques and giving bedside support to nurses and doctors caring for surgical patients.¹⁸ The APS often establishes pain treatment policies for the hospital. Such policies should be in conformance with international and/or national guidelines and should emphasize the fact that pain assessment and pain treatment are the responsibility of all healthcare professionals. APSs are now widely accepted, and they have introduced pain measurement scales, standardized protocols, education, role models, and new pain management techniques. They have contributed immensely to the acceptance of the need for regular postoperative pain assessment and optimal pain management.¹⁹

Barriers to optimal pain management

Although patients are often encouraged to request analgesics as needed, they often do not do so for a number of reasons. Many patients have low expectations of pain relief and are reluctant to report pain, or they simply do not want to complain.²⁰⁻²² Moreover, patients are concerned that the side effects of analgesics will be inevitable and unmanageable. Some patients report that they would rather be in pain than experience drowsiness, nausea, constipation, or mental confusion.²³ Barriers to accepting pain treatment are identified as important factors in hindering pain management. Many patients still believe that using analgesics, especially opioids, for the relief of pain will result in addiction.^{24,25} Patients seem to be overly concerned with analgesic addiction, as a systematic review of long-term opioid use in chronic pain patients observed a low rate of opioid addiction (7 out of 4,884 patients, 0.14%).²⁶ The risk of opioid addiction in acute pain patients is lower than in chronic pain patients, because the former are administered opioids for a very short period after surgery.²⁷

Pain model

The pain model of Loeser²⁸ is frequently cited in order to outline the complexity of pain. According to this model, the phenomenon of pain can be separated into four nested components: nociception, pain, suffering, and pain behaviors. Nociception exists when stimuli that act on pain receptors evoke activity in nerve fibers. The next circle is the actual quality or experience of pain. The electrochemical signal arrives in the brain. Through the so-called pain matrix, the pain signal is connected with the emotional and cognitive systems, and suffering occurs. This is the patient's judgment of the meaning of the pain experience. The last circle, pain behavior, is what the patient in pain says, does, or does not do about the pain. The model emphasizes that nociception, pain, and suffering are personal, private, internal events that cannot be established by observing the patient. The patient is the only one who can describe it. The healthcare professional can only discuss the patient's pain by observing the patient's behavior (Figure 1).

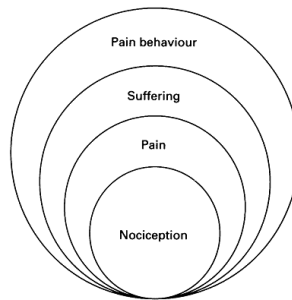


Figure 1. Pain model of Loeser.

Pain assessment

Pain is a subjective experience, and no objective tests are clinically available to measure it. Whenever possible, the existence and intensity of pain are measured via self-report. The ability to quantify the intensity of pain is essential when caring for patients with postoperative pain. Therefore, several one-dimensional pain scales have been developed and assessed for reliability and validity.²⁹ The NRS, in which patients verbally assign a number from 0 to 10 to their current pain at regular intervals is preferred for use in adult patients.^{11,12} Moreover, the pain scores should be documented in the patient's record so that all involved in the patient's care understand the severity of the patient's pain and trends can be monitored.

Nurses' assessment of pain

Nurses must be knowledgeable of pain assessment and management, as it is a significant part of nursing care. Pain assessment scales primarily focus on the pain intensity experienced by the patient. Discrepancies have been identified between nurses' assessments of patients' pain and patients' self-assessments, with nurses giving consistently lower ratings than patients.^{30,31} Nurses are taught to treat pain when patients assign their pain NRS scores higher than 3.¹² However, in clinical practice, some patients who report pain scores higher than 3 and are offered opioid analgesics by the nurse in accordance with pain guidelines might refuse these drugs.

Aims and outline of the thesis

The general aim of the work presented in this thesis is to understand patients' postoperative pain scores in order to strengthen pain management. The specific aims of this thesis are:

1. To understand how postoperative patients and professionals interpret pain scores, particularly how NRS scores relate to the presence of "bearable" versus "unbearable" pain (Chapters 2 and 3)
2. To investigate the ability of the NRS to discriminate between postoperative patients desiring opioids and those not desiring opioids, because the relation between reported pain scores and the desire for opioids is uncertain (Chapter 4)

The work aims to assess whether patients understand the NRS and the importance of accepting analgesics to prevent postoperative complications of pain. Thereafter, we want to influence patients in their use of NRS scores and in their understanding of the importance of accepting analgesics to prevent postoperative complications of pain.

3. To study if a preoperative educational film lessens fear, improves knowledge and attitudes concerning opioid use, and influences patients' use of NRS scores (Chapter 5)
4. To study the effect of written information on patients' knowledge, beliefs, and fear toward postoperative pain and pain treatment (Chapter 6)

Finally, we aim to understand the factors influencing pain ratings. Patients seem to be overly concerned regarding side effects of pain medication, and nurses need to try to alter these concerns to realize adequate pain treatment. Therefore, nurses themselves should not be hindered by barriers preventing adequate pain treatment.

5. To study nurses' knowledge and beliefs regarding postoperative pain and pain management (Chapter 7)
6. To study how patients assign a number on the NRS to their currently experienced postoperative pain and the considerations influencing this process. Here, we used a qualitative study design with structured in-depth interviews with postoperative patients (Chapter 8)

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Chapter 2

Postoperative pain assessment based on numeric ratings is not the same for patients and professionals: A cross-sectional study

Jacqueline F.M. van Dijk
Albert J.M. van Wijck
Teus H. Kappen
Linda M. Peelen
Cor J. Kalkman
Marieke J. Schuurmans

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Abstract

Background Numeric pain scores have become important in clinical practice to assess postoperative pain and to help develop guidelines for treating pain. Professionals need the patients' pain scores to administer analgesic medication. However, do professionals interpret the pain scores in line with the actual perception of pain by the patients?

Objective The study aim was to assess which Numerical Rating Scale (NRS) pain score was considered "bearable" on a Verbal Rating Scale (VRS) by patients and professionals.

Methods This prospective study examined the relationship between the Numerical Rating Scale and a Verbal Rating Scale. The patients (n=10,434) rated their pain the day after surgery on the 11-point NRS (0 = no pain and 10 = worst imaginable pain) and a VRS comprising five descriptors: "*no pain*"; "*little pain*"; "*painful but bearable*"; "*considerable pain*"; and "*terrible pain*". The first three categories together ("*no pain*", "*little pain*" and "*painful but bearable*") were considered "bearable" and the last two categories ("*considerable pain*" and "*terrible pain*") were deemed as "unbearable" pain. The professionals (n=303) were asked to relate the numbers of the NRS to the words of the VRS.

Results Most patients considered NRS 4–6 as "bearable" pain. Among professionals, anesthesiologists, Post Anesthesia Care nurses, and ward nurses interpreted NRS scores in the same way as the patients. Only the Acute Pain Nurses interpreted the scores differently; they considered NRS of 5 and higher to be not bearable.

Conclusions Some care providers and patients differ in their interpretation of the postoperative NRS scores. A risk of overtreatment might arise when health care providers rigidly follow guidelines that prescribe strong analgesics for pain scores higher than 3 or 4 without probing the patient's preference for pharmacological treatment.

Introduction

According to the American Pain Society guidelines for pain management, postoperative pain should be assessed regularly and documented carefully.¹ The intensity of pain should be evaluated and recorded at intervals depending on the severity of pain and the clinical situation. Pain assessment and management is a significant part of nursing care and the pain is mostly assessed through verbal communication with the patient. The Numeric Rating Scale (NRS) is frequently used for this purpose: the patient is asked to score the pain on an 11 point scale, where 0 indicates no pain and 10 indicates the worst imaginable pain. The NRS is considered a valid and reliable pain assessment tool.²⁻⁴

The patient's NRS score is a leading indicator in the postoperative pain treatment. Many guidelines for pain management recommend prescription of analgesics on the basis of the patients' NRS pain score.^{1,5,6} However, the NRS threshold for prescribing analgesics varies: some guidelines for acute and cancer pain chose an NRS cut-off > 4 ^{1,6} while at least in one other, also for acute and cancer pain, an NRS cut-off > 3 is the criterion for administering analgesics.⁵ Furthermore, in clinical practice not all patients with an NRS pain score above the treatment threshold are willing to accept the analgesic treatment offered mostly because they still consider the pain as "bearable". This suggests that professionals and patients might perceive the necessity for pain treatment differently. If so, health care providers who strictly follow current guidelines could be at risk of overtreating some patients.

The aim of the study was to investigate how postoperative NRS pain scores of the patients relate to the presence of "bearable" versus "unbearable" pain. In a prospective study, the postoperative NRS pain scores were compared with the same patients' adjectival descriptions of pain on a Verbal Rating Scale (VRS). The agreement between patients and professionals on the relationship between the NRS and VRS was then studied on the basis of comparisons between the two scales. We hypothesized that patients and professionals might differ in their interpretation of NRS scores.

Methods

Design

We describe a cross-sectional study of a large sample of patients admitted for elective surgery. The current study was part of a large cluster-randomized study, implementing a prediction rule for improving the treatment of postoperative nausea and vomiting. In this study, 23,000 in- and out-patients participated. The study was approved by the institutional Ethics Committee of the University Medical Centre in Utrecht. It was not necessary to obtain informed consent from the patients because pain measurement is part of clinical care. Verbal informed consent was obtained for each patient. Informed and

voluntary consent of the health care professionals was assumed by return of a completed questionnaire.

Subjects

Between March 16th, 2006 and December 21st, 2007, all adult patients scheduled for elective surgery at the University Medical Centre of Utrecht were recruited. The following patients were excluded: those who were transferred directly to an intensive care unit; who needed postoperative ventilatory support; who had complications followed by a second operation; who did not understand the verbal questions of the research nurse; or who underwent ambulatory surgery. All patients received a written brochure preoperatively giving information about postoperative pain measurement and treatment, in accordance with the protocol of the hospital's Acute Pain Service.

Furthermore, we conducted a national survey in which 303 professionals participated: anesthesiologists, Acute Pain Nurses, nurses working on the Post Anesthesia Care Unit (PACU), student PACU-nurses and ward nurses. The health professionals were a convenience sample. During one week in May, 2008 the PACU nurses and nurses on the surgical wards of the UMC Utrecht were visited and invited to participate in the study. In addition, the nurses in training in the UMC Utrecht for PACU-nurse and working in different hospitals in the Netherlands were invited to participate. The anesthesiologists were randomly selected from a national anesthesia congress. The Acute Pain Nurses, registered as members of the Dutch association for pain nurses in 2008, were approached by email. All health professionals were personally informed and invited to participate by the pain nurse who was not involved in patient care.

Data collection

Trained research nurses who were not involved in the postoperative care asked the patients about their pain at rest on the day after surgery. The 11 point NRS was used, where 0 indicates no pain and 10 the worst pain imaginable. The VRS used in this study gives five expressions on a scale of increasing burden: “no pain” (VRS 0), “little pain” (VRS 1), “painful but bearable” (VRS 2), “considerable pain” (VRS 3) and “terrible pain” (VRS 4). The first three categories together (“no pain”, “little pain” and “painful but bearable”) were considered “bearable” and the last two categories together (“considerable pain” and “terrible pain”) were deemed as “unbearable” pain. Furthermore, information concerning gender, age, surgical procedure and type of anesthesia was gathered. The professionals were invited to relate the NRS to the VRS; they received a hand-delivered questionnaire with the five descriptions constituting the aforementioned VRS and were asked to relate the numbers 0–10 of the NRS to these words. The questionnaires were hand-collected when once completed. No demographic data from the health professionals were collected.

Statistical analyses

Data were analyzed using descriptive statistics on complete cases. Results for continuous variables were expressed as mean (SD) or as median for variables following normal and non-normal distributions, respectively. Categorical data were expressed as frequencies. Correlations between NRS and VRS were calculated by the Spearman rank correlation coefficient. Statistical testing for non-normally distributed variables used the Mann-Whitney test, and for categorical values the χ^2 test. Sensitivity and specificity of the NRS in detecting “unbearable” pain were calculated using cut-off points VRS ≤ 2 (bearable pain) and VRS > 2 (unbearable pain) and were represented by a Receiver Operator Characteristic (ROC) curve. To analyze the relationship between VRS and NRS scores, we used the modal score (the most frequent value) of the numbers of the NRS per VRS category and examined whether this relationship differed between patients and professionals. To be able to detect differences between males and females and different age groups we did subgroup analyses for gender and age. Statistical analyses were performed using SPSS Statistical Software, version 15.0 (SPSS Inc., Chicago, IL). The results were considered statistically significant if the p-values were less than 0.05.

Results

Patients

The demographic and perioperative data are presented in Table 1. Data from 10,576 surgical inpatients were eligible for the current study; the other 12,424 patients underwent ambulatory surgery or did not meet the inclusion criteria. An NRS and VRS pain score pair was obtained 24 hours after surgery from 10,434 patients. Data on one or both scales were incomplete for 142 patients, mainly because they were too sick to determine the pain score; failed to understand; were confused; or were uncooperative.

Figure 1 shows the distribution of the NRS scores of actual pain at rest 24 hours after the operation. The median NRS score was 2. Twenty-four percent of the patients scored an NRS > 4 ; this is the threshold value for pain treatment according to various guidelines (APS, 1995; Gordon et al., 2005).^{1,6} In general, women reported higher pain scores than men (median 3 versus 2, respectively; $p < 0.001$). Older patients (aged 65 and older) reported lower pain scores than younger patients (median 2 versus 3; $p < 0.001$) (Table 2).

Table 1. Demographic and perioperative data (n=10,434 patients).

Age, mean \pm SD (range)	52 \pm 17 (18–98)
Gender N (%)	
Female	5,348 (51)
Male	5,086 (49)
Type of surgery N (%)	
General	2,097 (20)
ENT/faciomaxillary	1,988 (19)
Orthopedic	1,058 (10)
Neurosurgery	974 (9)
Urology	965 (9)
Gynecologic	868 (8)
Plastic surgery	838 (8)
Vascular surgery	676 (6)
Eye surgery	593 (6)
Cardiothoracic	226 (2)
Other	151 (1)
Type of anesthesia N (%)	
General	9,182 (88)
Locoregional	1,252 (12)

ENT=ear, nose and throat surgery.

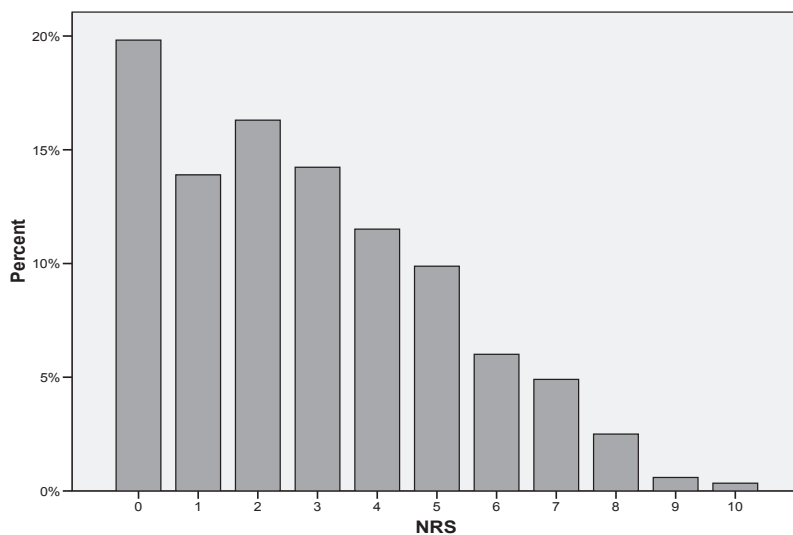


Figure 1. NRS scores of the postoperative patients in percentages.

Table 2. Differences in NRS pain scores.

		Median pain score	p-value
Gender (n)	Male (5,086)	2	<0.001 ^a
	Female (5,348)	3	
Age (n)	≥ 65 years (7,760)	2	<0.001 ^a
	< 65 years (2,674)	3	

^a Mann-Whitney test.

Figure 2 shows the distribution of the VRS scores of actual pain at rest 24 hours after surgery. Both the median and the mode of the VRS scores were 1 (“little pain”). In total, 22.7% of the patients reported “no pain” (VRS 0), 38.9% reported “little pain” (VRS 1), 29.4% reported “painful but bearable” (VRS 2), 8.3% reported “considerable pain” (VRS 3) and 0.7% reported “terrible pain” (VRS 4). Women consistently reported more severe pain scores than men ($p < 0.001$). Older patients reported less severe pain scores than younger patients ($p < 0.001$) (Table 3).

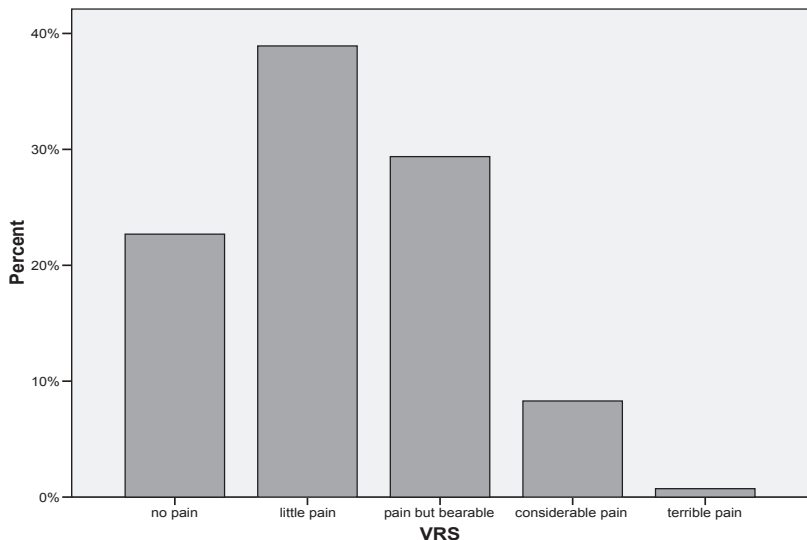


Figure 2. VRS scores of the postoperative patients in percentages.

Table 3. Differences in VRS pain scores.

			Considerable and terrible pain	p-value
Gender (n)	Male	(5,086)	7.6%	<0.001 ^b
	Female	(5,348)	10.3%	
Age (n)	≥ 65 years	(7,760)	8.0%	<0.001 ^b
	< 65 years	(2,674)	9.4%	

^b Chi-square test.**Professionals**

One hundred and forty anesthesiologists participated (response rate 100%), along with 50 Acute Pain Nurses (response rate 94%); 33 PACU nurses (response rate 100%); 16 nurses in training for PACU-nurse (response rate 100%); and 67 nurses on the ward (response rate 100%).

The relation of the NRS to the VRS

The VRS and NRS scores of the patients were significantly correlated (Spearman correlation coefficient $r = 0.84$, $p < 0.001$). Twenty-four percent of the postoperative patients reported an NRS pain score > 4 , while 9% reported “considerable” or “terrible pain” on the VRS. The patients associated NRS 0 with VRS “no pain”; NRS 1–3 with VRS “little pain”; NRS 4–5 with VRS “painful but bearable”; NRS 6–8 with VRS “considerable pain”; and NRS 9–10 with VRS “terrible pain”.

As different guidelines show various NRS cut-off points to determine the need for treatment with analgesics, the sensitivity and specificity of the NRS scores and VRS “bearable” and “unbearable” were calculated for different NRS cut-off points. Figure 3 shows an ROC curve depicting the sensitivity and 1-specificity for these cut-off points. Using an NRS cut-off point of 4, 17% of the patients considered NRS > 4 to be “bearable” pain (1-specificity) and 5% with NRS ≤ 4 considered it as “unbearable” pain (sensitivity). So using an NRS cut-off value of 4 for analgesic administration, 17% of the patients would be incorrectly classified as having unbearable pain, possibly resulting in overtreatment, while 5% would be undertreated because they were incorrectly classified as having bearable pain. With an NRS cut-off point of 3, 30% of the patients would be overtreated and 3% would be undertreated.

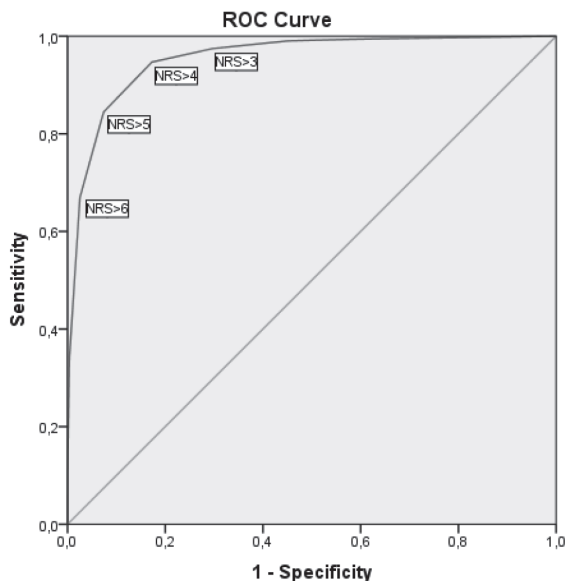
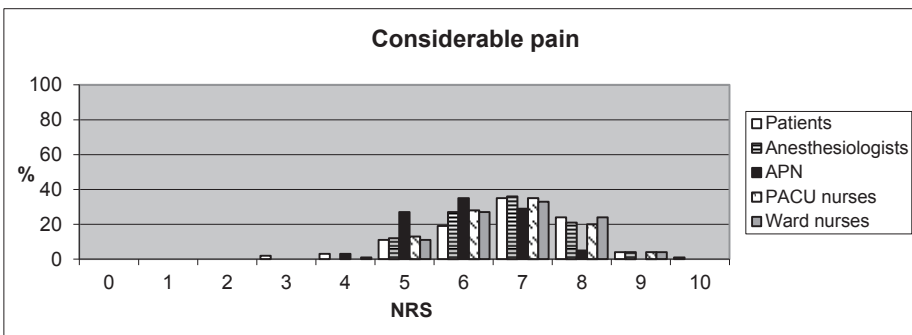
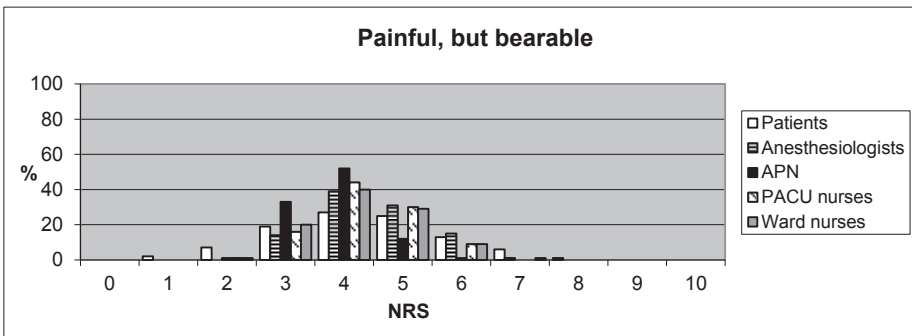
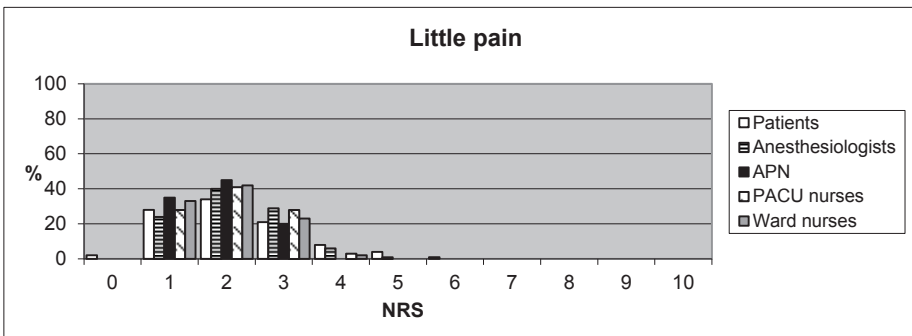
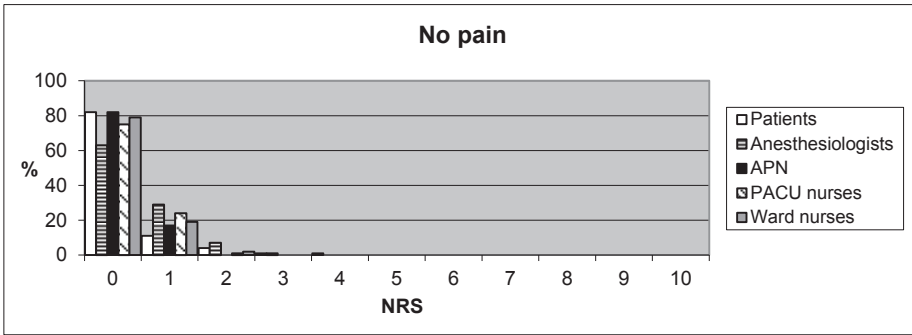


Figure 3. ROC curve of bearable pain ($VRS \leq 2$) and unbearable pain ($VRS > 2$) with the different NRS cut-off points for 10,434 patients.

Figure 4 shows the distribution of the relationship between the NRS and VRS according to the patients and the professionals. The PACU and ward nurses interpreted the NRS and VRS scores in the same way: NRS 0 equated with VRS “no pain”; NRS 1–3 with VRS “little pain”; NRS 4–5 with VRS “painful but bearable”; NRS 6–8 with VRS “considerable pain”; and NRS 9–10 with VRS “terrible pain”. The anesthesiologists interpreted NRS 1 as “no pain” but their other ratings were identical to those of the PACU and ward nurses. The Acute Pain Nurses interpreted the scores differently: NRS 1–2 “little pain”; 3–4 “painful but bearable”; 5–7 “considerable pain”; and 8–10 “terrible pain”. The distribution of the NRS scores over the VRS categories given by the Acute Pain Nurse was shifted to the left in comparison with those of the other professionals and patients, because they assigned lower NRS scores to the VRS categories.



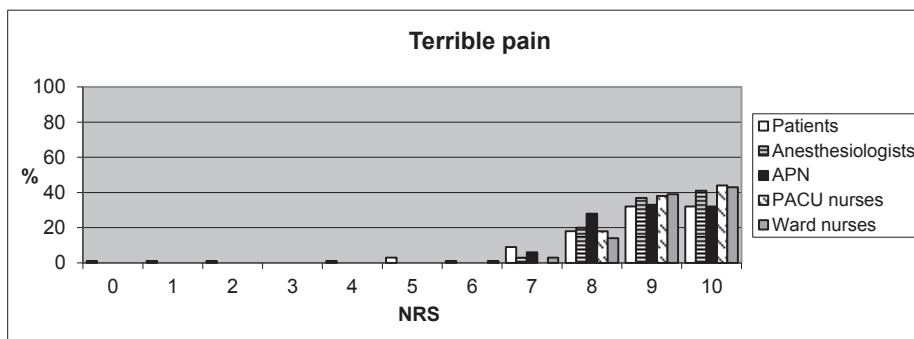


Figure 4. The relations made of the NRS with the VRS by patients and professionals: Anesthesiologists, Acute Pain Nurses, Post Anesthesia Care Unit nurses and ward nurses. Spearman Correlation Coefficient NRS-VRS $r = 0.84$, $p < 0.001$.

Discussion

The present study distinguishes “bearable” from “unbearable” postoperative pain and analyzes the relationship between NRS and VRS scores as assessed by postoperative patients and professionals. We found that most patients (65%) with NRS 4–6 considered their pain bearable. Among the professionals, the anesthesiologists, PACU and ward nurses interpreted the NRS scores in the same way as the patients. Only the Acute Pain Nurses interpreted the scores differently.

In previous studies, different descriptions of pain have frequently been used: no; mild; moderate; and severe pain. In a recent study on pain after orthopedic surgery, the patients related NRS 1–3 to mild; 4–5 to moderate; and 6–10 to severe pain.⁷ After coronary artery bypass grafting, NRS 1–3 was related to mild; 4–6 to moderate; and 7–10 to severe pain.⁸ These studies show that in postoperative pain the upper boundary for mild pain is NRS 3 and for moderate pain NRS 5 or 6. These results are comparable to the findings of the current study. However, instead of moderate pain we used the term “painful but bearable”. For severe pain we distinguished “considerable” and “terrible pain”. Several previous studies have demonstrated that postoperative patients suffer moderate to severe pain despite the use of guidelines⁹⁻¹¹ and that nurses often underestimate the severity of postoperative pain of the patients in their care.¹²⁻¹⁴ It is, however, uncertain to what extent the patients who indicate “moderate” pain really suffer. In the current study most patients with NRS 4-6 considered their pain as bearable. This relates with other studies where the patients were satisfied with their postoperative pain relief although they still had moderate pain.^{9,12,15} It is possible that most patients experienced moderate but “bearable” pain and that the nurses did not underestimate the patients’ pain.

Most patients with NRS 4–6 considered their pain bearable. Possible reasons are that patients do not understand the NRS pain scores or refuse pain therapy because of side effects or fear for addiction.¹⁶ It is unknown why some patients bear acute pain to some degree and why others do not. Nurses should not only ask the patient about the pain score and follow the guidelines rigidly but also communicate with the patient about the pain and pain therapy.¹⁷ The numerical pain ratings are only one dimension of the patient's subjective experience of pain¹⁸ and adequate pain relief cannot be reliably achieved using opioid analgesics without a high risk of adverse effects.¹⁹

The results of the current study indicate that the patients and the professionals have a different view of the range of numerical ratings that indicate “bearable” or “unbearable” pain. In particular, Acute Pain Nurses tended to overestimate the severity of pain as perceived by the patient when interpreting NRS scores. Of all health care professionals, the nurses operate most closely to the patient in postoperative care and they can make independent medication decisions for pain relief. The results of this study suggest that the PACU and ward nurses were best informed about what the patients consider as “bearable” pain. In contrast, the Acute Pain Nurses evaluated the pain scores differently from the patients; they more often overestimate the intensity of pain. In most hospitals the Acute Pain Nurse is the coordinator of the Acute Pain Service and responsible for the in-service education of health care professionals. Although he/she often daily checks up on the patients with Patient Controlled Analgesia or epidural analgesia, the Acute Pain Nurse is not as close to the patient as the ward and PACU nurses are. Another possible explanation of the observed differences is that the Acute Pain Nurses are typically aware of the results of several former studies which have repeatedly demonstrated underassessment and undertreatment of postoperative pain.^{20–22}

What does “moderate” pain or an NRS 5 or 6 mean for the patient in order to decide on the need for opioid administration? In the present study, many patients who reported an NRS of 5 or 6 considered their condition to be “*painful but bearable*”. A patient who indicates that his/her pain is “bearable” might not necessarily want to receive additional analgesic medication, even though all guidelines suggest starting treatment on the basis of these NRS scores. Although we did not ask the patient if he/she would need treatment for his pain, and we did not measure the administered amount of analgesics, the data imply a potential risk of overtreatment when health care providers follow the postoperative pain guidelines to the letter. Because a number of studies have demonstrated poor control of the postoperative pain^{9–11} the Joint Commission on Accreditation of Health Care Organizations defined new standards for pain management in their standards manual.²³ In addition, the American Pain Society and the Dutch VMS recently provided recommendations for improving the quality of acute and cancer pain management.^{5,6} In these recommendations increasing emphasis is placed on reducing the patients' pain scores, which entails increased analgesic usage. Decreasing the intensity of pain is a laudable objective and one of the pillars of health care. In postoperative pain

management, both undertreatment and overtreatment are undesirable. Unrelieved pain has adverse psychological and physiological consequences e.g., more complications and prolonged hospital stay.²⁴ On the other hand, improved pain control should not jeopardize patient safety.¹³ Unnecessary use of analgesics, especially opioids, increases the patient's discomfort because of the side effects, such as nausea, vomiting and pruritus. Unnecessary opioid administration also increases the probability of sedation and potentially dangerous respiratory depression.^{25,26} An increase of opioid oversedation is reported after the implementation of the new standards of the Joint Commission.²⁷ Therefore, to balance the risks of overtreatment and undertreatment in this range of numerical pain scores, the health care provider might simply add the following question: "would you like to have an analgesic?" In addition, the patients' level of consciousness should be assessed when patients receive (additional) opioids.

Limitations

The present study is subject to a number of limitations. We measured the postoperative pain scores of the patient in rest. These pain scores can be different of the pain scores at movement. Nevertheless, the purpose of the study was to examine what numeric ratings were bearable to the patient. The health care professionals participated in this study were a convenience sample and no demographic data were collected. Regarding their level of experience, however, given the fact that all professionals working in the shift in which the data were collected participated, the sample was representative. Another potential source of error is the order in which the two pain scores were asked. All patients first indicated the severity of their pain on the VRS and then on the NRS. We chose this order because we anticipated that patients might try to "convert back" to an adjective in the VRS once they had given an NRS score (which requires mental conversion from a subjective feeling to a number). Although in theory it can make a difference whether NRS or VRS is asked first, a recent study reported that error rates were not related to the order of presentation of the scales.²⁸

The data we used for this study were part of a larger study implementing a prediction rule to improve the treatment of postoperative nausea and vomiting (PONV). We are aware of the relationship between PONV and pain. In the larger study, the anesthesiologists were more focused on PONV and possibly prescribed less analgesia. However, we assume that there was no interference from the PONV study, because we studied two scales for expressing the severity of pain, and not the severity of the pain itself. This assumption was verified by repeating our analyses with data from the control group of the PONV study only; this yielded similar results.

Conclusions

By combining data from a large sample of surgical patients with a national survey of health care workers, a lack of agreement is found between the patients and the Acute Pain Nurses on what constitutes “bearable” pain in relation to the reported NRS scores. The Acute Pain Nurses tended to overestimate the severity of pain when the patients reported intermediate NRS scores, whereas most patients considered NRS 4–6 to be “bearable” pain. These findings suggest a potential risk of overtreatment, if the pain is assessed by the NRS only and treatment decisions are based solely on a patient’s NRS response. Specifically asking a patient whether the pain is bearable and he/she would like to receive additional analgesics might circumvent this problem.

Funding

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Postoperative pain assessment based on numeric ratings is not the same for patients and professionals



Chapter 3

The diagnostic value of the numeric pain rating scale in older postoperative patients

Jacqueline F.M. van Dijk

Teus H. Kappen

Albert J. M. van Wijck

Cor J. Kalkman

Marieke J. Schuurmans

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Abstract

Aims and objectives To measure the diagnostic value of the numeric rating scale by comparing it to a verbal rating scale in older patients.

Background Pain management in older patients is an important challenge due to their greater susceptibility to adverse effects of analgesics. Nurses play an important role in applying guidelines for postoperative pain treatment. However, effective pain management is dependent upon valid and reliable pain assessment.

Design Cross-sectional study.

Methods In total 2,674 older patients scored their postoperative pain on an 11 point numeric scale (NRS) and an adjective scale (VRS) including: *no pain; little pain; painful but bearable; considerable pain; and terrible pain*. The diagnostic value of different NRS cut-off values for administering analgesics is determined by an ROC curve.

Results Sensitivity of NRS > 3 for “unbearable” pain in older patients was 97.2% with a specificity of 72%. With a cut-off point NRS > 4, sensitivity decreased to 96.7%, while specificity was 83%. With a cut-off point NRS > 5, sensitivity was 85%, while specificity was 94%. A high proportion (75%) of older old patients (≥ 75 yr.) with “*painful but bearable*” considers NRS 4, 5 and 6 to this VRS category.

Conclusion Using an NRS cut-off point > 3 or > 4, a large group of older patients with “bearable” pain would incorrectly classified as “unbearable”. When we make the assumption that bearable pain means no wish for additional analgesics, this misclassification might result in overtreatment with analgesics, while 3% would be undertreated. With NRS cut-off point > 5, 6% have a risk of overtreatment and 15% of undertreatment.

Relevance to clinical practice Nurses should not rely solely on the NRS score in determining pain treatment; they need to communicate with older patients about their pain, the need for analgesics and eventual misconceptions about analgesics.

Introduction

The population of older people, defined as 65 years and older, is one of the fastest growing groups in Europe and the United States (US). In Europe, from 2000 to 2030 the percentage of older people will increase from 14 to 21% of the total population and in the US from 10 to 20%.¹ The older old, those aged 75 and older, compose a rapidly growing group within the older population. As older adults frequently undergo surgery, the number of surgical procedures will increase significantly in the upcoming decades. Surgical procedures can result in postoperative pain and health care providers are expected to relieve this pain safely.

Background

According to the American Pain Society guidelines² for pain management, postoperative pain should be regularly assessed and carefully documented. The intensity of pain should be assessed at intervals depending on the severity of pain and the clinical situation. The need for regular assessment makes pain management a significant part of nursing care. Due to the subjective nature of pain, effective communication between the person in pain and the health care provider is essential to select an appropriate drug and dose for pain relief. Nurses mostly assess pain through verbal communication with the patient. The patient's Numeric Rating Scale (NRS) score is often a leading indicator in the assessment of postoperative pain. An NRS is obtained by asking a patient to rate his or her pain on an 11 point scale, where 0 indicates no pain and 10 indicates the worst imaginable pain. The NRS and the Verbal Rating Scale (VRS) may be the most suitable instruments for older adults because of the validity, reliability and preference; the Visual Analogue Scale (VAS) seems to be the least suitable scale to score pain intensity in older adults because of poor comprehension and high error rate.³⁻⁵ The NRS and VRS are also suitable for older patients with mild to moderate cognitive impairment.^{6,7}

Most guidelines for pain management recommend prescription of analgesics on the basis of the patients' NRS pain score.^{2,8,9} However, the NRS threshold for prescribing analgesics varies: some guidelines for acute and cancer pain use an NRS cut-off > 4 ^{2,8} while at least in one other guideline, also for acute and cancer pain, an NRS cut-off > 3 is the criterion for administering analgesics.⁹ Moreover, not all older patients with an NRS pain score above the threshold for analgesic therapy will necessarily consider their pain "unbearable", and they might not be willing to accept the analgesic treatment. Both undertreatment and overtreatment of pain in older patients are not desirable. Due to altered pharmacodynamics and pharmacokinetics older patients are more susceptible to the sedative and respiratory depression effects of opioids¹⁰ and receive more prolonged pain relief.¹¹ On the other hand, undertreatment of pain in older patients increases the risk for functional decline, atelectasis, pneumonia, thromboembolism, and depressed

immune function.¹² Therefore, the need for appropriate pain management in older patients is crucial. The population older patients defined as 65 years and older is very heterogeneous.¹³ The older old, aged 75 years and older, compose a rapidly growing group within the older population. The number of surgical procedures in this age group has increased significant in the last decade. Nevertheless, there is not much known about the pain assessment in the older old patients, those aged of 75 years and older.

The aim of the study is to measure the diagnostic value of the NRS in the old and the older old patients by comparing it to a Verbal Rating Scale (VRS), which distinguished “bearable” from “unbearable” pain and may indicate the need for analgesics.

Methods

Design

A cross-sectional study was performed within a large study about postoperative care. The study was approved by the institutional Ethics Committee of the University Medical Centre in Utrecht. It was not necessary to obtain informed consent from the patients because pain measurement is part of clinical care. Verbal informed consent was obtained for each patient.

Patients

Between March 16th, 2006 and December 21st, 2007 all older inpatients scheduled for elective surgery at the University Medical Centre of Utrecht were included. Exclusion criteria were postoperative stay at the intensive care unit, insufficient knowledge of the Dutch language and patients who could not rate the VRS and NRS because of cognitive impairment, hearing impairments and inability to use self-report.

Measures

Pain at rest was measured by an interview with each patient on the ward on the day after surgery to exclude the effects of anesthesia. Trained research nurses who were not involved in the postoperative care of that patient first asked patients to indicate the severity of their pain on the VRS and then on the NRS. The 11 point NRS was used, and it was explicitly stated to patients that 0 indicated no pain and 10 the worst pain imaginable. The VRS used in this study gives five expressions on a scale of increasing burden: “no pain” (VRS 0), “little pain” (VRS 1), “painful but bearable” (VRS 2), “considerable pain” (VRS 3) and “terrible pain” (VRS 4). For the purpose of this study, the first three categories (“no pain”, “little pain” and “painful but bearable”) were considered to represent “bearable” pain (VRS ≤ 2) and the last two categories together (“considerable pain” and “terrible pain”) were deemed as “unbearable” pain (VRS > 2). Demographic data were collected concerning gender, age and surgical procedure.

Statistical analyses

Data were analyzed using descriptive statistics on complete cases. Results for continuous variables were expressed as mean (SD) or as median for variables following normal and non-normal distributions, respectively. Categorical data were expressed as frequencies. The correlation between NRS and VRS was calculated by the Spearman rank correlation coefficient. Sensitivity and specificity of the NRS in detecting 'unbearable' pain were calculated using cut-off points $VRS \leq 2$ (bearable pain) and $VRS > 2$ (unbearable pain) and were represented by a Receiver Operator Characteristic (ROC) curve. The Area Under the ROC Curve (AUC) was calculated. To analyze the relationship between NRS and VRS scores, we calculated the mode score (the most frequent value) of the NRS per VRS category; subgroup analyses were performed for patients between 65 and 74 years and 75 years and older. Statistical analyses were performed using SPSS Statistical Software, version 15.0 (SPSS Inc., Chicago, IL). The results were considered statistically significant if the p-values were less than 0.05.

Results

In total 2,674 older postoperative patients were included in the study; 138 patients were not able to complete one or both pain measurement instruments. The demographic data are presented in Table 1.

Table 1: Demographic and perioperative data (n = 2,674 patients).

Age, mean \pm SD (range)	73 \pm 6 (65–98)
Gender N (%)	
Female	1,358 (51)
Male	1,316 (49)
Type of surgery N (%)	
General	449 (17)
ENT/faciomaxillary	427 (16)
Orthopedic	323 (12)
Neurosurgery	238 (9)
Urology	307 (12)
Gynecologic	221 (8)
Plastic surgery	93 (4)
Vascular surgery	309 (12)
Eye surgery	192 (7)
Cardiothoracic	78 (3)
Other	37 (1)

ENT=ear, nose and throat surgery. Values are numbers (%).

The median NRS score was 2. Figure 1 shows the distribution of the NRS scores of actual pain at rest for older patients, 24 hours after surgery.

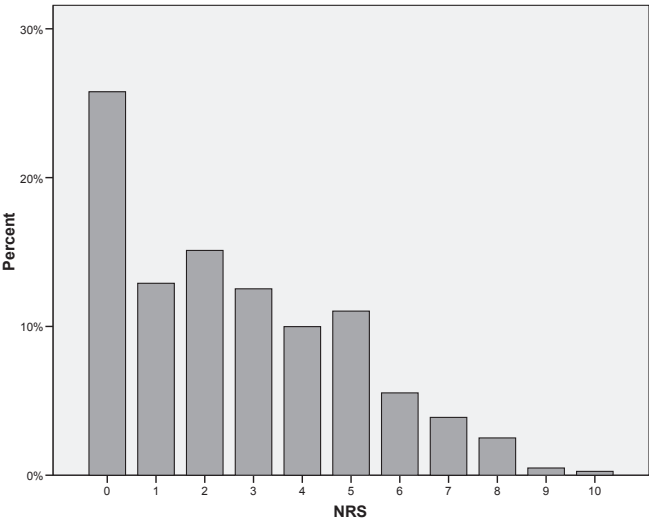


Figure 1. Pain scores on the Numeric Rating Scale 24 hours after surgery of 2,674 patients in percentages.

Both the median and the mode of the VRS scores were 1 (*little pain*). Figure 2 shows the distribution of the VRS scores of actual pain at rest 24 hours after surgery.

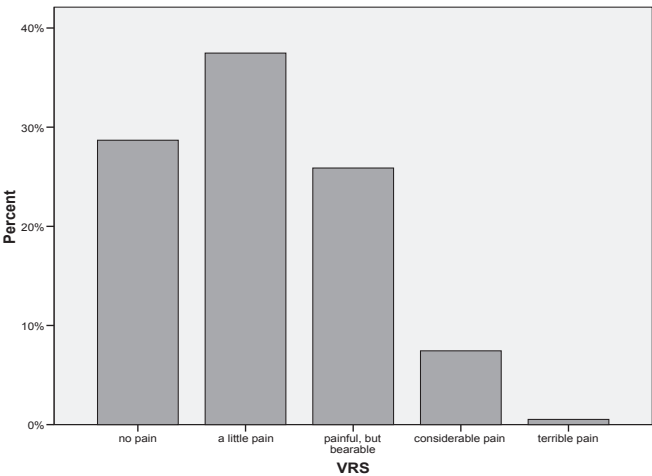


Figure 2. Pain scores on the Verbal Rating Scale 24 hours after surgery of 2,674 patients in percentages.

The relation of the NRS to the VRS

The NRS and VRS scores of older patients were significantly correlated: the Spearman correlation coefficient for all older patients was $r = 0.86$ ($p < 0.001$).

Sensitivity of $NRS > 3$ for “unbearable” pain in all older patients was 97.2% with a specificity of 72%. With a cut-off point $NRS > 4$, sensitivity decreased to 96.7%, while specificity was 83%. Sensitivity of $NRS > 5$ was 85%, while specificity was 94%. The area under the ROC-curve was 0.96. (Figure 3).

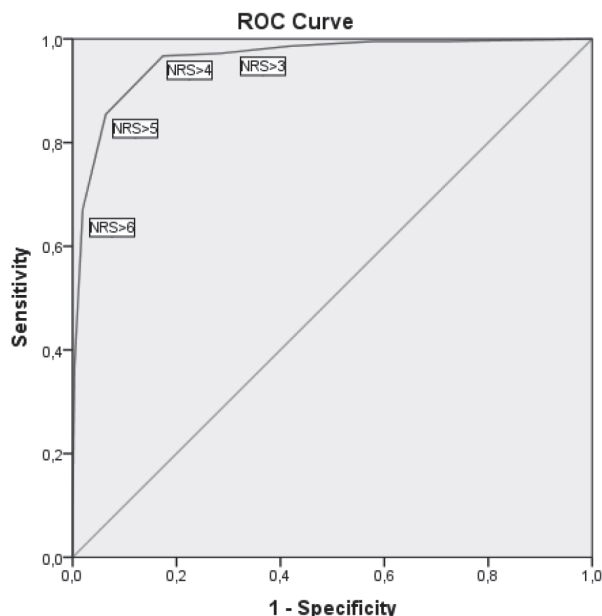


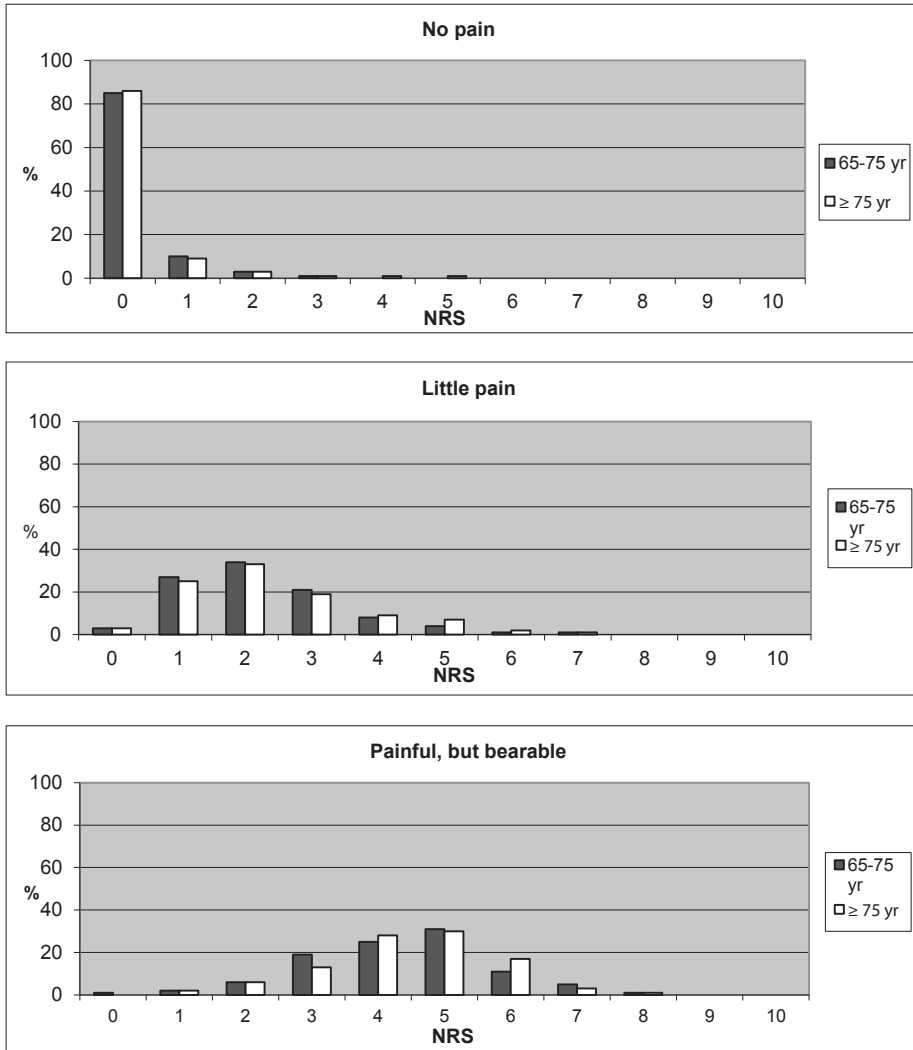
Figure 3. ROC curve of unbearable pain ($VRS > 2$) with the different NRS cut-off values for patients aged ≥ 65 years.

The most common NRS score (the mode) within older patients reporting VRS “no pain” was NRS 0 (85%); the mode within VRS “little pain” was NRS 2 (34%); within VRS “painful but bearable” was NRS 5 (31%); within VRS “considerable pain” was NRS 7 (33%); and within VRS “terrible pain” was NRS 10 (43%).

For subgroup analysis two groups were made: 65 to 74 years ($n = 1,640$) and 75 years and older ($n = 1,034$). Correlation of NRS and VRS scores in patients of 65 to 74 years of age was $r = 0.85$ ($p < 0.001$) and in patients of 75 years and older $r = 0.87$ ($p < 0.001$). There were no relevant differences in ROC-curves or AUC between the subgroups.

The most common NRS scores per VRS category differed between the subgroups. The most common NRS score within patients of 65 to 74 years of age reporting VRS “no pain” was NRS 0 (85%); the mode within VRS “little pain” was NRS 2 (34%); within VRS

“painful but bearable” was NRS 5 (31%); within VRS “considerable pain” was NRS 7 (40%); and within VRS “terrible pain” was NRS 9 and 10 (both 33%). In patients of 75 years and older, the mode within VRS “no pain” was NRS 0 (86%); within VRS “little pain” was NRS 2 (33%); within VRS “painful but bearable” was NRS 5 (30%); within VRS “considerable pain” was NRS 8 (39%); and within VRS “terrible pain” was NRS 10 (60%). NRS scores of the older patients that were related to VRS categories considerable and terrible pain were higher than the NRS scores of the younger patients (Figure 4).



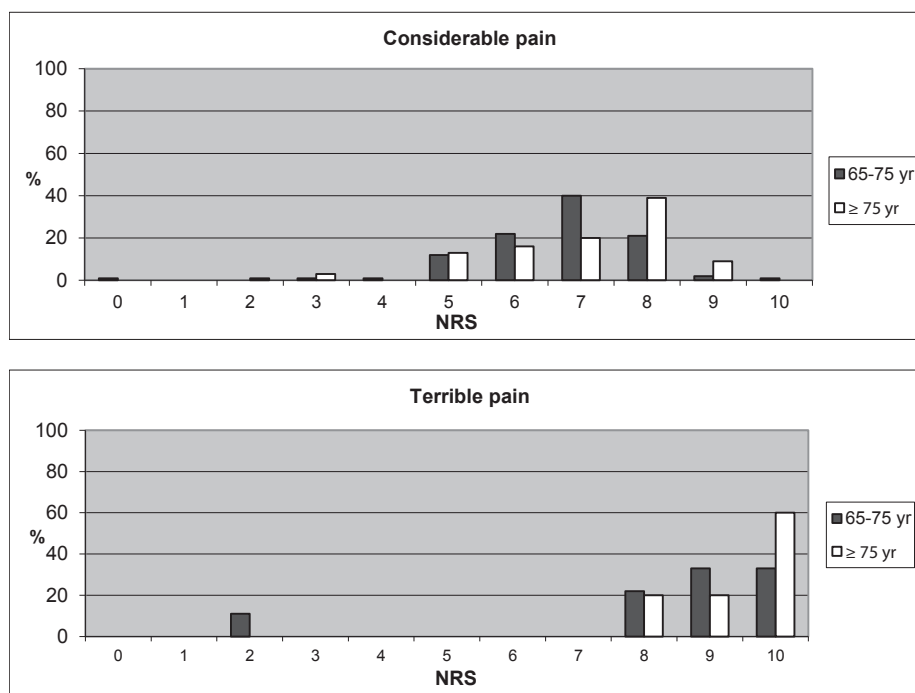


Figure 4. The relation of the NRS to the VRS according to the two subgroups of older patients (per VRS category).

Discussion

In the present study the diagnostic value of the Numeric Rating Scale (NRS) to assess postoperative pain in a large group of older patients was analyzed by comparing it to a Verbal Rating Scale (VRS). The NRS is highly correlated to the VRS ($r = 0.86$, $p < 0.001$) and when using the NRS to distinguish “bearable” from “unbearable” pain - as a surrogate for the need for analgesics - the area under the ROC-curve is very high (0.96); there is no difference between old and older old patients. These results highly suggest that the NRS is an appropriate tool for assessment of postoperative pain in all older patients. Despite the high correlation and the high area under the ROC-curve, the NRS might be insufficiently accurate close to guideline cut-off values for administration of additional analgesics. When assessing an older patient’s pain using an NRS cut-off value of greater than 3 for analgesic administration, 28% of the patients with bearable pain would be incorrectly classified as having unbearable pain (1-specificity). For patients having unbearable pain 3% of all older patients would be incorrectly classified as bearable pain (1-sensitivity). With a higher

cut-off point, NRS greater than 4, 17% of the older patients with bearable pain would be incorrectly classified as having unbearable pain and 3% with unbearable pain would be classified as having bearable pain. If the cut-off point is further increased to above 5, 6% of the older patients with bearable pain would be classified as having unbearable pain and 15% with unbearable pain would be classified as having bearable pain. Patients who indicate that their pain is bearable might not necessarily want to receive additional analgesic medication, even though all guidelines ^{2,8,9} suggest starting treatment on the basis of these NRS scores.

Of all older patients who scored VRS “*painful but bearable*”, 70% of these patients gave an NRS score of 4, 5 or 6; 67% of patients of 65 to 74 years and 75% of the patients of 75 years and older. A higher proportion (17%) of older old patients (75 years and older) consider NRS 6 as “*painful but bearable*” compared to the younger patients between 65 and 75 years of age (11%). Older old patients are at higher risk of overtreatment when health care providers rigidly follow guidelines that prescribe strong analgesics for pain scores higher than 3 or 4 without probing the patient’s preference for pharmacological treatment.

A reason why older patients consider high NRS scores as “bearable” pain might be that they fail to understand the NRS or are unaware of the cut-off values for pain treatment used in guidelines. It is also possible that older patients may not complain of pain because they want to be seen as “good patients”.^{10,14} These patients fail to report pain because they perceive that health care professionals are “too busy” and they do not want to bother them. In addition, some older adults are stoic, believing that they should tolerate unnecessary pain, and should not ask for or self-administer analgesia until pain is more severe.¹⁵ Alternatively, the older patient may not report pain because they are worried about taking pain medication. They fear that they will become addicted to analgesics or they are concerned about the undesirable side effects associated with pain medication.¹⁴ Furthermore, older patients may report less pain because they have experienced more painful events during their lifetime than those who have lived fewer years. These experiences may cause them to interpret any noxious stimulus in an age-dependent context that decreases perception of severity.¹⁶ Finally, ageing can produce physiological and psychological changes which result in pain being reported very differently from that of younger patients. Some studies assume that perceptions of pain diminish with ageing, although, the precise nature of the relationship between aging and pain perception is unclear.^{17,18}

A number of studies have demonstrated poor control of postoperative pain,^{19,20} therefore, recommendations are made for improving the quality of acute pain management.^{8,21} In these recommendations increasing emphasis is placed on reducing the patients’ pain scores, which entails increased analgesic usage. In postoperative pain management for older patients both undertreatment and overtreatment are undesirable. Unrelieved pain has adverse physiological and psychological consequences. On the other hand, unnecessary use of analgesics, especially opioids, increases the older patient’s

discomfort because of side effects and increases the probability of sedation and potentially dangerous respiratory depression. Old patients and moreover, older old patients are more vulnerable for these adverse effects of opioids.

Limitations

This study has some limitations. The first limitation of this study may be that we measured the postoperative pain scores of the older patients only in rest. These pain scores can be different of the pain scores at movement. In addition, we did not actually ask patients if they would need treatment for their pain and we did not measure the administered amount of analgesics. However, assuming that “bearable” pain is similar to no requirement for additional analgesics, the data imply a large risk of overtreatment when health care providers follow the postoperative pain guidelines to the letter.

The second limitation might be the order in which the two pain scores were asked. All patients first indicated the severity of their pain on the VRS and then on the NRS. We chose this order to anticipate that patients might try to “reason back” from their NRS score to an adjective in the VRS (which requires mental conversion from a number to a subjective feeling). Although in theory it can make a difference whether NRS or VRS is asked first, a recent study reported that error rates were not related to the order of presentation of the scales.³

Conclusion

When assessing postoperative pain in older patients using the NRS, a large group of old and older old patients with bearable pain would be incorrectly classified as having unbearable pain. This misclassification can result in overtreatment with analgesics in older patients, which may result in potentially dangerous adverse effects. Therefore, pain treatment for old and older old patient should be individualized, rather than using the same cut-off score for all older patients.

Relevance to clinical practice

With NRS scores close to guideline cut-off values for administration of additional analgesics, pain treatment in old and older old patients requires great caution because of the risk of overtreatment. Appropriate evaluation of pain is critical to effective pain management for these patients and relies on the development of a good nurse/patient relationship. It is recommended that nurses allow sufficient time for pain assessment, and instruction must be given on the use of the Numeric Rating Scale each time it is administered. Moreover, nurses should not rely solely on the NRS score in determining pain treatment. In addition, nurses need to communicate with patients about their pain, the need for analgesics and eventual misconceptions about analgesics.

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Chapter 4

The relation between patients' NRS pain scores and their desire for additional opioids after surgery

Jacqueline F.M. van Dijk
Teus H. Kappen
Marieke J. Schuurmans
Albert J.M. van Wijck

Pain Practice,
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Abstract

Background Postoperative pain is commonly assessed through a Numerical Rating Scale (NRS), an 11-point scale where 0 indicates no pain and 10 indicates the worst imaginable pain. Guidelines advise the administration of analgesics at NRS pain scores higher than 3 or 4. In clinical practice, not all patients with pain scores above the treatment threshold are willing to accept additional analgesic treatment, especially when opioids are offered. The objective of this study is to measure the relation between patients' NRS pain scores and their desire for additional opioids.

Methods This cross-sectional study examined 1,084 patients in an academic hospital the day after surgery between January 2010 and June 2010. The day after surgery, patients were asked to score their pain and desire for opioids. Sensitivity, specificity, positive predictive value, and negative predictive value of the desire for opioids and the different NRS thresholds were calculated.

Results Only when patients scored an 8 or higher on the NRS did the majority express a need for opioids. Many patients did not desire opioids, because they considered their pain tolerable, even at an NRS score higher than 4.

Conclusions With the current guidelines (i.e., using pain scores higher than 3 or 4 for prescribing opioids), many patients could be overtreated. Therefore, scores generated by the NRS should be interpreted individually.

Introduction

Postoperative pain is commonly assessed through a Numerical Rating Scale (NRS). Patients are asked to rate their pain on an 11-point scale, where 0 indicates no pain and 10 indicates the worst imaginable pain. The NRS is considered a valid and reliable pain assessment tool.¹⁻³ In 2000, new pain standards were implemented by the Joint Commission on Accreditation of Health Organizations (JCAHO). These standards made adequate pain management a clinical performance measure and pain a fifth vital sign.⁴ Many institutions implemented treatment policies guided by patient pain-intensity ratings indexed with a numerical scale that resulted in cut-off scores for prescribing analgesics.⁵ Some guidelines suggest NRS scores of > 4 as a cut-off for prescribing analgesics.^{6,7} However, the Dutch guideline suggests $\text{NRS} > 3$ as a cut-off,⁸ as the health care inspectorate contends that only few patients should have high postoperative NRS scores. This has led to increased efforts to reduce patients' pain scores that result in increased opioid prescriptions.

Merely asking for an NRS score may be insufficient to assess postoperative pain, as professionals and patients often interpret pain scores differently.^{9,10} In a previous study, 65% of postoperative patients with NRS scores between 4 and 6 considered their pain bearable.⁹

High NRS pain scores do not necessarily reflect the desire of patients for additional analgesic treatment. In clinical practice, not all patients with an NRS pain score above the treatment threshold are willing to accept the analgesic treatment, especially when opioids are offered. In a previous study that compared NRS scores to scores on a Verbal Rating Scale (VRS), it was assumed that bearable pain indicated a lack of desire for additional opioids. As the relation between NRS pain scores and the desire for opioids is uncertain, the present study aims to investigate the ability of the NRS to discriminate between postoperative patients desiring opioids and those not desiring opioids.

Methods

Design

A cross-sectional study was conducted on a sample of consecutive patients admitted for elective surgery. The study was approved by the Institutional Medical Ethics Committee of the University Medical Center in Utrecht, and the need for individual written informed consent was waived, because pain measurement is part of routine clinical care. Verbal informed consent was obtained for each patient.

Patients

All adult patients scheduled for elective surgery under either general or regional anesthesia at the University Medical Center Utrecht from January 5, 2010, to June 2, 2010, were eligible

to participate in the current study. Patients were excluded when directly transferred to an intensive care unit, when insufficiently proficient in the Dutch or English language, when undergoing ambulatory surgery, or when already discharged at the time of measurement.

Standard pain treatment

Non-pharmacological pain treatment was offered to patients, such as position in bed, applying heat and cold, etc. Acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs) were administered to all postoperative patients when not contraindicated. The next step in pain treatment were opioids. Depending on the anticipated severity of postoperative pain, patients were prescribed opioids preemptively or on demand. The aim of the pain treatment was $\text{NRS} \leq 4$, so patients were offered opioids when pain scores exceeded NRS 3. Patients were free to accept these opioids. Consequently, a proportion of included patients was receiving opioids at the time of measurement. Preoperative patients received a written brochure about postoperative pain management.

Data collection

Actual pain was measured in each patient on the ward on the morning after surgery by trained research assistants who were not involved in postoperative care. Patients were asked to rate their pain from 0 to 10, where 0 indicated no pain and 10 indicated the worst pain imaginable. Furthermore, patients were asked whether they desired opioids at the time of data collection or, if they were already receiving opioids, whether they desired additional opioids. If patients did not desire opioids or additional opioids, the reason was asked. Finally, patients with no active desire for opioids were asked at which NRS pain score they would desire opioids or additional opioids (henceforth referred to as desire for additional opioids). Information regarding gender, age, and surgical procedure was also collected.

Statistical analysis

Data were analyzed using descriptive statistics on complete cases. Results for continuous variables were expressed as mean with standard deviation (SD) or as median with interquartile range (IQR) for variables following normal and non-normal distributions, respectively. Categorical data were expressed as absolute frequencies (percentages). Sensitivity, specificity, Positive Predictive Value (PPV), and Negative Predictive Value (NPV) were calculated for different NRS cut-off points with the desire for additional opioids as the reference standard. A Receiver Operator Characteristic (ROC) curve was presented. Statistical analyses were performed using IBM SPSS Statistics version 20.0 (IBM, New York, NY, USA). Two-tailed p-values < 0.05 were considered statistically significant.

Results

Patients

In total, 1,138 patients were included (Figure 1). Fifty-four patients were excluded from the analysis, as they could not answer the questions due to sickness, confusion or sedation; 1,084 questionnaires were left to be analyzed. Demographic and perioperative data are presented in Table 1.

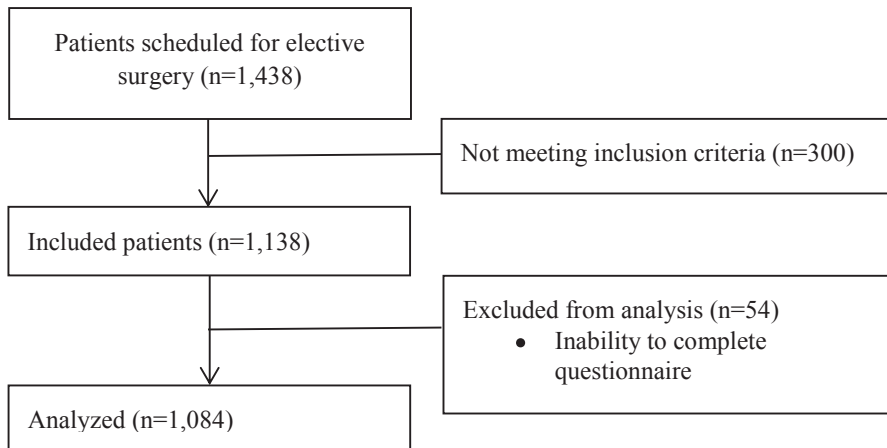


Figure 1. Profile of the study.

Table 1. Demographic data of 1,084 patients.

Age, mean (range)	53 (18–90)
Gender N (%)	
Male	560 (52)
Female	524 (48)
Type of surgery N (%)	
ENT/faciomaxillary	314 (29)
General	158 (15)
Orthopedic	132 (12)
Neurosurgery	107 (10)
Plastic surgery	98 (9)
Vascular surgery	94 (9)
Urology	70 (6)
Gynecologic	50 (5)
Eye surgery	38 (3)
Cardiothoracic	23 (2)

ENT=ear, nose and throat surgery.

Relation of the NRS and desire for additional opioids

The median actual NRS pain score was 3 (IQR 1–5). In total, 982 patients (91%) did not want additional opioids (Figure 2). The sensitivity, specificity, PPV, and NPV of the NRS scores and the desire for opioids for different NRS cut-off points are shown in Table 2. The ROC curve is presented depicting the sensitivity and 1-specificity (Figure 3).

Of all 213 patients with NRS scores between 5 and 10 and no desire for additional opioids, 62% reported that they did not want additional opioids because their pain was tolerable. Other reasons for not wanting opioids included fear of postoperative nausea and vomiting (PONV) (12%); fear of drowsiness, addiction, or dizziness (10%); the belief that opioids are not good for the body (6%); and other reasons (10%). Of all patients with NRS scores > 4 and no desire for opioids, 110 patients were on opioids and 103 patients were not.

Of all 982 patients with no active desire for additional opioids, 108 could not answer the question regarding at which pain score they would desire additional opioids, mostly because they did not understand the question. Both the median and the mode of the pain scores at which patients would desire opioids was an NRS score of 8. Moreover, 11 patients (1%) reported that they would like to have opioids if they had an NRS score ≤ 3, and 119 patients (12%) reported that they would never choose to have opioids (Figure 4).

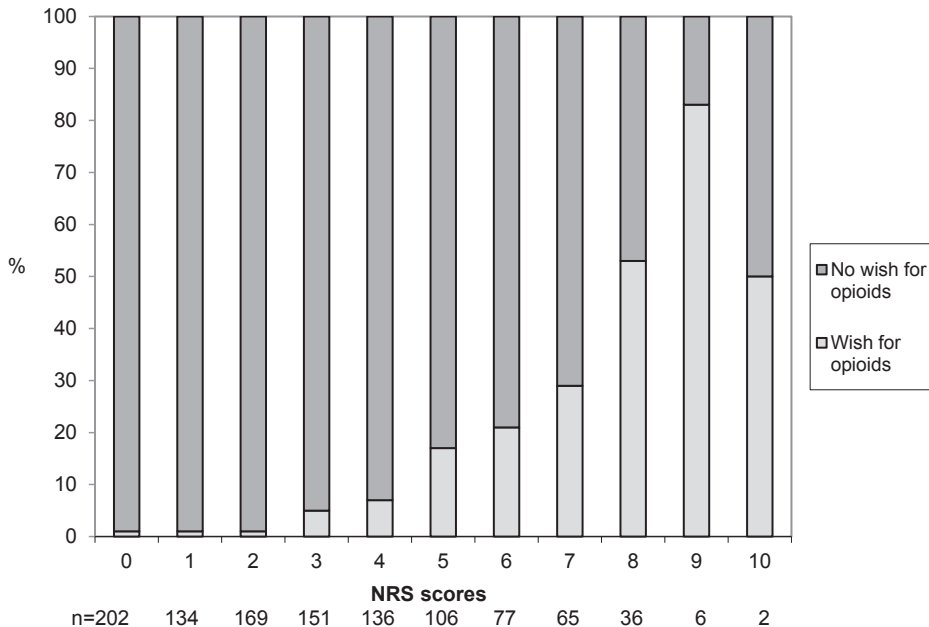


Figure 2. Distribution of patients with a desire for additional opioids and those who do not, for each NRS score, n=number of patients for each NRS score.

Table 2. Sensitivity, specificity, PPV and NPV for different NRS cut-off points in relation to the desire for additional opioids for 1,084 patients.

NRS Cut-off	PPV %	NPV %	Se %	Sp %
≥ 1	11	99	98	20
≥ 2	13	99	96	34
≥ 3	17	99	94	51
≥ 4	21	98	86	65
≥ 5	27	97	77	78
≥ 6	32	95	59	87
≥ 7	40	94	43	93
≥ 8	57	93	25	98
≥ 9	75	91	6	100
= 10	50	91	1	100

PPV=Positive Predictive Value, NPV=Negative Predictive Value, Se=sensitivity, Sp=specificity.

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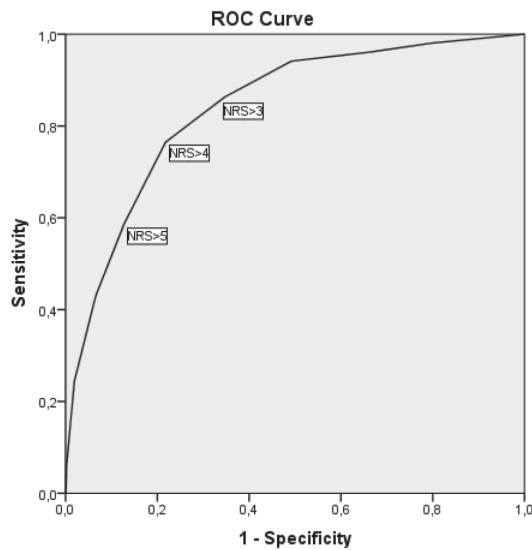


Figure 3. Receiver Operating Characteristic (ROC) curve of desire for additional opioids for the different cut-off points of NRS pain scores (Area under the curve = 0.84).

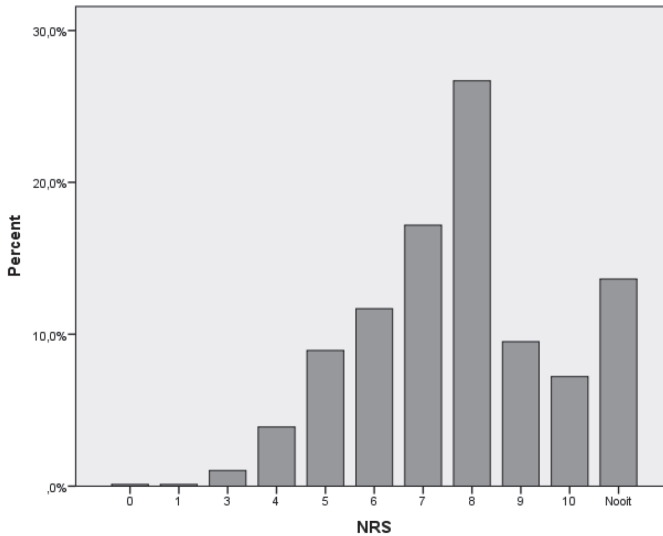


Figure 4. NRS score of all patients with no active desire for additional opioids (n=874) at which postoperative pain score they would desire additional opioids, NRS median is 8.

Discussion

The results of our study indicate that the NRS cannot adequately discriminate between patients who desire additional opioids and those who do not. Only when patients scored an 8 or higher on the NRS did the majority have a desire for additional opioids. Moreover, patients who did not have an active desire for additional opioids reported a median score of 8 as the NRS value at which they would desire additional opioids. When a patient's NRS score is the only leading factor in pain treatment, using NRS cut-off values of > 3 or > 4 according to guidelines may put patients at risk of analgesic overtreatment resulting in sedation and lethal respiratory depression.^{11,12}

The validity of a test describes its ability to distinguish between those who do and do not have a given condition. In this study, the condition in question is the patient's desire for additional opioids. In this study, the majority (73%) of patients having pain scores higher than 4 did not want additional opioids at the point of data collection. Previous studies also found that a high percentage of patients with pain scores > 4 did not need analgesics (28% of patients visiting an emergency department¹³ and 42% of postoperative children¹⁴). The reason why we have found an even higher percentage of patients refusing analgesics may be that we offered them opioids despite what analgesics they actually had received; it could be a greater barrier to accept opioids than other analgesics. Many patients are concerned about the use of opioid analgesics and have fears about addiction and drowsiness.^{15,16}

Reasons why patients with NRS scores > 4 did not want opioids included tolerability of their pain (63%) and fear of the side effects of opioids (22%). It is possible that patients' fears of the side effects were based on previous experiences, because many patients suffer from nausea and vomiting due to postoperative opioids.¹⁷ Moreover, previous research showed that patients are willing to accept some pain in order to avoid the side effects of analgesics.¹⁸

Another explanation for patients with NRS scores > 4 refusing opioids may be the large variation in how patients translate their pain to an NRS score. This large variation may result in two types of discrepancies for interpretation of the classic NRS > 4 cut-off point: patients with NRS pain scores ≤ 4 expressing a need for additional opioids and patients with NRS pain scores > 4 expressing no need for additional opioids. Consequently, nurses should double check their interpretation of a patient's NRS score by asking whether the pain is actually tolerable or whether the patient desires additional analgesics. Without a pain assessment beyond the NRS by healthcare professionals, postoperative patients may be at risk of both undertreatment and overtreatment of their pain.

The present study is subject to some limitations. We measured patients' actual postoperative pain scores, and it is unknown if it was pain at rest or at movement. However, the purpose of the study was to examine the diagnostic properties of the NRS score. In this study, all patients were on analgesic treatment, as it would have been unethical to let patients suffer from pain until data collection. Nevertheless, the number of patients with and without opioids administrated was comparable: Of all patients with NRS scores > 4 and no desire for opioids, 110 patients were on opioids and 103 patients were not.

In conclusion, the NRS cut-off values commonly used by professionals do not reflect patients' wishes for additional opioids. There is a possible risk of overtreatment when healthcare providers rigidly follow guidelines on prescribing strong analgesics without probing patients on their preference for pharmacological treatment.

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Chapter 5

The effect of a preoperative educational film
on patients' postoperative pain in relation to
their request for opioids

Based on:

Jacqueline F.M. van Dijk

Albert J.M. van Wijck

Teus H. Kappen

Linda M. Peelen

Cor J. Kalkman

Marieke J. Schuurmans

Pain Management Nursing 2015;16:137-45.



Abstract

Background Guidelines for postoperative pain treatment are based on patients' pain scores. Patients with an intermediate NRS score, of 5 or 6, might consider their pain as either bearable or unbearable, which makes it difficult to decide on pain treatment, as guidelines advise professionals to treat pain at $\text{NRS} > 4$. Educating patients in using an NRS score for pain might improve adequate pain treatment.

Method A quasi-randomized controlled trial was conducted where 194 preoperative patients watched the educational film and 183 the control film. Pain scores were considered discordant when patients reported an $\text{NRS} \leq 4$ and wanted additional opioids or when patients reported an $\text{NRS} > 4$ and did not want additional opioids. Beliefs, fear and knowledge of pain, pain assessment and pain treatment were measured by questionnaires.

Results No significant differences in discordant pain scores between the groups were found: RR 0.73, CI 0.47–1.15 at rest and RR 0.96, CI 0.72–1.28 at movement. Patients in the intervention group had lower NRS pain scores than patients in the control group. In the intervention group, patients had significantly more knowledge and lower barriers to pain management compared to the control group.

Conclusions We did not find a statistically significant reduction in discordant pain scores when comparing the intervention group with the control group. However, patients in the intervention group had significantly lower pain scores, lower barriers and more knowledge of pain treatment than patients in the control group.

Background

Many patients experience pain after surgery; on the first postoperative day, 30–43% of patients report moderate or severe pain.^{1,2} Unrelieved postoperative pain has been shown to increase postoperative complications, prolong hospital stay and increase the risk of chronic pain.³⁻⁵ International guidelines advise professionals to administer additional analgesics when patients report a Numeric Rating Scale (NRS) pain score greater than 4.^{6,7} A previous study showed that patients with NRS 5 or 6 vary in the interpretation of this score.⁸ Some patients with NRS 5 or 6 consider their pain as bearable and refuse opioids, while other patients with identical NRS scores consider their pain as unbearable and ask for opioids. For adequate pain treatment, it is necessary that patients and professionals share a common lexicon of pain referents. It is conceivable that some patients do not understand the assessment of pain on the NRS. In addition to achieving clarity of understanding and communication with reference to pain and pain management, it is important that patients accept opioids when they are in pain. Previous research showed that patients refuse opioids due to concerns about addiction or side effects of opioid analgesics.^{9,10} Negative beliefs about opioids, like fear of addiction, can affect the willingness to take opioids to manage pain.¹¹

Specific information given preoperatively regarding postoperative pain, pain assessment and pain treatment can help patients obtain better pain assessment and pain relief after surgery. Patient education is defined as the process of influencing patient behavior, resulting in changes in knowledge, attitudes and skills necessary to maintain or improve health.¹² Preoperative information is considered to be an important tool in helping patients to reduce fear associated with surgery and pain that will lead to better treatment compliance.¹³ Patient education can enable patients to become full participants in their assessment and treatment of pain through improved communication with professionals. The ideal medium to provide information for patients is unclear. Several studies have investigated the use of leaflets to improve the level and quality of information received by patients.¹⁴ These studies have shown mixed results. Many patients do not read such forms, and many of those do not completely understand the information provided. Electronic media such as a DVD and streaming video over the internet have the potential to overcome these known limitations of information leaflets.¹⁵

The aim of the study was to explore the effect of a preoperative educational film on the relation of patients' postoperative NRS score to their request for additional opioids; pain scores; and fear, knowledge and attitudes concerning opioid use. Our hypothesis was that there would be more patients with a wish for additional opioids while reporting NRS > 4 and fewer patients with a wish for additional opioids while reporting NRS ≤ 4 in the intervention group compared with the control group. Moreover, we expected that patients would have lower pain scores, more knowledge, better attitudes and less anxiety in the intervention group compared with the control group.

Methods

Design and sample

We conducted a quasi-randomized controlled trial in which surgical patients were preoperatively exposed to either an educational film on postoperative pain, pain assessment and pain treatment or a control film on the hospitals' infotainment system. Between 1st November, 2011 and 19th March, 2012, all adult patients scheduled for elective surgery at the University Medical Center Utrecht were considered for inclusion during their visit to the Outpatient Preoperative Evaluation (OPE) clinic. Patients were excluded when: scheduled for ambulatory surgery; having impaired eyesight or hearing; or being unable to read or understand Dutch. Acetaminophen was prescribed to all postoperative patients, and non-steroidal anti-inflammatory drugs (NSAIDs) were prescribed when not contraindicated. Depending on the (anticipated) severity of postoperative pain, patients were prescribed opioids. Consequently, a proportion of included patients was receiving opioids at the time of measurement. The study was approved by the institutional Medical Ethics Committee of the University Medical Center in Utrecht and was registered at the Dutch Clinical Trials Registry with registration number NTR3095.

Procedure

Eligible patients were given a letter describing the content and purpose of the study at the OPE clinic and were asked to read it while waiting for their preoperative consultation. At the end of the consultation, the patient was asked to participate in the study, and informed consent was obtained. Thereafter, the patient was brought to a separate room where either the educational film or the control film was shown without any disturbance. Afterwards, they filled in a questionnaire. For logistical reasons, patients could not be randomized individually; therefore, we randomized selection periods. During the even weeks of the study, the educational film was shown on Monday, Wednesday and Friday, and the control film on Tuesday and Thursday, and vice versa on odd weeks.

Intervention

The intervention of interest was an educational film on postoperative pain. Two topics were specifically targeted: Pain assessment and Pain medication. A six-minute film was made in collaboration with the Research Center for Communication and Journalism in Utrecht. The film starts with an acute pain service nurse explaining the NRS pain assessment. She explicitly explains that an NRS of more than 4 is used as a cut-off for unbearable pain, which indicates that the patient would require additional analgesics. The next scenes show the simulated experiences of two "patients" (actors) after their surgery. Thereafter, the anesthesiologist explains the importance of postoperative pain management and that it is necessary to move and cough to prevent complications such as pneumonia. The last scene shows an animation while a voice-over summarizes the take home messages. The control

group was shown a 3-minute film about the hospital's infotainment system: a bedside information system containing internet, telephone and television.

Outcomes

The primary study outcome was the relation of the patient's postoperative NRS pain score at rest and at movement to the expressed need for additional opioids. It was considered that NRS scores ≤ 4 should relate to no wish for additional opioids, while NRS score > 4 should relate to an expressed need for additional opioids.^{6,7} Otherwise, the combination was regarded as discordant. The secondary outcomes were patients' pain scores, beliefs, fear and knowledge of pain, pain assessment and pain treatment, and the relation of the postoperative Verbal Rating Scale (VRS) pain score to the expressed need for additional opioids by the patient.

Data collection

After watching one of the films, patients were asked to fill in questionnaires testing the beliefs, fear and knowledge of pain, pain assessment and pain treatment. Pain scores at rest and at movement were measured in each patient on the ward on the day after surgery by trained research nurses who were not involved in the postoperative care of that patient and were not aware of the study group in which the patient was included. Patients were asked by interview to score their pain at that moment on the NRS and VRS. Furthermore, patients were asked if they had a request for opioids at that moment or – when they were already receiving opioids – a request for additional opioids. At baseline, patients' characteristics such as gender, age, highest education, type of surgery and postoperative opioid use were recorded.

Instruments

Pain measurement

Pain was measured by the NRS, an 11-point scale where 0 indicates no pain and 10 the worst imaginable pain, and by a VRS which contained five expressions: "no pain", "little pain", "painful but bearable", "considerable pain", and "terrible pain". The first three categories together (no pain, little pain and painful but bearable) were considered "bearable" pain, and the last two categories (considerable pain and terrible pain) were deemed "unbearable" pain.

Questionnaires

We used questionnaires to measure the effect of the intervention film on beliefs, fear and knowledge of the patient on pain, pain assessment and pain treatment: the beliefs subscale of the Barriers Questionnaire (BQ),¹⁶ Fear of Surgery Questionnaire,⁴ and a self-developed Pain Knowledge Questionnaire. To determine whether all items in a questionnaire measured the same concept, internal consistency was assessed by calculating Cronbach's alpha (α).

Beliefs subscale of Barriers Questionnaire

The BQ is a 27-item instrument designed to measure the extent to which patients have concerns about reporting pain and using analgesics.¹⁶ In this study, the beliefs subscale of the BQ is used to decrease respondent burden.^{17,18} The questionnaire consists of seven items that address patients' beliefs about pain management i.e., inability to control pain, addiction, good patients avoid talking about pain, side effects, complaining of pain distracts physician from treating underlying illness, tolerance and progression of disease. The scale was translated into Dutch by the forward-backward translation method.¹⁹ The items were rated using a six-point Likert scale, anchored with 0 (strongly disagree), and 5 (strongly agree). Cronbach's alpha measured with results of the present study was 0.68.

Fear of Surgery Questionnaire

Surgical anxiety was measured by the Dutch Fear of Surgery Questionnaire.⁴ The 4-item scale measuring fear of immediate consequences of the operation was used i.e., fear of the operation, pain, anesthesia and unpleasant side-effects. These items were rated on a 6-point Likert scale, from no fear (0) to most extreme fear (5). Cronbach's alpha measured with results of the present study was 0.85.

Knowledge Questionnaire

The Pain Knowledge Questionnaire was designed for this study. Four statements regarding pain were formulated based on literature and expert opinion. Face validity of these statements was established by pain experts and experts of patient communication. Each statement needs to be confirmed or rejected on a 6-point Likert scale; from strongly disagree (0) to strongly agree (5). Cronbach's alpha measured with results of the present study was 0.36.

Data analyses

Sample size

Before the study was conducted, a sample size calculation was performed. In a previous study in our institute, we found that 47 out of 74 patients did not want additional opioids while they had an NRS score > 4 , and 17 out of 201 patients did want additional opioids while they had $\text{NRS} \leq 4$. Accordingly, 64 of 275 patients (23%) had a discordant score compared with guidelines for postoperative pain treatment. After patients' exposure to the pain film, we expected to decrease this proportion of 0.23 to 0.115 (a 50% reduction). Using a significance level of 0.05 and a power of 0.80, 166 patients were required per study arm. Including a 10% loss to follow-up, the required sample size was estimated at a total of 350 patients.

Statistical analyses

Descriptive statistics were used to describe the sample. Categorical data were expressed

as frequencies and percentages. Results for continuous variables were expressed as means with standard deviation (SD) or as medians with interquartile range (IQR) for variables following normal and non-normal distributions, respectively. Statistical testing for non-normally distributed variables used the Mann-Whitney test, and for categorical values the χ^2 test was deployed. The number of discordant pain scores in each of the groups was calculated as the sum of the number of patients that wanted additional opioids when the pain score was $\text{NRS} \leq 4$ or VRS bearable pain and the number of patients that did not want additional opioids when the pain score was $\text{NRS} > 4$ or VRS unbearable pain. Differences between the groups were tested with the Chi-squared test and expressed as relative risk (RR) with a 95% confidence interval (CI). The data were analyzed according to the intention-to-treat principle. All answers on the questionnaire were rated using a 6-point Likert scale. Scores on each scale were added up to a sum score; higher scores indicated higher levels of knowledge, stronger barriers and extreme fear toward pain management. For the graphs, three categories were made: strongly disagree and disagree were combined to make the “disagree” category, the “neutral” category, and strongly agree and agree were combined to make the “agree” category. Statistical analyses were performed using IBM SPSS Statistics version 20.0 (IBM, New York, NY, USA). Two tailed p-values < 0.05 were considered statistically significant.

Results

Patients

Of all eligible patients, 507 patients consented to participation. Of those who declined participation, time constraints was the most frequently mentioned reason (76%). Of all patients who participated in the study, 264 patients were allocated to the educational film and 243 to the control film. Four patients did not watch the educational film for logistical reasons, and five patients discontinued the control film. Fifty-five patients in the intervention group and 39 patients in the control group were excluded because they did not have surgery before the end of the study. Data collection the day after surgery was not possible for 12 patients in the intervention group and 18 patients in the control group because of early discharge. Three patients in both groups could not score on the NRS. Thus, we analyzed data of 194 patients in the intervention group and 183 patients in the control group (Figure 1). The demographic data of each group are presented in Table 1.

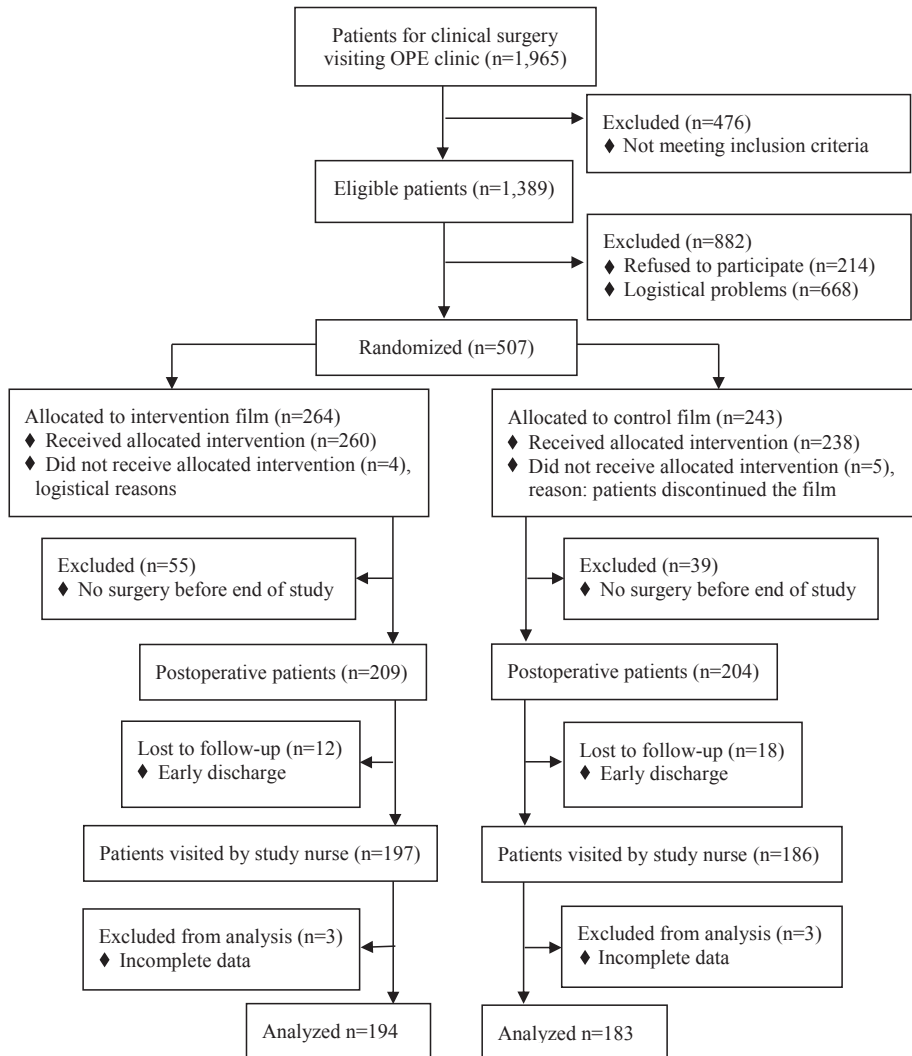


Figure 1. Consort flow diagram.

Table 1. Demographic data.

	Intervention Group (n=194)	Control Group (n=183)
Age, mean (range)	53 (18-90)	51 (19-90)
Male, n (%)	100 (52)	91 (50)
Education, n (%)		
Low	39 (20)	40 (22)
Medium	60 (31)	64 (35)
High	89 (46)	71 (39)
Missing	6 (3)	8 (4)
Type of surgery, n (%)		
General	52 (27)	25 (14)
ENT surgery	36 (19)	42 (23)
Neurosurgery	24 (12)	31 (17)
Orthopedic	16 (8)	13 (7)
Gynecologic	15 (8)	17 (9)
Faciomaxillary	13 (7)	11 (6)
Urology	11 (6)	9 (5)
Plastic surgery	10 (5)	14 (8)
Vascular surgery	6 (3)	6 (3)
Cardiothoracic	4 (2)	7 (4)
Eye surgery	4 (2)	3 (2)
Other	3 (1)	5 (2)
Analgesics, n (%)		
No opioids	114 (59)	111 (60)
I.v. opioids	51 (26)	44 (24)
Oral opioids	10 (5)	14 (8)
Epidural opioids +LA	19 (10)	14 (8)
Film was shown on, n		
Monday	36	27
Tuesday	45	38
Wednesday	37	37
Thursday	45	55
Friday	31	26

ENT= ear, nose and throat surgery, I.v.=Intravenous, LA= local anesthetics.

The relation of the NRS to the wish for opioids

When measuring the NRS pain score at rest, in the intervention group 4 patients (2%) with $\text{NRS} \leq 4$ had a wish for additional opioids and 6 patients (3%) in the control group. Twenty-four patients (12%) with an $\text{NRS} > 4$ had no wish for additional opioids in the intervention group and 30 patients (16%) in the control group. When we add up these discordant scores, 14% of the patients had a discordant score in the intervention group and 20% in the control group. The relative risk (RR) is 0.73, 95% CI 0.47–1.15. When measuring the NRS pain score at movement, 2 patients in both the intervention and the control group with $\text{NRS} \leq 4$ had a wish for additional opioids (1%). Sixty-one patients (31%) in the intervention group with an $\text{NRS} > 4$ had no wish for additional opioids and 60 patients (33%) in the control group. In total, 32% of the patients had a discordant pain score in the intervention group and 34% in the control group. The relative risk is 0.96, 95% CI 0.72–1.28, Table 2.

The relation of the VRS to the wish for opioids

When measuring the VRS score at rest, in the intervention group six patients (3%) with VRS bearable pain had a wish for additional opioids, and eight patients (4%) in the control group. Seven patients in each group (4%) with VRS unbearable pain had no wish for additional opioids. In total, 13 patients (7%) in the intervention group and 15 patients (8%) in the control group had a discordant score. The relative risk (RR) is 0.82, 95% CI is 0.40–1.67. When measuring the VRS pain score at movement, four patients (2%) in each group with VRS bearable pain had a wish for additional opioids. In each group, 19% of the patients with VRS unbearable pain had no wish for additional opioids (36 and 34 patients, respectively). In total, 21% of the patients in both groups had a discordant VRS score (RR 1, 95% CI 0.67–1.48; Table 2).

Table 2. Relative risk of the discordant pain scores on the NRS and VRS.

	RR	95% CI
NRS at rest discordant scores	0.73	0.47–1.15
VRS at rest discordant scores	0.82	0.40–1.67
NRS at movement discordant scores	0.96	0.72–1.28
VRS at movement discordant scores	1.00	0.67–1.48

Pain scores and opioid use

Patients in the intervention group had lower NRS scores than patients in the control group; at rest, the median NRS pain score was 2 (IQR 1–4) in the intervention group and 3 (IQR 1–4) in the control group ($p=0.02$); at movement, the median NRS pain score was 3 (IQR

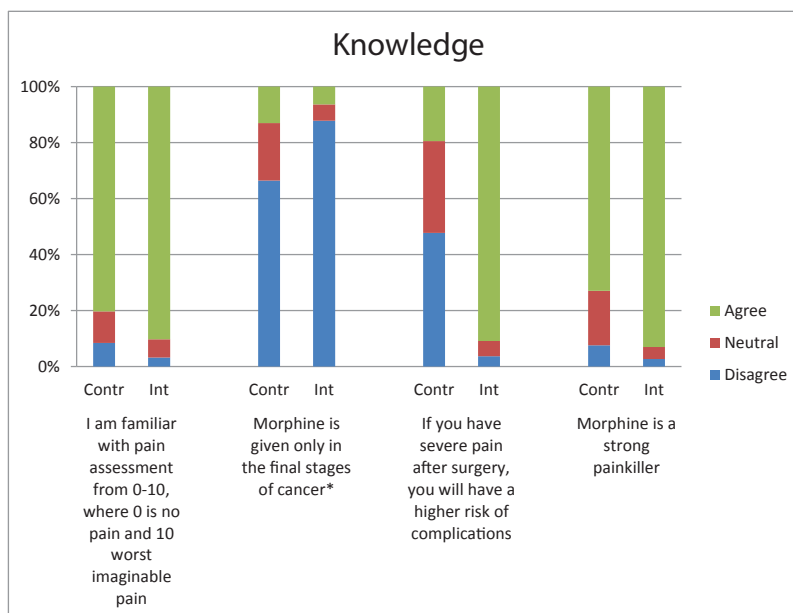
2–5) in the intervention group and 4 (IQR 2–6) in the control group ($p = 0.35$). Patients in the intervention group and control group had the same median score on the VRS at rest (median “little pain”). At movement, the patients in the intervention group had median VRS “little pain” (IQR “little pain”–“painful but bearable”) and in the control group median VRS “painful but bearable” (IQR “little pain”–“painful but bearable”) ($p = 0.41$).

In the intervention group, 80 patients (41%) were administered opioids the day after surgery compared with 72 patients (39%) in the control group ($p = 0.55$).

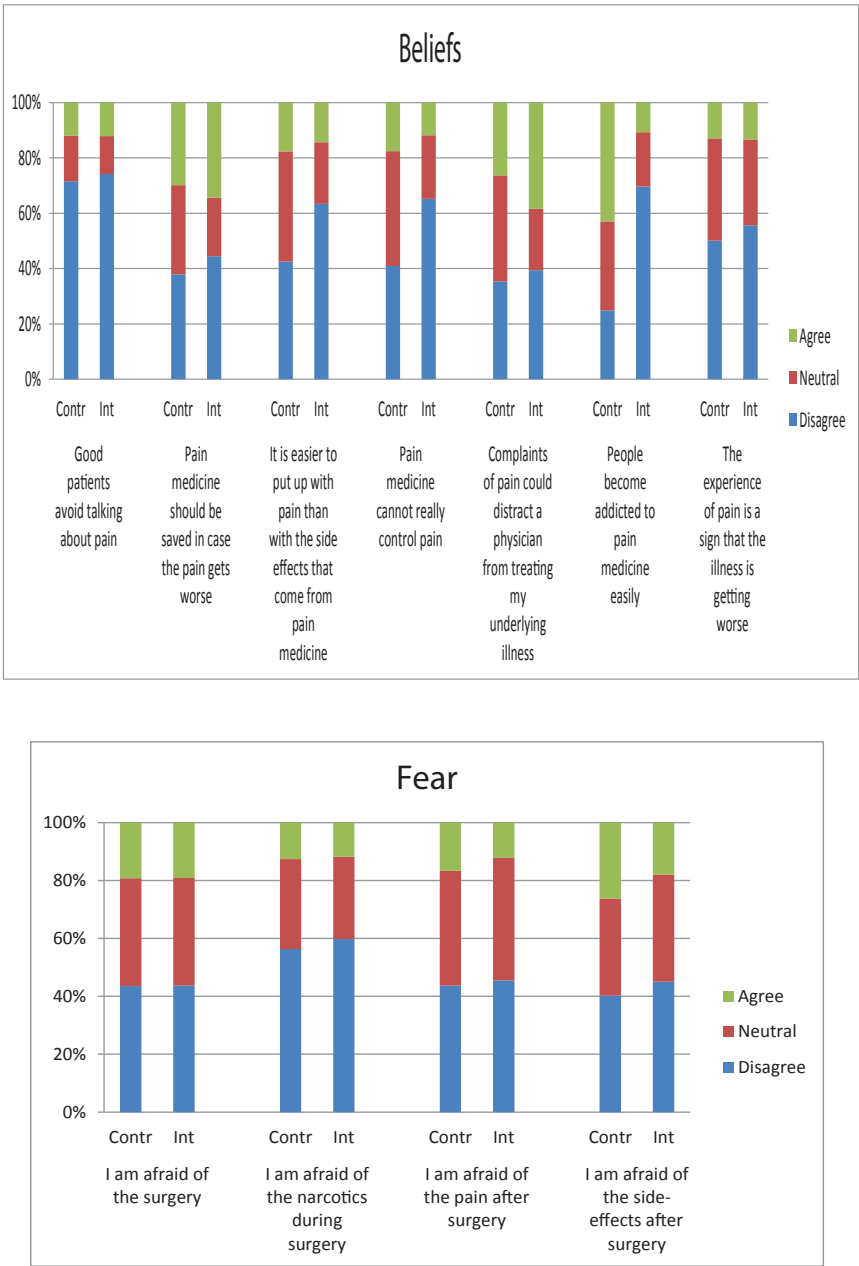
Beliefs, fear and knowledge

Answers on the knowledge, beliefs and fear questionnaires are shown in Figure 2. In total, 174 patients (90%) in the intervention group answered all the questions of the questionnaires and 156 (85%) in the control group ($p = 0.21$).

The median score of the total beliefs questionnaire was 1 (IQR 0–2) in the intervention group and 2 in the control group (IQR 1–3) ($p < 0.001$). The median score of the total fear questionnaire in each group was 1.5 (IQR 0.5–3) ($p = 0.9$). The median score of the total knowledge questionnaire in the intervention group was 5 (IQR 4.5–5) and 4 (IQR 3–4.5) in the control group ($p < 0.0001$).



**This question is reversed in the total knowledge score.*



Contr=Control group, Int=Intervention group.

Figure 2. Answers of patients in the control group and intervention group on the knowledge, beliefs and fear questionnaire.

Discussion

The main objective of the present study was to analyze the relation between the postoperative NRS pain score and the expressed need for additional opioids by patients who watched the educational film versus patients who watched a control film. There was no significant difference in the proportion of discordant pain scores between the intervention and the control group. However, patients in the intervention group had significantly higher knowledge scores and lower barrier scores to pain management than patients in the control group. Moreover, patients in the intervention group had lower pain scores compared with patients in the control group. This is probably due to a better understanding of the pain scores in the intervention group. Patients in the intervention group gave lower pain scores when their pain was bearable, and they had no wish for additional analgesics. A second explanation of the lower pain scores in the intervention group could be an increased awareness of the importance of taking pain medication, leading to earlier administration of analgesics and higher doses. In both groups, the rate of administration of opioids was equal; however, data on the total dose or the time of administration were not collected. A higher dose or an earlier administration in the intervention group could also explain the lower pain scores.

In both groups combined, 53 patients with NRS > 4 at rest and at movement had no wish for additional opioids, and another 68 patients with NRS > 4 at movement had no wish for additional opioids. The need for analgesics is lower when patients have pain during movement compared with pain at rest, probably because most movements are brief and can be controlled by the patient.

Attitudes towards opioids can affect patients' willingness to communicate about pain to professionals and to take opioids to manage pain.²⁰ In several studies, the BQ has been found to be associated with adequacy of analgesic use: patients who use analgesics inadequately have higher barrier scores than those who use analgesics adequately.^{17,18} In the present study, patients in the intervention group did not receive opioids significantly more often, despite having lower barrier scores to pain management.

Anxiety provokes a physiological stress response, which impedes the healing process. High preoperative fear is predictive for experiencing more pain, longer hospital stay, more postoperative complications and poorer treatment compliance.²¹⁻²³ Therefore, it is important to reduce patients' fear before surgery. Preoperative information is considered to be an important tool in helping patients to reduce fear associated with surgery and pain; well-informed patients experience less anxiety and are more easily mobilized.¹³ Several studies have investigated the effect of an educational film on anxiety before surgery. Some studies found a decrease in anxiety before surgery,^{24,25} although these effects were small and not supported by other studies.²⁶⁻²⁸ In the present study, no significant difference between the two groups was found concerning patients' fear before surgery. Patients in the intervention group were informed about pain, pain assessment and pain treatment,

but also on possible complications because of pain. Mentioning complications in the educational film did not lead to an increase of anxiety in the intervention group.

Patients reported higher knowledge scores in the intervention group compared with the control group. A previous study investigated the effect of a booklet on the patients' pain scores.²⁹ The intervention did not change patients' analgesics intake, pain ratings or concerns about taking analgesics after surgery. This poor result might be due to the fact that one third of the patients did not remember receiving the booklet or had not read most of it. Several studies have investigated the effect of video education on patients' knowledge and found higher knowledge scores in the intervention group than in the control group.^{26,27} Therefore, electronic media-based education is a more effective approach to educating patients to increase their knowledge compared with written education. However, it is a logistical challenge to show the film to patients while visiting the OPE clinic, because they have more appointments in the hospital that day, such as the laboratory, ECG, surgeon, and so on. Further improvement could be made by showing the film on a more quiet moment (e.g., at home via the internet) and with some repetitions at different moments in the preoperative and postoperative period.

Educating patients on how to score pain on the NRS might be not enough to get 'accurate' pain scores. Pain is subjective, and nociception cannot be measured directly. In clinical practice, patients are asked to make ratings of their sometimes complex pain experience on a single, uni-dimensional pain scale. Pain is always an unpleasant emotional experience, and patients make their own interpretation of the pain scale, influenced by their emotions, surgery and the specific context they are in.³⁰ Although, the NRS is an important tool to measure patients' pain, the pain needs to be assessed further by interviewing patients about their pain and their wish for pain treatment. Thereafter, professionals can arrive at more informed treatment decisions.

Limitations

The present study was subject to a number of limitations. First, participants' waiting time between exposure to the films and surgery varied from one day to three months; thus, it is possible that some patients had forgotten the content of the pain film, and it is recommended that patients watch the film more often, at least one more time close to the day of surgery. Therefore, the patient could watch the film at home by DVD, on the internet or preoperatively on the hospital's infotainment system. Second, the Cronbach's alpha of the knowledge questionnaire was low ($\alpha = 0.36$), probably due to many patients in the control group giving a wrong answer to the statement 'If you have severe pain after surgery, you will have a higher risk of complications such as pneumonia'. A last limitation is that the study population was more highly-educated than the general population in the Netherlands. This may limit the generalizability of the findings of the present study.

Conclusions

We educated patients by showing them a film on postoperative pain, pain assessment and pain management; however, there were no statistically significant differences in the relation between scoring on the NRS and the expressed need for additional opioids between the intervention and the control group. However, the intervention group had higher knowledge scores and lower barriers to pain medication, which may explain the lower NRS pain scores in the intervention group compared with the control group. Therefore, it is concluded that an educational film on postoperative pain management is a valuable tool to prepare patients before surgery.

Acknowledgments

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Appendix A. Supplementary data

Educational film about pain management:

<http://www.youtube.com/watch?v=2F4gbMgo4AQ&feature=youtu.be>

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Chapter 6

The effect of written information on
patients' knowledge, beliefs, and fear toward
postoperative pain and its management:
A randomized controlled trial

Jacqueline F.M. van Dijk
Marieke J. Schuurmans
Eva E. Alblas
Cor J. Kalkman
Albert J. M. van Wijck

Submitted



Abstract

Objective This study explores the effects of providing written information about complications due to pain on patients' knowledge, beliefs, and fear toward pain and pain treatment.

Methods The study was a randomized controlled trial in which 862 elective surgical patients were either preoperatively exposed to information about the complications of postoperative pain or not. Data was collected by a questionnaire.

Results The data of 760 patients were analyzed. Patients' knowledge level was significant higher in the intervention group than in the control group (Mann–Whitney $p=0.002$). No differences were found in beliefs or fear.

Conclusion Written information was effective for increasing patients' knowledge. However, it was not effective for changing beliefs about analgesics.

Practical implications It is worthwhile to continue the efforts to inform patients before surgery about postoperative complications due to pain to improve patients' knowledge.

Introduction

Many patients experience pain after surgery. The day after surgery, pain scores of patients undergoing different types of surgery are often high, indicated by scores > 4 on the Numeric Rating Scale (NRS).¹ A patient's pain score on the NRS is the leading indicator of postoperative pain treatment.^{2,3} Previous research has shown that professionals' interpretations of pain are not in line with the actual perceptions of patients. Most patients consider pain with an NRS score of 4–6 as bearable, while acute pain nurses consider pain with an NRS score > 4 unbearable.⁴ In clinical practice, many patients who report NRS scores > 4 refuse analgesics offered in accordance with the guidelines for pain management.

It is not known why postoperative patients give high NRS scores but refuse analgesics, especially morphine. Barriers—such as fear of addiction and side effects, lack of knowledge about the negative consequences of pain, and a desire to look tough—may play a role. Specific information given prior to surgery about pain and pain treatment may help patients obtain better pain relief after surgery. Usually, preoperative patients receive written information regarding postoperative pain treatment. However, the effect of this written information (when it is actually read) is unknown. The aim of this study is to investigate the influence of written information on patients' knowledge, beliefs, and fear toward pain and pain treatment. It is hypothesized that written information will lead to higher patients knowledge and lower barriers toward pain treatment but not influence fear of pain or surgery.

Methods

Study design and participants

The study was a randomized controlled trial in which surgical patients were either preoperatively exposed to information about postoperative pain and potential complications or not. The study was approved by the Institutional Ethics Committee of the University Medical Center in Utrecht (protocol 12/567). Between April 2 to July 9, 2013, all adult patients scheduled for elective surgery at the University Medical Center Utrecht were considered for inclusion during their visit to the Outpatient Preoperative Evaluation (OPE) clinic. Patients unable to read or understand Dutch were excluded.

Procedure

The researcher (EA) explained the purpose of the study to all eligible patients at the OPE clinic while they were waiting for their preoperative consultation. Thereafter, they were asked to participate and informed consent was obtained. Questionnaires with or without information were inserted in blinded envelopes, shuffled and sequentially numbered. The envelopes were only opened when patients agreed to participate. The researcher observed

the patients and asked them to read the text first if they had not read it before beginning to answer the questions. The questionnaire was read aloud for patients with impaired eyesight.

Intervention

The version of the questionnaire with information started with a short (87-word) paragraph: "It is possible that you will have pain after surgery. Usually, we can treat this pain adequately. If you have severe pain, we can administer a strong analgesic, such as morphine. If severe pain is not adequately treated, it can have negative health consequences. Pain is unpleasant and can cause complications. Severe pain can cause pneumonia if it prevents you from coughing after surgery, and thrombosis can occur if it prevents you from moving normally. Therefore, good pain management can prevent complications." The version without information simply started with the first question.

Data collection

Patients characteristics (e.g., gender, age, highest education, and previous surgery) were recorded. The 15 statements in the questionnaires were divided into three groups: (1) knowledge, (2) beliefs, and (3) fear toward pain and pain treatment. Each statement needed to be confirmed or rejected on a five-point Likert scale from strongly disagree (1) to strongly agree (5). The beliefs subscale of the Barriers Questionnaire (BQ),⁵ the Fear of Surgery Questionnaire,⁶ and the Pain Knowledge Questionnaire were used.

Beliefs subscale of BQ

The BQ is a 27-item instrument designed to measure the extent to which patients have concerns about reporting pain and using analgesics.⁵ In the present study, only the beliefs subscale of the BQ was used to decrease respondent burden.^{7,8} The questionnaire consists of seven items that address patients' beliefs about pain management (i.e., inability to control pain, fear of addiction, good patients avoid talking about pain, side effects, complaining of pain distracts physician from treating underlying illness, tolerance and progression of disease). The scale was translated into Dutch by the forward-backward translation method.⁹ The items were rated using a five-point Likert scale, anchored with 1 (strongly disagree), and 5 (strongly agree), with higher scores indicating stronger barriers to pain medication.

Fear of Surgery Questionnaire

Fear was measured by the Dutch Fear of Surgery Questionnaire,⁶ a four-item scale measuring fear of the immediate consequences of an operation (i.e., fear of the operation, pain, anesthesia, and unpleasant side-effects). These items were rated on a five-point Likert scale from no fear (1) to extreme fear (5).

Pain Knowledge Questionnaire

The Pain Knowledge Questionnaire was designed for a previous study.¹⁰ Four statements regarding pain assessment and pain treatment were formulated based on the literature and expert opinion. The face validity of these statements was established by pain experts and experts in patient communication. The statements used were as follows: “I am familiar with pain assessment from 0 to 10,” “Morphine is given only in the final stages of cancer,” “If you have severe pain after surgery, you will have a higher risk of complications,” and “Morphine is a strong painkiller.” Each statement needed to be confirmed or rejected on a five-point Likert scale from strongly disagree (1) to strongly agree (5), with higher scores indicating better knowledge.

Data analysis

Descriptive statistics were used to describe the sample. Categorical data were expressed as frequencies and percentages. Results for continuous variables were expressed as means with standard deviations (SDs) or as medians with interquartile ranges (IQRs) for variables following normal and non-normal distributions, respectively. Statistical testing for non-normally distributed variables used the Mann–Whitney test, and for categorical values, the χ^2 test was employed. The results were considered statistically significant if p-values were below 0.05. For the graphs, three categories were made: strongly disagree and disagree were combined to make the “disagree” category, the “neutral” category, and strongly agree and agree were combined to make the “agree” category. Statistical analyses were performed using IBM SPSS Statistics version 20.0 (IBM, New York, NY, USA).

Results

Patients

In total, 862 patients were asked to participate in the study. The data of 760 patients were analyzed: 381 in the intervention group and 379 in the control group (Figure 1). Eighty-seven patients refused to participate (mean age 55 years (range 20–88), 52 women and 35 men). Sixty-one patients were read the questionnaire aloud (30 in the intervention group and 31 in the control group). Patients underwent all types of surgery. The demographic data of each group are presented in Table 1.

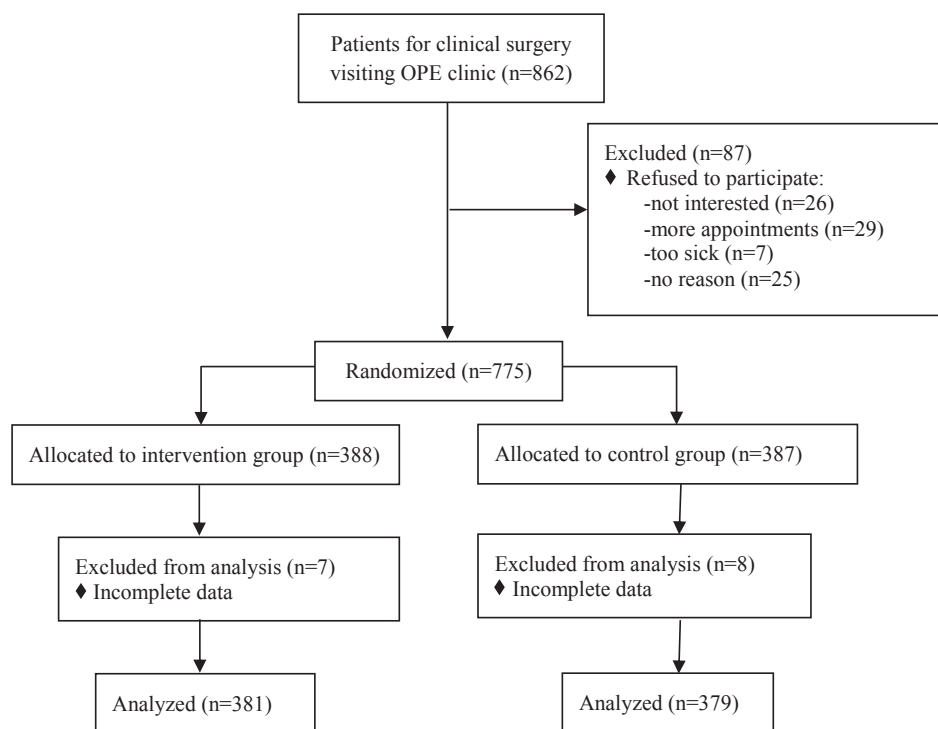


Figure 1. Flow diagram of participants.

Table 1. Demographic data.

	Intervention group (n=381)	Control group (n=379)
Age mean (range)	54 (18–86)	54 (18–88)
Gender, n (%)		
Male	189 (50)	202 (53)
Previous surgery yes, n (%)	327 (86)	322 (85)
Education, n (%)*		
Low	125 (33)	102 (27)
Medium	138 (36)	135 (36)
High	118 (31)	142 (37)

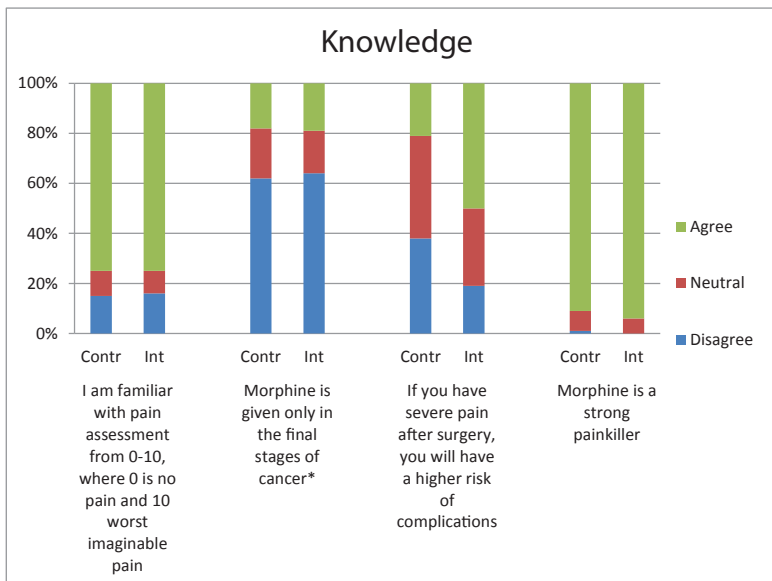
*No significant difference in education between the two groups, $p=0.09$.

Questionnaires

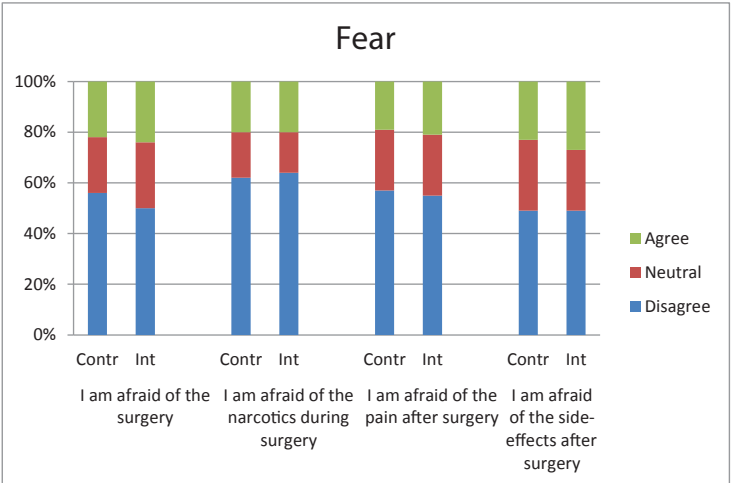
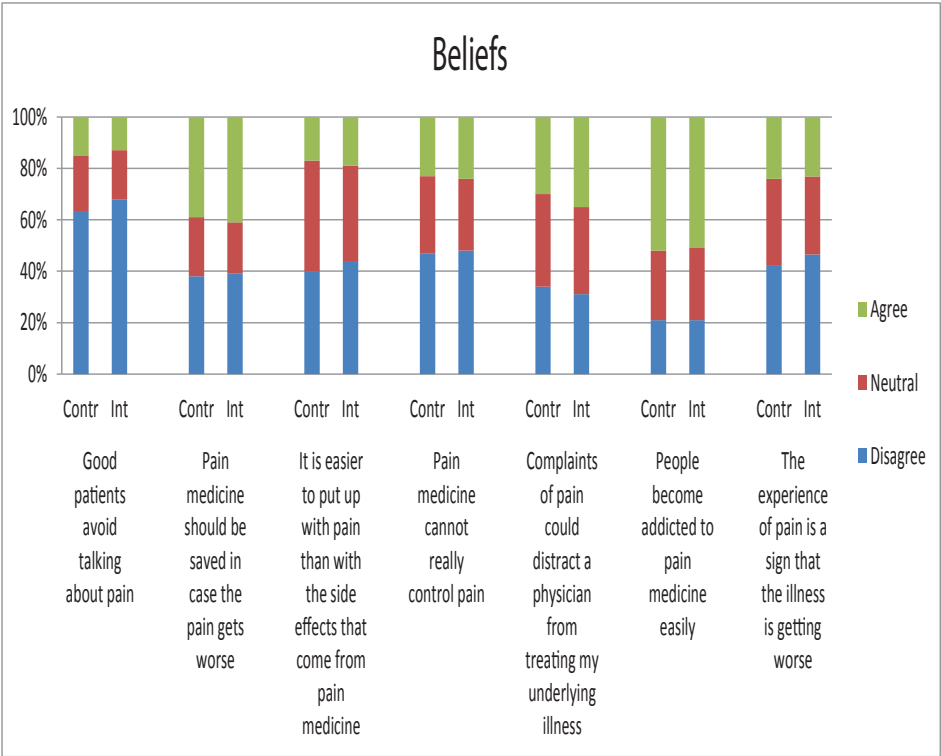
Answers to the questionnaires are shown in Figure 2. Although the median of the Pain Knowledge Questionnaire was 4.5 in both groups, the IQRs differed between the groups (4–5 in the intervention group and 3.5–5 in the control group). The difference between the groups was significant (Mann–Whitney U-test, $p = 0.002$). The means on the Pain Knowledge Questionnaire were 4.1 and 3.8 for the intervention group and the control group, respectively.

The median (IQR) on the beliefs questionnaire for both groups was 3 (2–3) ($p=0.60$). The median (IQR) scores on the Fear of Surgery Questionnaire were 2.5 (1–3) and 2 (1–3) for the intervention group and the control group, respectively ($p=0.46$).

Eighty-five percent of the patients had had surgery before, and the mean (SD) was 7.9 (10.9) years ago. In a post-hoc subgroup analysis, a significant difference in knowledge was found in the group of patients that had had surgery before (median (IQR) for the intervention group 4.5 (4–5) and for the control group 4.5 (3.5–5), Mann–Whitney U-test, $p = 0.006$). However, it was not found in the group that had not had surgery before (median (IQR) 4 (3.5–5) for both groups, Mann–Whitney U-test, $p = 0.3$).



**This question is reversed in the total knowledge score.*



Contr=Control group, Int=Intervention group.

Figure 2. Answers of 381 patients in the intervention group and 379 patients in the control group on the knowledge, beliefs, and fear questionnaires.

Discussion

The main objective of the present study was to analyze the influence of written information on patients' knowledge, beliefs, and fear toward pain and pain treatment. Confirming the main hypothesis, patients' knowledge level was significantly higher in the intervention group than in the control group. No differences were found in beliefs or fear.

Few studies have examined patients' knowledge on pain treatment after being provided with written information. Chumbley¹¹ examined the effect of written information on patients' knowledge of Patient Controlled Analgesia (PCA) after surgery. Patients had higher knowledge of the use of PCA; however, it had no effect on pain relief, knowledge of side effects, or worries about addiction. Cheung¹² examined the effect of providing written and verbal information about anesthesiology. In the intervention group and control group patients' knowledge increased. A systematic review evaluated 19 studies on patient education before surgery: All studies combined written, video, and face-to-face interventions. Knowledge was the only positive outcome. No significant differences were found in concerns about taking analgesics, patients' analgesic intake, or pain ratings after surgery.¹³ The same outcome was found in the current study, showing that a single intervention consisting of written information produces the same effect as multiple interventions in terms of improving patient knowledge.

In line with these studies, we found that after giving patients specific information about the importance of good postoperative analgesia, their knowledge improved; however, their beliefs about pain treatment did not change. A possible explanation could be found in the difference between automatic and planned behavior. Automatic processes enable behaviors to be carried out with little or no demand on cognitive effort. We must make the most of our automatic behaviors, otherwise, we could not function. These automated processes, or habits, can make behavioral changes very complicated. Education can lead to improved knowledge; however, this does not necessarily change old habits.¹⁴ Therefore, patients can have increased knowledge of pain treatment without the desired changes in their beliefs or behaviors in accepting analgesics after surgery.

Previous research with postoperative patients has reported that patients have high concerns about addiction to pain medication and beliefs that pain medication should be saved in case the pain gets worse.^{15,16} In the present study, 79% of the patients were neutral or agreed with the statement that people become addicted to pain medicine easily, 60% were neutral or agreed with the statement that pain medication should be saved in case the pain gets worse, and 37% of the patients were neutral or agreed with the statement that morphine is given only in the final stages of cancer (no significant differences between the two groups). Patient concerns about using analgesics have been cited as major contributors to the problem of inadequate pain management.^{17,18} These concerns may explain the finding that despite the extra information provided with the questionnaires, 50% of the patients in the intervention group were neutral or disagreed with the statement that severe

pain after surgery will cause a higher risk of complications.

High preoperative fear is predictive of a more intense pain experience, longer hospital stays, more postoperative complications, and poorer treatment compliance.¹⁹⁻²¹ Therefore, it is important to reduce patients' fear before surgery. Preoperative information is considered an important tool in helping patients to reduce their fear associated with surgery and pain. In the present study, no significant difference between the two groups was found concerning patients' fear before surgery. The extra information about possible complications provided with the questionnaire in the intervention group did not cause higher levels of fear compared with the control group.

In agreement with other studies,^{11,15} a high percentage (85%) of the patients had had surgery before. In this group, a significant difference in knowledge was found. Although these patients had had surgery before, and the pain was treated by healthcare professionals, their beliefs did not change, and they still had high concerns about addiction to pain treatment. It is possible that the healthcare professionals had the same concerns about fear of addiction.

Strengths and limitations

The current study is strengthened by the fact that we confirmed that all patients in the intervention group had actually read the extra pain information paragraph. A potential limitation is that we did not test the extent to which patients had retained the information until the day of surgery and the postoperative period. It is likely that some of the information will be lost, especially if there is a long period between the preoperative clinic visit and the day of admission. Repeated exposure to this information (e.g., preoperatively during admission) might be necessary for maximum effect.

Conclusions

We provided patients with written information about the importance of good postoperative analgesia and accepting analgesics to reduce the incidence of postoperative complications. Compared to the control group, knowledge of pain treatment was higher in patients in the intervention group. However, the intervention did not alter beliefs toward analgesics or fear toward pain and surgery.

Practical implications

It is possible to improve patients knowledge with a single informative paragraph. Proper information is not only a patient right but also a first step in educating patients and changing their attitudes toward postoperative pain and its management. However, repeated exposure to such information may be necessary to effectively remove barriers to postoperative pain control.

Acknowledgments

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Chapter 7

Nurses' knowledge and beliefs about postoperative pain and pain management

Jacqueline F.M. van Dijk

Albert J. M. van Wijck

Cor J. Kalkman

Marieke J. Schuurmans

Submitted



Abstract

Background In the treatment of postoperative pain, inadequate knowledge and irrational beliefs may hamper the appropriate use of analgesics, and both patients and healthcare professionals may hold such irrational beliefs. The aim of this study was to examine nurses' knowledge and beliefs about pain and pain management.

Methods Data for the study were collected by an online questionnaire sent to nurses working with surgical patients in Dutch hospitals.

Results The data of 1,184 nurses from 28 hospitals were analyzed. Nurses were found to have high knowledge scores and low barriers toward pain and pain management. Nurses were also asked what percentage of pain scores matched their impression of the patient's pain, and the median was found to be 70%. Nurses receiving additional pain education scored better than nurses without additional pain education. However, nurses still had concerns about analgesic addiction after surgery.

Conclusion Additional pain education increases nurses' knowledge about pain assessment and pain management. Ongoing education, possibly through a longer education program or a combination of education methods, might change nurses' negative beliefs about pain management. Such training could emphasize that a discrepancy between a patient's reported pain score and the nurse's own assessment of the patient's pain should prompt a discussion with the patient about his/her pain.

Introduction

Pain is a common experience for patients in the surgical ward. A patient's reported pain score on the Numeric Rating Scale (NRS) is the leading indicator in postoperative pain treatment. Previous research from our group revealed that patients' assessments of their pain often differed from those of professionals. For example, many patients still considered NRS scores of 5 and 6 as representing "bearable pain."¹ Moreover, many patients who reported NRS scores > 4 refused opioid analgesics when professionals offered additional treatment according to postoperative pain guidelines.² Some patients refused opioids, as they considered their pain bearable or were concerned about opioid analgesic addiction and side effects. Patients' concerns about using analgesics have been cited as one of the major contributors to the problem of inadequate pain management.^{3,4}

Nurses have a very important function in the assessment and treatment of patients' pain. They administer prescribed analgesic drugs and often must decide on the optimal dose and dosing interval for individual patients. When patients refuse analgesics for irrational reasons, nurses can challenge these beliefs and attempt to change the associated behaviors. Therefore, nurses themselves should not be hindered by barriers preventing adequate pain treatment.

According to many practice guidelines, nurses must have up-to-date knowledge and appropriate beliefs regarding pain management⁵ and receive regular education on pain measurement and pain treatment.⁶ However, the extent to which nurses' knowledge and beliefs regarding pain and pain management are in agreement with the content of educational materials for patients is unknown. The aim of this study was to determine nurses' knowledge and beliefs about postoperative pain and pain management using a questionnaire that was originally developed to assess patients' knowledge and beliefs about postoperative pain.

Methods

Study design and participants

We conducted a prospective, cross-sectional study of a sample of nurses working with surgical patients in Dutch hospitals. The study was approved by the Institutional Ethics Committee of the University Medical Center in Utrecht (protocol 14/211).

Procedures

An email with a link to the online questionnaire was sent to Acute Pain Nurses (APNs) working in 73 hospitals in the Netherlands. The email addresses of these coordinators of Acute Pain Services (APSS) were obtained from an up-to-date list. APNs were asked to send the accompanying email with the link to the online questionnaire to the nurses

on the surgical wards in their hospital. The email for the nurses explained the content of the study and stated that the questions concerned postoperative pain. Demographic data (e.g., gender, age, level of education, and years of experience) were collected. Participant consent was implied when an individual respondent completed the questionnaire. The returned questionnaires were processed anonymously.

Questionnaire

The questionnaire was developed for a previous study that assessed patients' knowledge and beliefs about postoperative pain and pain management.⁷ The beliefs subscale of the Barriers Questionnaire (BQ)^{8,9} and the Pain Knowledge Questionnaire were included, and for the present study, one additional question was added on pain scores.

Pain Knowledge Questionnaire

The Pain Knowledge Questionnaire was based on the literature and expert opinion. Four statements were formulated to examine patients' knowledge about pain and pain treatment. For the present study, we used three of the four statements: "Morphine is given only in the final stages of cancer," "If you have severe pain after surgery, you will have a higher risk of complications," and "Morphine is a strong painkiller." We assumed that all nurses were familiar with the fourth statement ("I am familiar with pain assessment from 0 to 10") and thus skipped this statement. Each statement needed to be confirmed or rejected on a 5-point Likert scale from strongly disagree (1) to strongly agree (5).

Additional pain score question

Instead of the fourth statement mentioned above, nurses were asked, "In your opinion, what percentage of NRS scores matches your own impression of the patient's pain?" The answer categories were in 11 steps from 0% to 100%.

Beliefs subscale of Barriers Questionnaire (BQ)

The validated beliefs subscale of the BQ was used to measure the extent to which individuals had concerns about reporting pain and using analgesics.^{8,9} The beliefs subscale consists of seven items that address beliefs about reporting pain and pain management (i.e., inability to control pain, addiction, good patients avoid talking about pain, side effects, complaining of pain distracts physician from treating the underlying illness, tolerance, and progression of disease). The scale was translated into Dutch by the forward-backward translation method.¹⁰ Again, each statement needed to be confirmed or rejected on a 5-point Likert scale from strongly disagree (1) to strongly agree (5).

Data analysis

Descriptive statistics were used to describe the sample. Categorical data were expressed as frequencies and percentages. Results for continuous variables were expressed as

means with ranges or as medians with interquartile ranges (IQRs) for variables following normal and non-normal distributions, respectively. Statistical testing for non-normally distributed variables used the Mann–Whitney U-test, and for categorical values, the χ^2 test was deployed.

All answers on the questionnaire were rated using a 5-point Likert scale. Scores on each scale were added up to a sum score; higher scores indicated higher levels of knowledge or stronger barriers toward pain management. For the graphs, three categories were made: strongly disagree and disagree were combined to make the “disagree” category, the “neutral” category, and strongly agree and agree were combined to make the “agree” category. Statistical analyses were performed using SPSS Statistical Software, version 21.0 (IBM, New York, NY, USA). Results were considered statistically significant if p-values were less than 0.05.

Results

Participants

In total, 28 of the 73 approached hospitals (38%) decided to participate in the study, and 1,184 nurses completed the questionnaire. Only 15 of the 28 hospitals reported the actual number of nurses that they had sent the questionnaire. Based on these data, the response rate was 42% (587 out of 1,400 nurses, range 21–78%). The demographic data are presented in Table 1.

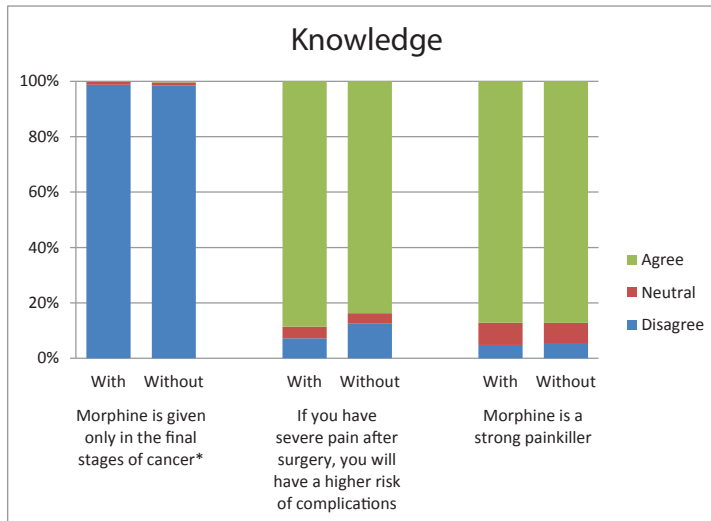
Table 1. Demographic data of 1,184 nurses.

Age, mean (range)	38 (18–64)
Gender, n (%)	
Female	1,061 (90)
Hospital, n (%)	
0–700 beds	463 (39)
>700 beds	720 (61)
Not known	1
Experience with surgical patients in years, mean (range)	12 (0–43)
Student nurse, n (%)	98 (8)
Received additional education on pain, n (%)	761 (64)

Pain Knowledge Questionnaire

Answers to the Pain Knowledge Questionnaire are shown in Figure 1. The median (IQR) score on the Pain Knowledge Questionnaire (where higher scores mean higher knowledge)

was 5 (5–5) on a scale from 1 to 5. The knowledge scores for nurses with additional pain education were as follows: a median score of 5 (5–5) and a mean score of 4.6. For nurses without additional pain education, the median score was 5 (5–5), and the mean score was 4.5 ($p = 0.02$).



*With=nurses with additional pain education, Without=nurses without additional pain education, *this question is reversed in the total knowledge score.*

Figure 1. Answers of 1,184 nurses on the Pain Knowledge Questionnaire.

Pain score question

The median (IQR) score for the question “In your opinion, what percentage of pain scores matches your own impression of the patient’s pain?” was 70 (50–80). As seen in Figure 2, 32% of the nurses ($n=378$) answered 50% or less. The median scores for nurses with additional pain education and for nurses without additional pain education were 70 (50–80) and 60 (50–70), respectively ($p=0.009$).

Beliefs questionnaire

The answers to the beliefs questionnaire are shown in Figure 3. The median (IQR) score for the beliefs questionnaire (where lower scores mean lower barriers toward pain management) was 1 (1–2) on a scale from 1 to 5. The median beliefs scores for nurses with additional pain education and for nurses without additional pain education were 1 (1–2) and 2 (1–2), respectively ($p < 0.0001$).

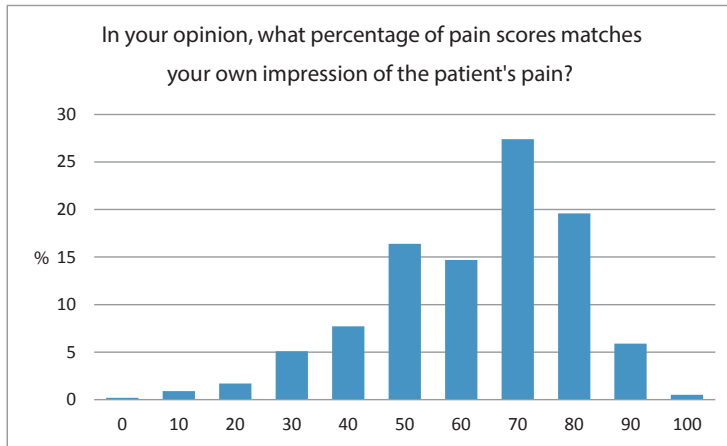
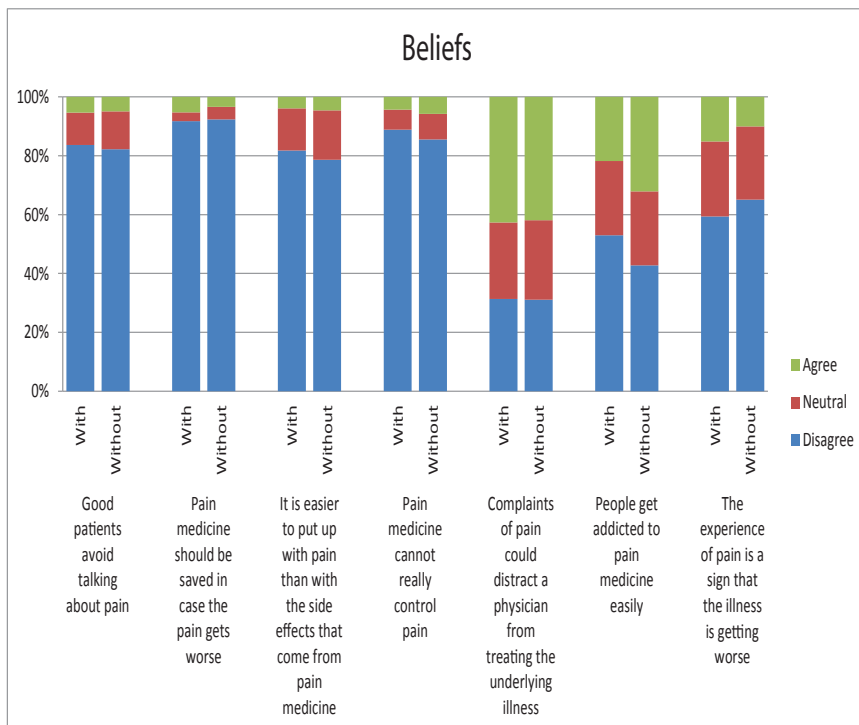


Figure 2. Answers of 1,184 nurses on the additional question on pain scores.



With=nurses with pain education, Without=nurses without pain education.

Figure 3. Answers of 1,184 nurses on the beliefs questionnaire: 761 nurses received additional pain education and 423 nurses did not receive additional pain education.

Discussion

The main objective of the present study was to explore nurses' knowledge and beliefs regarding postoperative pain and pain management. Overall, nurses working on surgical wards had high knowledge scores and low barriers toward pain management. However, the level of pain education did play a role: Nurses with additional pain education scored better than nurses without such education.

Concerns about developing an addiction to opioids represent an important barrier preventing adequate pain treatment.^{11,12} In a previous study, we examined patients' knowledge and beliefs about postoperative pain and pain management using a similar questionnaire.¹³ As expected, nurses were found to have higher knowledge and lower barriers to pain management than patients. Patients' median (IQR) knowledge score, mean knowledge score, and median beliefs score were 5 (3–5), 3.9, and 3 (2–3), respectively. In total, 79% of the patients were neutral or agreed with the false statement that patients become addicted to pain medicine easily. We expected that nurses caring for postoperative patients would think differently. However, in the present study, 51% of the nurses were neutral or agreed with the same statement. Of the nurses with additional pain education, 47% were neutral or agreed that patients become addicted to pain medicine easily compared with 57% of the nurses without additional pain education.

Clearly, even today, many nurses remain concerned about patients developing opioid addiction after surgery.¹⁴ One possible reason is that nurses have learned that chronic pain patients are at risk of opioid addiction. However, a systematic review of long-term opioid use in chronic pain patients revealed a low rate of opioid addiction (7 out of 4,884 patients, 0.14%).¹⁵ The risk of addiction to opioids was lower in acute pain patients than chronic pain patients, because acute pain patients were administered opioids for a very short period of time after surgery.¹⁶ This important issue should be emphasized in the additional pain education for nurses.

Pain education, however, does not automatically change beliefs. Dahlman et al. also failed to find a change in nurses' beliefs about pain management after education and hypothesized that this was probably due to the short duration of the educational program.¹⁷ Other studies showed that both nurses' knowledge and the likelihood that they would administer analgesics increased with the number of workshops they had attended.^{11,18} The presence of an APS has been found to have a positive influence on pain management practices.¹⁹ A survey of nurses' pain knowledge and beliefs demonstrated that the nurses working regularly with APNs as role models were more knowledgeable about analgesics and addiction issues.²⁰ Therefore, continuation of additional pain education efforts can change nurses' knowledge and beliefs about pain management. The exaggerated concerns about potential addiction to opioid analgesics should be highlighted in such ongoing education.

Nurses often disagree with patients' pain scores and appear to make their own assessments of patients' pain.^{21,22} In the present study, we asked nurses what percentage of pain scores matched their impression of the patient's pain and found the median to be 70%. In other words, only 70% of patients' pain scores matched the nurses' impression of the patient's pain. Moreover, 378 nurses (32%) answered that the patient's pain score and their own impression concurred in only 50% or less of cases. Such diverging opinions on the current severity of pain are another important barrier to adequate pain treatment. Discrepancies have been identified between nurses' assessments of pain and patients' experiences, with nurses giving consistently lower ratings than patients.^{23,24} One possible reason for the discrepancy between a patient's pain score and the nurse's view is that patients may be confused or have delirium after surgery. Another possibility is that many patients will consider NRS scores between 4 and 6 as representing "bearable" pain not requiring additional analgesics,² while nurses have been taught that only NRS scores < 4 may be considered as representing bearable pain. Therefore, nurses may be tempted to think that their patients do not understand the NRS and assign lower scores to patients' pain. In a previous study, we found that most patients seem to understand NRS scores very well, but some patients said they had their own scale regarding the meaning of the NRS scores. Moreover, patients know that nurses sometimes doubt that their pain is truly severe, and they said it hurt when they were not taken seriously.²⁵

Strengths and limitations

The current study is strengthened by the fact that a large number of nurses working on postoperative surgical wards completed the questionnaire. A potential limitation is the response rate of 38%, which may indicate a bias. That is, nurses with a high level of knowledge and beliefs about pain and pain management could be more inclined to participate than nurses with a lower level. This means that the present results might give a more positive impression of nurses' knowledge and beliefs than would be found in actual clinical practice.

Conclusion

Nurses had high knowledge scores and low barriers toward pain management. However, more than half of the nurses were neutral or agreed with the statement that postoperative patients become addicted to pain medicine easily. There was a small but statistically significant difference between nurses who had received additional pain education and nurses who had not (57% versus 47%). Therefore, additional pain education appears to increase nurses' knowledge. Nurses' beliefs can probably only change over time through a program of continuous education or a combination of education and appropriate role models. In such education, exaggerated concerns about possible opioid addiction should

be addressed. Finally, patient-reported pain scores often do not match nurses' impressions of the patient's current pain state. Nurses should be taught about the existence of and reasons for these discrepancies and be encouraged to see them as important opportunities to talk with their patients about their pain and jointly decide on the most appropriate analgesic strategy.

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Chapter 8

Patients' perspectives on rating pain: A qualitative study in postoperative patients

Jacqueline F.M. van Dijk
Sigrid C.J.M. Vervoort
Albert J. M. van Wijck
Cor J. Kalkman
Marieke J. Schuurmans

In revision



Abstract

Background In postoperative pain treatment patients are asked to rate their pain experience on a single uni-dimensional pain scale. Such pain scores are also used as indicator to assess the quality of pain treatment. However, patients might differ in how they interpret the Numeric Rating Scale (NRS) score.

Objectives This study examines how patients assign a number to their currently experienced postoperative pain and which considerations influence this process.

Methods A qualitative approach according to grounded theory was used. Twenty-seven patients were interviewed one day after surgery.

Results Three main themes emerged that influenced the NRS scores (0-10) that patients actually reported to professionals: score-related factors, intrapersonal factors, and the anticipated consequences of a given pain score. Anticipated consequences were analgesic administration—which could be desired or undesired—and possible judgments by professionals. We also propose a conceptual model for the relationship between factors that influence the pain rating process. Based on patients' score-related and intrapersonal factors, a preliminary pain score was “internally” set. Before reporting the pain score to the healthcare professional, patients considered the anticipated consequences (i.e., expected judgments by professionals and anticipation of analgesic administration) of current NRS scores.

Conclusions This study provides insight into the process of how patients translate their current postoperative pain into a numeric rating score. The proposed model may help professionals to understand the factors that influence a given NRS score and suggest the most appropriate questions for clarification. In this way, patients and professionals may arrive at a shared understanding of the pain score, resulting in a tailored decision regarding the most appropriate treatment of current postoperative pain, particularly the dosing and timing of opioid administration.

What is already known about the topic?

- Patients are asked to rate their complex pain experience on a single uni-dimensional pain scale.
- Patients' pain scores are the leading indicator in postoperative pain treatment.
- It is unknown how patients interpret the NRS scores.

What this paper adds

- Three main themes emerged that influenced patients' NRS scores actually reported to professionals: score-related factors, intrapersonal factors and the anticipated consequences of assigning a particular NRS score.
- A conceptual model emerged for the relationship between factors that influence the pain rating process. When assigning an NRS score to their pain, patients process the first two themes in stages: They first weigh score-related factors and intrapersonal factors. Some patients go through a last stage before telling the professional: weighing the judgments by healthcare professionals and the anticipated consequences of reporting a particular NRS score against their actual desire for more or less analgesics.
- The proposed model could help professionals to better understand the complex process by which patients assign pain scores and could serve as a basis for a dialogue beyond the given pain scores.

Introduction

The adequacy of pain treatment is an important healthcare quality indicator. Many patients still experience severe pain after surgery, suggesting that there is considerable room for improvement in postoperative pain management. The quality of pain management is in many quality systems operationalized in terms of measuring patients' pain scores.

Pain is subjective, and nociception cannot be measured directly. In clinical practice, patients are asked to rate their (sometimes complex) pain experience on a single uni-dimensional pain scale. However, in contrast to the high number of quantitative studies using the NRS, only one study is found how chronic pain patients use the NRS ¹ but no study has explored how postoperative patients interpret the NRS, how they assign a number from 0 to 10 to their pain, and what considerations come into play when translating a highly subjective complex pain experience into a single number.

Patients' pain scores are the leading indicator in postoperative pain treatment. Several guidelines advise healthcare professionals to administer additional analgesics when patients report a pain score on the Numeric Rating Scale (NRS) greater than 3 or 4.²⁻⁵ In a previous study, we reported that patients with NRS scores of 4, 5, or 6 vary in the interpretation of their score.⁶ In that study, we observed that some patients reporting NRS

scores between 4 and 6 considered their pain “bearable” and refused opioids, while other patients with identical NRS scores considered their pain “unbearable” and requested more opioids. This raises the question of whether simple thresholds such as “NRS > 3 or 4” are the most appropriate cut-off points upon which professionals should base their decisions regarding administering additional analgesics. In postoperative pain management, both undertreatment and overtreatment are undesirable. Unrelieved pain has adverse psychological and physiological consequences, including increased rates of postoperative complications and prolonged hospital stays.⁷ Conversely, unnecessary use of analgesics, especially opioids, increases the patient’s discomfort due to the side effects (e.g., nausea, vomiting, and pruritus) and potentially harmful adverse effects (e.g., oversedation and respiratory depression).^{8,9} For optimal pain treatment, patients and professionals must communicate effectively and have a shared understanding of the burden of the patient’s currently experienced pain.

The aim of this qualitative study was to explore how patients assign a number on the basis of the NRS to their currently experienced postoperative pain and which considerations influence this process

Methods

Study design

The study was descriptive and qualitative in nature. The method used was based on grounded theory,¹⁰ a qualitative research method designed to aid in the systematic collection and analysis of data and the construction of a model. Individual interviews were used as the data-collection method. Guidelines for conducting qualitative studies established by the Consolidated Criteria for Reporting Qualitative Research (COREQ) were followed.¹¹

Participants

The study was conducted between November 2012 and July 2013 in an university hospital. Patients were eligible for selection if they had surgery the day before and currently experienced postoperative pain with a reported NRS score of at least 4. Patients were selected purposively by the researcher (JvD) and to create a diverse sample patients were selected with regard to sex, age, ethnicity, previous pain experiences, and previous experience with rating an NRS score. Theoretical sampling was used as much as possible; we started with a homogeneous sample of patients, and as the data collection proceeded and themes emerged, we turned to a more heterogeneous sample to see under what conditions the themes hold.¹⁰

The researcher was not involved in the patients’ care. Exclusion criteria were as follows: younger than 18 years, unable to read and understand Dutch, cognitive impairment,

having impaired hearing, or not being well enough to be interviewed. The researcher identified eligible patients by consulting the Electronic Patient Dossiers (EPDs) and asked the nurse on the ward whether identified eligible patients were able to be interviewed. None of the eligible patients were unable to be interviewed. Thereafter, the researcher approached the patients, provided information about the study, and handed over an information letter. After reading the letter, patients were asked to consider participation in the study. All 27 patients who were asked agreed to participate, and written informed consent was obtained. The study was approved by the medical ethics committee of the University Medical Centre Utrecht in which the study took place.

Data collection

Data were collected using semi-structured, in-depth interviews on the day after surgery. The researcher's (JvD) interview technique (validity and reliability of the interview style) during the first two interviews was discussed with experts.) The questions were open-ended, and all interviews started with, "The nurse regularly asks you to assign a number from 0 to 10 to your pain, where 0 is no pain and 10 is the 'worst imaginable' pain. We heard from some patients that they perceived it as difficult to assign a number to their pain. How is that for you? Can you tell me how you assign a number to your pain?" A topic guide for the interviews based on the literature, the knowledge of nursing experts, and preliminary studies of the research group was used (Table 1). The Dutch school grades were chosen as a topic because the meaning of these grades (where 1 is insufficient and 10 is excellent) are the opposite of meaning of the pain scores. Therefore, Dutch patients could be confused when they were asked to score their pain on the NRS.

Insights from the interim analyses were incorporated in the interview guidelines used in subsequent interviews. Interviews were conducted in a private room on the ward, digitally recorded and transcribed verbatim. Identifying details were removed from the transcripts. The interviews lasted between 5 and 32 minutes (mean 12 minutes). Information concerning age, gender, ethnicity, surgical procedure, presence of chronic pain, and education was obtained using a structured questionnaire.

During data collection, memos were made containing impressions and thoughts about the themes and their relationships. Data collection stopped after saturation was reached (i.e., interviewees were selected until the new information obtained did not provide further insight into the themes or no further new themes emerged).¹⁰

Table 1. The topic guide for the interviews.

The value of the numbers from 0 to 10
Pain score at that moment
Bearable or unbearable pain
Assigning scores at the upper extreme of the scale
Previous experiences with pain
Upbringing
The role of the healthcare professional
Analgesics: when desiring light or strong analgesics fear of addiction and side effects
Grades at school from 1 to 10

Data analysis

The data analysis was conducted by two researchers (SV and JvD) and supported by NVivo 10 software (QSR International, Cambridge, MA, USA). Data were analysed applying constant comparison analysis. First the texts were read out in full to obtain an overall picture and then reread to elucidate the details. During open coding meaningful paragraphs were analysed and initial concepts identified leading to fragmentation of the data. Axial coding enabled the concepts to be aggregated according to their similarities leading to categories (themes). New data were compared with the evolved categories. Throughout selective coding relations between the categories were defined and a preliminary model was described.¹² The theoretical model in development was compared with the interview transcripts to verify the interpretation into the original interview texts. During the coding process the researchers discussed the concepts and categories. When their opinions differed, they discussed the issue until consensus was reached. A third researcher (CK, an expert in the field of pain treatment with a different background), read the transcripts, checked the coding, and discussed his opinion if different, allowing us to verify the themes and the preliminary model. The research team reviewed the main categories and its relations and worked toward consensus about the interpretations and finally the theoretical model was developed.

Trustworthiness

Validity was established by generating a non-judgmental atmosphere during interviews ensuring to learn from patients. A critical stance to interview style was taken and feedback led to more depth which enhanced accurateness. Transcribing the interviews verbatim reduces the chances for bias. Researcher triangulation during the data analysis and peer review by the researcher team enhanced the validity of the interpretation. From the beginning of the data collection to the data analysis memos were written. These memos

supported the research process and the creation of theoretical ideas. By means of peer review and the use of memo's the transparency of the analytical process was enhanced leading to strengthen the controllability of the research.

Results

The age of the 14 men and 13 women who participated in the study was between 18 and 79 years old (mean 51). The severity of surgery varied from minor (e.g., thyroidectomy) to major (e.g., spinal fusion). Demographic and medical data are presented in Table 2.

Translating currently experienced pain into an NRS score between 0 and 10 appeared to be a complex process for the patients. From the analysis, three main themes emerged regarding the process of scoring one's pain experience: score-related factors, intrapersonal factors, and the anticipated consequences of rating one's pain with an NRS score. The latter theme comprised two subthemes: expected judgments by professionals and anticipation of analgesic administration, particularly opioids. Factors that were reported to influence the rating of pain using an NRS score are shown in Table 3.

Table 2. Demographic data.

N	27
Male, n	14
Age, mean (range)	51 (18–79)
Ethnicity, n	
Caucasian	23
Other	4
Surgical type, n	
Orthopedic	16
General	5
Gynecologic	3
Plastic surgery	2
Vascular surgery	1
Education, n	
Low	10
Median	10
High	7
Patients with chronic pain, n	6

Table 3. Three main themes and associated factors that emerged from the interview analyses.

Score-related factors	Intrapersonal patient factors	Anticipated consequences of assigning a particular NRS score	
		Judgments by professionals	Analgesic administration
<ul style="list-style-type: none"> • Unique pain experience • Distinction between bearable and unbearable pain • Avoiding high extremes • Different pain levels at rest and movement 	<ul style="list-style-type: none"> • Previous pain experiences • Being tough on oneself • Pain threshold • Holding oneself to one's own standards • Desiring confirmation from professionals 	<ul style="list-style-type: none"> • Being seen as a bother • Experiencing basic mistrust • Wish to meet the expectations of professionals 	<ul style="list-style-type: none"> • Encounter ambivalence • Suffering side effects • Variation on timing of opioids • Nurses have own point of view

A model emerged of the interrelation between the themes clarifying what underlies patients' rating of their pain on the NRS (Figure 1). Patients went through consecutive stages wherein the themes were at play. However, not all patients were affected by the themes in the same way. Based on the patients' score-related and intrapersonal patient factors, a preliminary pain score was "internally" set. Before reporting the pain score to the healthcare professional, the patient considered the anticipated consequences of the current NRS score. Based on these expectations, this preliminary pain score was sometimes adjusted to a definitive pain score that was reported to the professional. First, patients expected that professionals would judge them regarding the magnitude of the reported pain score. Second, patients considered what pain treatment would likely be administered as a result of their reported pain score. Some patients wanted to meet the expectations of the professional and considered what would be the most socially acceptable pain score. Based on these considerations, the "adjusted" pain score was then communicated to the healthcare professional.

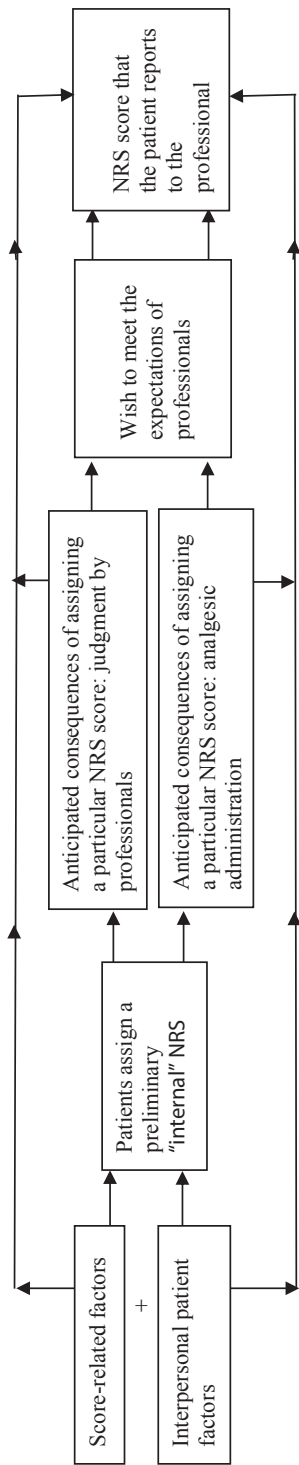


Figure 1. The model for the patients' underlying process of rating an NRS score to their pain.

Score-related factors

Unique pain experience. Patients found it difficult to rate their pain using an NRS score, because they felt they had an “unique” pain experience. They said it was difficult to explain to another person exactly what they felt or what their pain level was in relation to what they felt. Several patients said that everyone experiences pain differently and therefore will assign their own value from 0 to 10.

“It’s difficult to measure. You’ve got your interpretation and I’ve got mine” (male, age 51).

“I think about worst pain as something I’ve never felt before and zero is no pain. I always find it a very difficult question to assign a number” (female, age 51).

Many patients perceived it as difficult to assign a number from 0 to 10 to their experienced pain, especially when it concerned the intermediate pain scores (NRS scores of 4 to 6). For some patients who had chronic pain in addition to acute postoperative pain, it was even more difficult to rate their current pain experience, because they often experienced different types of pain that differed in intensity.

Distinction between “bearable” and “unbearable” pain. To make it easier to rate their pain, some patients first created a cut-off point between bearable and unbearable pain, the latter often expressed as an NRS score of 6 or higher.

“I balance between bearable and severe. If it is bearable then it is a six, it is not good, but I can bear it. But when I feel it with any movement and it’s really painful, then it is eight or sometimes nine” (female, age 79).

The number 5 was seen by many patients as a natural midpoint of the pain scale. Therefore, patients themselves often used an NRS score of 5 as a cut-off point: At 5 and below, the pain was considered bearable, and at above 5, the pain was called “real pain.”

“‘Five’ I would consider the average, that is bearable. Over five, then I’d say: give me something. That is not really bearable I think. So, as long it is up to five, I’d say I am doing OK” (female, age 45).

Patients concluded that there clearly was a difference between their interpretation of bearable and unbearable pain and that of professionals. In the patients’ opinion, many professionals considered only NRS scores below 4 as representing bearable pain, while many patients considered an NRS score of 6 as indicating bearable pain. In the Netherlands school system, a grade system from 1 to 10 is traditionally used, where 1 means completely insufficient and 10 denotes excellent. In this system, a score of 6 is sufficient to pass an exam. One patient mentioned that this had an effect on how she used the NRS.

“The grades at school that is something you are familiar with, that is also a validation, that has an effect, because that’s what you grew up with. Because it is also a kind of validation, when you give the pain a number then you also validate something, you know? Yes, I think so” (male, age 77).

Most patients said that they were not confused when rating their pain experience in relation to scores they were used to getting at Dutch schools.

Avoiding high extremes. Most patients assign an extreme score on the NRS as follows: 0 and 1 meaning no or light pain and 9 and 10 meaning the worst imaginable pain. Some patients explained that they would never use the highest pain score, because “10” is so extreme that they could not imagine having so much pain.

“If it hurts a little, then it is often two or three. Higher than five, then it has to hurt a lot. I would never give a ten. Yeah, ‘unbearable’ wouldn’t cross my mind” (male, age 36).

Other patients said that they would never assign a very high number to their pain, because they mentally compared their current situation to a more severe imagined situation.

Different pain level at rest and movement. When patients were asked how they assigned a number to their pain, many patients said they experienced a difference between pain at rest and pain at movement. Patients mostly assigned two different numbers to their pain: an NRS score below four at rest and an NRS score above six or seven at movement.

“If I lie very still and I have used the PCA pump then it is a three or four, and when I move it goes up to a seven, eight” (male, age 41).

Some patients consider their pain at rest as bearable and only move if necessary. Patients accepted a brief moment of pain at movement and did not want additional analgesics for such short severe pain episodes.

Intrapersonal patient factors

Previous pain experiences. When rating their current pain using an NRS score, patients used past pain experiences as a benchmark to judge their current pain level. Patients who had experienced severe pain in the past tended to consider their current pain as less severe than patients who had not experienced severe pain before. They explained that they understood what “worst imaginable” pain was and accordingly recalibrated the NRS.

“I now rate it a three, almost no pain, but I’ve had surgery before and then they asked it as well. I’ve had a tonsillectomy and then you’re actually constantly in pain, so I had an eight or something, that’s really very painful, that’s not normal anymore” (female, age 18).

“My neuropathic pain was severe and then you know how ‘worst imaginable’ pain can be. And that’s quite irritating because I’ve had a lot of pain and if you have to compare then I say, ‘it’s a four’ and you compare it with a ten that is not as high as someone else’s, I always find it difficult to distinguish. And then they (the nurses) say, ‘oh, then it’s okay.’ But they don’t know with what I’m comparing it” (female, age 26).

Being tough on oneself. Regarding their postoperative pain experience, many patients said that they were tough on themselves.

“They have often told me that I am very hard on myself. I didn’t allow myself to complain. I was very hard on myself” (male, age 41).

Patients said that they expected pain after surgery and that they could bear some pain. Moreover, patients indicated that postoperative pain is temporary. Sometimes, high NRS scores were given, yet patients considered the experienced pain bearable and did not want additional analgesic treatment. Several patients said that they thought it was appropriate to be tough on themselves, and they often traced that back to their own upbringing and the way they were taught to handle pain during childhood.

“I don’t moan quickly. I don’t often visit the doctor. I get that from my upbringing. Yeah, it has to be really necessary before I make a fuss” (female, age 45).

Pain threshold. Many patients thought they had a high pain threshold, because they could bear a lot of pain.

“My pain threshold is quite high because I’ve been through a lot. My knees had to be bent three years ago. So, I can take quite a lot because that was very severe” (male, age 41).

One patient said that the individual pain threshold depends on the degree of resilience that one has and that this differs between people. Patients who also had chronic pain considered their postoperative pain intermediate but bearable, explaining that they were used to having pain. They explained that because they were accustomed to pain, they had a high pain threshold and could handle more pain than patients without chronic pain.

“You learn to live with it, but there are limits. Anyone else would already be screaming because of the pain, but my pain threshold is a bit higher” (male, age 45).

Few patients said they had a low pain threshold because they could not bear a lot of pain. One patient told the interviewer that after giving birth to her children, she could not bear pain anymore.

Holding oneself to one’s own standards. Many patients considered NRS scores of 4 and higher, especially scores between 4 and 6, still bearable. During the interviews, the researcher explained to the patients how professionals are taught that NRS scores of 4 and higher are unacceptable and require intervention. Even after this explanation, patients continued to maintain their own point of view (i.e., that NRS scores between 4 and 6 were bearable). They said they had their own standards about the meaning of the different numbers of the pain scale.

Interviewer: “You told me a six, seven is bearable. Would you alter it if I told you that nurses consider zero to four as bearable pain?”

Patient: “No, because I have got my own norm, I am more used to pain and I think it is bearable. If I’m in pain and I can handle it, it is bearable for me” (male, age 47).

Desiring confirmation from professionals. Patients sometimes doubt about the NRS score they assign to their pain. Patients appreciated it when the professional confirmed their assignment of a high number to their pain. They were more convinced that they had correctly assigned a number to their pain experience if the doctor or nurse had said that a high level of pain was expected or normal.

“When I actually told him (the doctor), he said ‘yes I can imagine, because it’s all bruised’. So then I thought ‘see, I’m not exaggerating!’. I have the idea that they will then think I’m being a wimp” (female, age 63).

Anticipated consequences of assigning a particular NRS score

Patients appeared to take the anticipated consequences of a given NRS score into account before telling the professional a number. They sometimes purposefully assigned a lower NRS score than the pain actually experienced in anticipation of the reaction of healthcare professionals. Patients were sometimes reluctant to provide an NRS score, fearing it is “too high” or “too low” that possibly lead to a reaction of the professional they did not expect. With giving a particular score, patients tried to anticipate whether professionals will administrate analgesics or not. Therefore, this distinction led to two subthemes: “judgment by care professionals” and “analgesic administration.”

Judgments by healthcare professionals

Being seen as a bother. Patients were worried that healthcare professionals would consider them being a bother if they reported high NRS scores.

“That is not because I want to be tough or anything, that is not the issue, but I just don’t want to be a bother. That’s the point, I just don’t want to be bothersome” (male, age 47).

“In the past, you didn’t complain, you just got on with it. That’s what’s in me and always will be” (female, age 63).

Patients fear that professionals think that they exaggerate pain. Consequently patients anticipated on the risk of being judged as bothersome by the professional and therefore do not want to complain. Many patients said they were afraid of being seen as troublesome while hospitalized. To avoid being seen as troublesome, they did not ask for analgesics, especially when they observed that the nurses were busy.

Interviewer: “Why did you wait two hours before you requested any analgesics?”

Patient: “Because I didn’t want to be troublesome” (male, age 70).

Experiencing basic mistrust. The expression of pain using a number from 0 to 10 was influenced by patients’ perception of professionals; some patients hesitated to report a high NRS score, thinking that healthcare professionals would not believe that they were really in so much pain.

“This week I gave a high pain score and I noticed that they (the nurses) looked at me as if to say, ‘mmm, that is a very high score’. They almost don’t believe you. Probably because it is rare that the pain score is that high. Like they can’t handle it that the pain is so severe, I think, I noticed that” (male, age 45).

This basic mistrust, patients said, led them to intentionally report lower NRS scores than they actually perceived.

“Well, there are interpretation differences between people. You’re not allowed to complain. So, you lessen your pain score because you feel that no-one will accept if you say ‘I feel so awful. I’m in so much pain’, then you minimize your pain” (female, age 65).

One patient defined basic mistrust as “mental pain”: “It hurt when someone said to me, ‘Nothing is wrong with you!’” Patients thought that this disbelief was due to a lack of visible tissue damage. Patients felt they were not taken seriously by healthcare professionals when reporting an NRS score. They perceived that the professionals did not consider their pain serious. Patients clearly indicated that they wanted to be taken seriously, even when professionals thought that the reported NRS score was (too) high. Some patients indicated that it was important that the professional just listened to them, without judging.

“Being taken seriously is pleasant for a patient. Knowing that you are being taken seriously, even though from an objective point of view it (the pain score) is not quite the right number on the scale” (female, age 65).

Wish to meet the expectations of professionals. Some patients wanted to meet the expectations of the professional in what pain score fits best on the experienced pain, considering what would be the most socially acceptable pain score. They adjusted their pain score to the estimated level of which they thought the professional will find it logical.

“Then I think I will lower my score, otherwise they (the nurses) will think ‘do you really have so much pain?’ (female, age 63).

“I am just going to give my usual scores and for now, I just not take my neuralgia into account. When my neuralgia gets worse again, then I will give it a score of 20 because adjusting my measure to even worse pain has been proven not efficacious to give a clear explanation of my experienced pain (to the nurses)” (female, age 26).

Analgesic administration

Encounter ambivalence. Many patients were ambivalent toward analgesics. On the one hand, they needed analgesics after surgery to recover, but on the other hand, they actually thought analgesics were not good for them because of toxicity.

“If it really hurts, after surgery for example, then I think it’s necessary. But if it’s not necessary, then preferably no painkiller, because ultimately it’s junk what you’re putting in your body” (female, age 18).

Some patients accepted analgesics and other patients said that most pain is transient, and therefore, refused analgesics. The different negative terms for analgesics given by patients,

like “junk” or “rubbish,” supported this opinion.

“There is so much rubbish in and I think every time ‘O my God, it’s morphine and it’s better if I can do without.’ They (the nurses) have explicitly told me that it’s okay, but it plays on my mind” (female, age 71).

Suffering side effects. Some patients said that they refused opioids because they had previously experienced typical opioid side effects, such as sedation and nausea, even when the nausea had been treated appropriately. Once they are no longer opioid naïve, patients often consciously weigh the desired analgesic effects of opioids against the negative side effects. One patient expressed this eloquently as follows:

“But as soon as I use too much morphine then I become very nauseous. You are constantly trying to find a balance between bearable pain and bearable nausea, shall we say” (female, age 65).

Variation on timing of opioids. There was significant variation in the pain levels at which patients wanted opioids to be administered. Some patients said they could bear the pain and did not need any analgesics. Other patients wanted light analgesics to be administered at NRS scores of 4 to 6. However, a large variability was seen when patients needed opioids: Some patients said they needed opioids at NRS scores from 6 onwards, while some only required opioids from NRS 7 or even higher:

“I want painkillers from a four and above and morphine, no, then I would say: eight or above” (male, age 36).

Patients gave different reasons for not wanting opioids (e.g., they had heard terrifying stories about opioids from family and friends, they had previously suffered from the side effects of opioids, they wanted to bear their own pain, they believed that pain was a signal telling the body it needed to rest or that they had to get used to pain).

Nurses have own point of view. Patients said that nurses had their own point of view about the meaning of the numbers from 0-10 and do not use the score to communicate about pain with the patient:

“As far as I can remember nobody asked me a question like that if the pain was mild because if it is severe, six or seven, then they (the nurses) say, ‘what can we do about it?’ But when it is three or four then they immediately say, ‘okay’ and write it down. I would prefer if they said, ‘do you want us to do something about it or can you handle it’, instead of saying, ‘so, you’re okay then” (female, age 26).

Patients said that there was no agreement in terms of the NRS score at which nurses administered analgesics. One patient describes this as follows:

“Well I thought, the pain is easing, so I said five or four, one of those I said and then she (the nurse) said, ‘well then you don’t need any more painkillers.’ And then I said no, then it is a six because it hurt and I needed them. Now I assume with five I won’t

get any painkillers so I think ok, with five no painkillers and I want some so I give a six and then I get them” (female, age 32).

In contrast, some patients who rated their pain as NRS 6 or 7 did not want additional analgesic medication, but nurses insisted that they accept additional pain medication according to acute pain treatment guidelines.

Discussion

The qualitative approach in this study identifies several elements underlying the process of a patient translating his/her currently experienced postoperative pain into a reported rating on the NRS. A model of this decision-making process is proposed made of the interrelationship between the factors that influence this rating process. The model can help healthcare professionals to better understand this process and the factors that possibly influence the NRS score that is actually reported to them. When assigning an NRS score to their pain, patients process the first two themes in stages: They first weigh score-related factors and intrapersonal factors. Some patients go through a last stage before telling the professional: weighing the anticipated consequences of reporting a particular NRS score against their actual desire for more or less analgesics. Patients can be aware of these factors, but most often, the entire process appears to be implicit and subconscious.

Quantifying pain through the self-reported NRS score from 0 to 10 is often referred to as the gold standard for pain assessment.¹³ However, for a gold standard, self-report is fraught with limitations. Nowadays, pain professionals develop guidelines for pain treatment including the manner for instructing and informing patients how they should interpret NRS scores from 0 to 10. Our data suggest that this single number does not tell the whole story. Instead, healthcare professionals should listen to the patient's story about the experienced pain rather than simply administering analgesics as soon as a single pain score exceeds a numeric threshold. Without a pain assessment beyond the NRS by healthcare professionals, postoperative patients might be at risk of both undertreatment and overtreatment of their pain. The scores on the NRS are only important to detect change in postoperative pain treatment. Knowledge of the factors in this study that influence a patient's pain scoring can help professionals use simple questions to explore patients' unique pain experiences and consequently titrate analgesic treatment in dialogue with the patient, improving the quality and safety of care.

The current study also confirmed that patients find it especially difficult to rate their unique pain experience on the NRS when their score is in the middle of the sequence (i.e., 4 to 6).^{1,14} Therefore, many patients considered an NRS score of 7 as the limit of pain acceptance, and at 7 or above, opioids were desired. This is clearly a much higher pain threshold than currently taught to professionals based on guidelines for acute pain management. There is no agreement on the optimal NRS cut-off score in guidelines for

pain treatment and there is no agreement on how to identify an optimal NRS cut-off score for pain treatment.¹⁵ Rigid cut-off scores in guidelines for pain treatment should not be used with individual patients to prevent a risk of over- or undertreatment. Therefore, patients should be asked what their individual cut-off score is when they require a particular intervention.

The patients often arrived at a new NRS score by comparing their worst previous pain experience with the current pain sensation.^{16,17} In the current study we found that the NRS scores from 0 to 10 can conceal real differences in pain intensity across patients, because previous pain experiences differ between patients. In line with this finding, a previous study concluded that it is impossible to compare pain scores between patients, because we cannot share pain experiences.¹⁸

Subjective norms influence the social pressure on the individual to exhibit (or not exhibit) a particular behaviour.¹⁹ Our findings confirmed the idea that patients do not want to deviate from perceived social norms and be known as an individual who complains a lot.^{14,20} Patients are afraid of being judged by healthcare professionals when the NRS score they report is perceived as “too high.” This exact situation, called basic mistrust, is described in a phenomenological study in which nurses did not believe the patients.²¹ Only when there is confirmation by the professional does the patient feel empowered to assign a high NRS score.

Patients also envision what their reported pain scores will mean regarding the subsequent administration of analgesics, especially opioids. There appears to be a wide variation in how patients interpret NRS scores in relation to if, when, and how much analgesia needs to be given. The NRS cut-off points used in guidelines for acute pain are often lower than those of patients; patients tend to use the midpoint of the scale as the NRS cut-off value for additional analgesia. Therefore, most patients with NRS scores of 4, 5, and even 6 consider their pain “bearable” and do not want opioid analgesics. It seems that many professionals have learned this from patients and do not administer analgesics when patients' NRS pain scores are in the middle of the scale. In turn, patients have learned from previous reactions of professionals at what NRS score they will be administered a certain analgesic. A study of chronic pain patients also showed that patients have to give an NRS score higher than 5 in order to receive more analgesics from the nurse.²⁰

When the NRS score is used, a shared understanding of patients and professionals is crucial to the adequate treatment of pain. However, this seems difficult to realize, because the interpretation of pain scores differs between individuals. Everyone has its own standards and values that are impossible to change in favour of looking the same way to the pain scores from 0 to 10. Culture influences how each person experiences and responds to pain. Some cultures value stoicism and tend to avoid saying that there is pain and other cultural groups tend to be more expressive about pain.²² Patients' diverse cultural patterns are not right or wrong, just different. The purpose is to achieve individualized pain assessment and pain treatment. Professionals evaluate patients' pain and make judgments that are

required for prescribing pain treatment. Therefore, healthcare professionals must learn to think about analgesic administration in a more “patient-oriented” way: a patient has to be seen as a whole person in his/her social context, and his/her feelings, wishes, expectations, norms, and experiences have to be taken into account.²³

Although our study was restricted to only one university hospital, the richness of the data makes us confident that our analysis has captured the most typical aspects of patients’ underlying processes for rating their pain on the NRS. Moreover, the current study is strengthened by the number of interviews and the fact that the new insights that emerged during data collection were incorporated into the interview topic list. In this qualitative study, only Dutch patients were interviewed, and the results are, therefore, not immediately generalizable to other countries and cultures. While we believe that many of the themes that we elicited (e.g., fear of being judged) will also emerge when repeated in other countries in the Western world, ideally a cross-cultural international study should be conducted to expand on the themes and to validate or extend our conceptual model of how patients arrive at their reported NRS scores. Such a study would possibly give interesting and important insights into cross-cultural differences in the pain experience and responses to pharmacologic and non-pharmacologic pain treatments offered.

Conclusions

In postoperative pain management, NRS cut-off scores are widely used as a basis for administering or withholding opioid analgesics. Patients however, have a different view on these NRS cut-off scores. Therefore, it is necessary to communicate with patients beyond the NRS score. The current qualitative study identified several elements of the underlying process by which patients translate acute postoperative pain into a rating on the NRS. The factors in the model are subsumed under three main themes: score-related factors, intrapersonal factors, and the anticipated consequences of reporting a particular NRS score. Knowing these factors could help healthcare professionals to better understand the complex process by which patients assign pain scores and the factors that influence the scores that are ultimately reported to them. This could serve as basis for a dialogue aimed at clarifying the patient’s current needs and result in more patient-centred, shared decision making regarding (opioid) analgesic administration improving the quality and safety of care.

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Chapter 9

General discussion



General discussion

Many patients experience pain after surgery. Their pain is often moderate to severe, with self-reported NRS scores higher than 4 out of a possible 10. Postoperative pain can cause complications when not adequately treated (Chapter 1). Therefore, pain experts have stated that pain scores should be seen as the fifth vital sign and developed guidelines for optimal postoperative pain treatment. Many of these guidelines state that pain should be treated when a patient reports pain scores higher than 4.

APSSs were established to improve postoperative pain management and decrease patients' pain scores through the timely prescription of one or more analgesics. Nonetheless, after the widespread implementation of APSSs, patients' reported pain scores remained high. A more recent Dutch guideline for postoperative pain management by the Dutch Healthcare Inspectorate suggested using an NRS score higher than 3 as the cut-off for prescribing analgesics.¹ This has sometimes led to vigorous efforts to decrease a patient's pain score. The guidelines are likely to have resulted in increased opioid prescriptions, some of which were clearly necessary. However, higher opioid use might also have resulted in more cases of over-sedation and respiratory depression events.² Unfortunately, no recommendations were given to measure the degree of sedation in postoperative patients who were administered opioids.

Is it possible that the pendulum has swung too far in the direction of aggressive number-based postoperative pain treatment? Perhaps in our zeal to improve pain treatment, we have focused too much on the absolute numbers that pain-scoring instruments provide. Absolute numbers seem to be easy to obtain, register, and analyze statistically. Consequently, we have based our pain treatment guidelines entirely on such numbers. In fact, satisfactory pain relief (i.e., patient comfort and prevention of complications) is the underlying goal. Therefore, whether hospital-wide NRS scores really represent the quality of local pain management remains questionable. It is therefore important to know the extent to which we can rely on patients' NRS scores and try to understand patients' NRS scores from 0 to 10. We need to know whether professionals and patients speak the same language when interpreting the numbers that patients assign to their pain and seek ways to improve understanding.

In this thesis, we have investigated the meaning of the pain scores assessed by the NRS in postoperative patients, for both patients and nurses. In this chapter, we will discuss the main findings and reflect on methodological aspects of our study. Implications and recommendations for future research, education, and clinical practice will be given.

Main findings

- Most postoperative patients who report NRS scores between 4 and 6 consider their pain bearable and do not desire additional opioids. Postoperative patients and Acute Pain Nurses (APNs) differ in their interpretation of NRS scores. A risk of overtreatment might arise when healthcare professionals rigidly follow guidelines that prescribe strong analgesics for pain scores higher than 3 or 4 without probing the patient's preference for pharmacologic treatment (Chapters 2–4).
- Educating patients with a film about pain assessment and treatment does not change the relation between their NRS scores and desire for opioids. Many patients with NRS scores higher than 4 have no desire to receive (more) opioids. However, their knowledge increases and their barriers toward pain management decrease (Chapter 5).
- Information about possible complications of postoperative pain increases patients' knowledge but does not change the negative beliefs preventing adequate pain treatment. In total, almost four out of five patients are neutral or agree with the false statement "Patients become addicted to pain medicine easily" (Chapter 6).
- Nurses have high knowledge scores and low barriers toward pain management. However, more than half of all nurses are neutral or agree with the false statement that patients become addicted to pain medicine easily (Chapter 7).
- We identified several elements of the underlying process by which patients translate their postoperative pain into an NRS rating (e.g., distinction between "bearable" and "unbearable" pain, being tough on oneself, previous pain experiences, basic mistrust by healthcare professionals, and attitudes toward opioids). These elements are grouped into three themes, and the relationships between them were used to form a model. This model can help professionals to understand patients' process in rating their pain on the NRS and to ask clarification questions (Chapter 8).

Reflections from the literature

Validity of the NRS

The NRS is supposed to be a valid pain assessment scale.³⁻⁵ The validity of a test describes its ability to distinguish between those who do and do not have a given condition. The condition in question is patients' need for pain treatment. The results of our studies indicate that the NRS cannot adequately discriminate between postoperative patients who do and do not desire analgesics. When $NRS \geq 4$ is the cut-off value for prescribing analgesics,¹

the results of our study showed a sensitivity of 86% and a specificity of 65%. Therefore, if pain treatment guidelines were followed rigidly, 49% of patients would have been treated inappropriately (i.e., 14% undertreated and 35% overtreated) (Chapter 4). We believe that this number is unacceptably high. Most postoperative patients who reported NRS scores between 4 and 6 considered their pain “bearable” and did not desire additional opioids (Chapters 2–4). The APNs, however, interpreted the NRS scores differently: In line with current guidelines for pain management, they considered pain “bearable” only when a patient reported low pain scores. It is questionable whether patients fully understand or accept the concept of giving a number to their pain using the NRS. We thought patients need to be empowered to be full participants in their assessment and treatment of pain through improved communication with professionals. That is why we studied the effect of educating patients about pain treatment by means of a film where an APN explained the NRS from 0–10, an anesthesiologist emphasized the importance of adequate postoperative pain treatment, and an animation summarized the information at the end. However, patients in the intervention group did not have less discordant NRS scores (i.e., NRS \leq 4 and desiring opioids or NRS $>$ 4 and not desiring opioids) than patients in the control group (Chapter 5). One possible explanation emerged from the in-depth interviews with postoperative patients who told us that they had their own ideas about the meaning of the different numbers of the pain scale, which could not easily be changed by education (Chapter 8).

Pain model

The pain model of Loeser⁶ emphasizes that nociception, pain, and suffering are personal, private, internal events that cannot be established by observing the patient. The patient is the only one who can describe it. The healthcare professional can only discuss the patient’s pain by observing the patient’s behavior. The NRS score is clearly important in postoperative pain treatment, but it is increasingly seen as an absolute indicator for the intensity of pain. However, the results of our studies suggest that the NRS equally reflects the emotional aspects of pain and the intensity of pain. Several factors come into play when patients are asked to assign a number to their complex pain experience, such as “being tough” on oneself, previous pain experiences, and concerns about being judged by professionals (Chapter 8). Therefore, in Loeser’s pain model, the NRS score that patients report to their healthcare worker is not simply a reflection of the intensity of their nociception and direct pain experiences. It is highly influenced by their level of suffering, their emotions, and even social pressures (e.g., not wanting to be seen as a burden).

Suffering from pain

Several previous studies have demonstrated that postoperative patients still suffer moderate to severe pain with reported NRS scores $>$ 4 despite active use of guidelines for pain treatment.^{7,8,9} However, paradoxically, many patients who report having moderate

or severe pain are satisfied with their postoperative pain treatment.^{10,11} Thus, the extent to which patients who indicate moderate pain (typically NRS 4–6) really suffer remains uncertain. Most postoperative patients in our study with NRS scores of 4–6 considered this bearable pain and did not want additional opioids (Chapters 2–4). Patients have various reasons for not wanting to take analgesics, and some patients will accept having some postoperative pain while still being satisfied with pain management. It is likely that patients are actively weighing the positive (e.g., pain relief) and negative (e.g., nausea) outcomes of treatment when making treatment decisions, especially after multiple doses of opioids have been received (Chapter 8). The obvious challenge for acute pain management is to find better ways to identify those patients who will truly benefit from additional analgesics. Many patients could tolerate short bouts of severe pain during movement as well and did not desire additional opioids (Chapters 5 and 8). For some patients, the pain can be so severe as to preclude adequate coughing. In these cases, it is important to administer additional analgesia to prevent pneumonia.

Barriers to pain treatment

The inability of the NRS scores to differentiate between patients who desire more analgesics and those who do not could be related to issues other than pain severity. Concerns about side effects, opioid addiction, and toxicity also contribute to the decision to accept or refuse analgesics (Chapters 5, 6, and 8). These concerns about using analgesics have been cited as one of the major contributors to the problem of inadequate pain management.^{12,13} After watching an educational film about postoperative pain management, patients in the intervention group had higher knowledge scores and lower barriers toward pain management than patients in the control group (Chapter 5). Education can lead to improved knowledge and decreased barriers, but this does not necessarily change old habits.¹⁴ Therefore, patients can have increased knowledge of pain assessment and pain treatment after seeing an educational video, but that does not mean that they are willing to use the NRS score as intended by the APS nurse or accept analgesics after surgery based on a particular NRS rating.

Nurses' assessments of patients' pain

The following is the definition of pain most often used by nurses: "Pain is whatever the experiencing person says it is, and it exists whenever he says it does."¹⁵ In our study, however, one third of all nurses considered at least half of their patients' pain scores inconsistent with their own impressions of patients' pain (Chapter 7). Nurses apparently make their own assessments of their patients' pain based on a combination of nonverbal cues, such as type of and time since surgery or patient behavior.^{16,17} Nurses believed that pain assessment tools are subjective and inaccurate,¹⁸ and they did not perceive the NRS pain scores as very useful.¹⁹ They did not feel that patients always understood the concept of giving a number to their pain. After interviewing patients, we found that most of them

understood the concept of NRS scores very well. However, several patients insisted that they had their own unique “scale” regarding the meaning of the numbers from 0–10, especially regarding which numbers correspond with “bearable” and “unbearable” pain (Chapter 8). Patients were clearly aware of nurses’ disbelief and sometimes felt that they were not taken seriously by healthcare professionals, especially when reporting a high NRS score. They said it hurt when nurses did not believe they were having so much pain. Therefore, we identified three important, related themes in a model, underlying patients’ process of assigning a number to their experienced pain. This model can help professionals to understand the factors influencing a given patient’s NRS score and to ask the most appropriate clarification questions during communication with the patient (Chapter 8). This will provide more patient-centered care that allows patients to feel they are being heard, understood, and taken seriously. In patient-centered care, healthcare providers must explore patients’ preferences and provide them with information that helps them to make the right decisions.²⁰ Therefore, nurses have to try to understand patients’ pain and determine their pain management needs. When assigning cut-off points to the treatment of pain without listening to the patient’s story beyond the NRS score, a patient’s unique pain experience might be misinterpreted, increasing the risk of undertreatment or overtreatment of pain.

Nurses have a very important function in the treatment of pain. They often have to select the right analgesic and dose for individual patients within the framework of existing guidelines. Moreover, nurses can choose non-pharmacologic interventions (e.g., cold and heat, massage, music, repositioning, relaxation, etc.) as well, which are often not described in guidelines for pain management. The knowledge and beliefs of professionals about pain management are important contributing factors that influence whether a patient receives effective pain treatment.²¹ Understanding how patients’ beliefs determine whether they accept or refuse analgesics might improve the quality of this shared decision-making process and the success of pain treatment. We investigated nurses’ knowledge and beliefs about pain management. Nurses had higher knowledge and lower barriers toward pain management than patients. However, 51% of the nurses were neutral or agreed with the false statement that patients become addicted to pain medicine easily (Chapter 7). This belief—together with some nurses’ refusal to accept a patient’s reported high pain score—can cause undertreatment of postoperative pain. Nurses need to be educated regularly about pain and pain management. Our results indicate that nurses with additional pain education had higher knowledge scores and lower barriers toward pain treatment than nurses without additional pain education (Chapter 7). Therefore, we conclude that ongoing education in pain for nurses is useful.

Future perspectives

Recommendations for clinical practice

Pain assessment and pain management

Pain assessment is the foundation of pain management when a patient is experiencing postoperative pain. Frequent and thorough assessment of patients' pain provides information to achieve optimal pain relief. I recommend assessing patients' pain on the NRS for several reasons. First, asking patients to score their pain on the NRS ensures that all professionals assess pain in the same way. Second, with adequate treatment of postoperative pain, subsequent NRS scores are expected to be lower. Finally, with NRS scores, effects of pain treatment in research studies can be established, and these scores can be used for statistics.

The first time the pain is assessed, the professional should explain the NRS to the patient: "0" means no pain at all and "10" means the "worst imaginable" pain. This is to ensure that patients are not confusing pain scores with school grades (in the Netherlands school system, scores of 8, 9, and 10 represent "good," "excellent," and "exceptional", respectively) and inadvertently assigning low NRS scores to their pain while actually experiencing severe pain.

The NRS score is not an absolute number. Once the patient has reported an NRS score, the professional is not finished as has been the case previously. Rather, the professional should communicate with the patient to understand the meaning of this particular score without being judgmental. Healthcare professionals should understand that patients can have their own interpretation of the pain scale and might have different ideas regarding the particular NRS score that signifies the need for additional analgesics. The conceptual model that we proposed in this thesis might help professionals to better understand the complex process by which patients assign pain scores and could serve as a basis for a dialogue beyond the reported pain scores. In this way, patients and professionals can arrive at a shared understanding of patients' pain, resulting in a tailored decision regarding the most appropriate treatment of current postoperative pain (i.e., pharmacologic or non-pharmacologic interventions).

Guidelines for pain treatment advise professionals to administer additional analgesics when patients report an NRS score higher than 3 or 4. However, great variation exists in how patients translate their pain to an NRS score and in the distribution of cut-off scores in desiring analgesics or not desiring analgesics. Therefore, rigid cut-off scores in guidelines for postoperative pain treatment should not be used with individual patients. Patients should be asked what their individual cut-off score is when they require a particular intervention. This NRS score should be registered in the patient's file, making care transferable to any healthcare provider caring for this patient. The individual NRS cut-off score is not a fixed cut-off score; that is, it can change during the patient's hospital stay.

Education

Patients should be well educated about postoperative pain and pain management, because unnecessary concerns about analgesics can prevent adequate pain treatment. Despite the fact that the educational video on postoperative pain assessment and pain management did not produce a difference between discordant NRS scores of the intervention group and the control group, it is a valuable tool to prepare patients for surgery. However, the video should be shown in a quiet environment (e.g., at home via the internet or on the hospital infotainment system) and more than once at different times in the preoperative and postoperative period. The video is available at <http://www.youtube.com/watch?v=2F4gbMgo4AQ&feature=youtu.be>

To change patients' beliefs and behaviors toward accepting analgesics after surgery, patients should be educated in different ways (e.g., by using leaflets or films or maybe by showing a patient with pain in a popular soap on television). Being tough on oneself and not wanting to be seen as a bother is deeply embedded in the Dutch culture and difficult to change. It is likely that we can learn from other cultures and discover new educational techniques that can change patients' beliefs and behaviors toward postoperative pain. Moreover, nurses and doctors should tell patients about the importance of postoperative pain treatment during communication with patients beyond the NRS score. Ongoing patient education is necessary to change patients' beliefs and behaviors about postoperative pain treatment.

In addition to patients, nurses can also benefit from additional education on pain measurement and pain treatment. Most importantly, nurses should be discouraged from assuming that patients do not understand the NRS and informed that they must take the time to listen to the patient's story beyond the NRS score without judging. Loeser's pain model can help to explain that nurses can only discuss a patient's pain by observing the patient's behavior and that only the patient himself can describe the experienced pain. Moreover, nurses should not be concerned about possible addiction resulting from postoperative opioid pain medication. Therefore, ongoing additional pain education for nurses is necessary. This might be best achieved through a longer educational program or a combination of education methods (e.g., theory, an APN role model, e-learning, simulation, etc.).

Quality indicators

The currently active Dutch Healthcare Inspectorate's indicator for the quality of postoperative pain management, while well intentioned, is in need of amendment. Hospital-wide average pain scores cannot adequately represent the quality of pain management in Dutch hospitals. We consider it more important to look at both process measures such as the specific interventions that have been applied (i.e., pharmacologic and non-pharmacologic approaches) and outcome measures such as reported NRS scores, supplemented with indicators of satisfaction with pain management. In addition, to assure

patient safety in the face of increased opioid use, sedation scores should be measured alongside NRS scores. Sedation scores might be added as a safety indicator to protect patients from the adverse effects of opioids.

In my opinion, pain is not the fifth vital sign. To promote pain assessment, pain is regarded as the fifth vital sign.²² All nursing staff members are required to document each patient's rating of their pain along with the other four vital signs (i.e., heart rate, blood pressure, temperature, and respiratory rate). Now, the risk arises that nurses collect all the five vital signs and think they have all the necessary information. However, adequate pain management involves more than simply asking for an NRS score. In contrast to the real vital signs, professionals need to uncover the story beyond the NRS score: What do patients mean by such self-reported pain scores? Moreover, because pain is subjective and NRS scores are not absolute numbers, this cannot exclusively lead to healthcare professionals administering analgesics according to pain management guidelines. The rigid NRS cut-off scores in these guidelines should not be followed; patients should be asked what their individual cut-off score is when requiring a particular intervention. The current burden of the pain and the desire for analgesics or a non-pharmacologic intervention need to be discussed with the patient. Administration of more analgesics or the decision to start or increase the dose of opioids should ideally be a shared decision between patient and nurse.

Recommendations for further research

In our qualitative study, only Dutch patients were interviewed, and the results are, therefore, not immediately generalizable to other countries and cultures. While we believe that many of the themes that we elicited (e.g., fear of being judged) will also emerge when repeated in other countries in the Western world, ideally a cross-cultural international study should be conducted to expand on the themes and to validate or extend our conceptual model of how patients arrive at their reported NRS scores. Such a study would possibly give interesting and important insights into cross-cultural differences in the postoperative pain experience and responses to pharmacologic and non-pharmacologic pain treatments offered.

We recommend determining each patient's individual NRS cut-off score instead of following guidelines with one NRS cut-off score for all postoperative patients. Future research should examine the effect of personalized cut-off scores in postoperative pain management on patients' pain scores.

More research is needed to examine the effect of ongoing additional pain education for patients and nurses. Therefore, future research should focus on:

- The most effective ways to employ educational videos to influence patients' beliefs and behaviors toward postoperative pain management, both in terms of content and mode of presentation as well as optimal frequency (videos shown once versus more frequently)
- The ways patients in other countries and cultures are educated about postoperative pain and pain management
- The effect of a more intensive pain education program or a combination of education methods for nurses on their beliefs and behaviors toward postoperative pain medication

Conclusion

In summary, the results of our studies indicate that when assigning cut-off points to the treatment of pain without listening to the patient beyond the NRS score, a patient's unique pain experience might be misinterpreted, increasing the risk of undertreatment or overtreatment of pain. Therefore, professionals should always communicate with patients about the meaning of self-reported NRS scores without being judgmental. We propose a model with factors influencing patients' assignment of NRS scores to their pain that could serve as a basis for a dialogue beyond the reported pain scores. Individual patients' cut-off scores should be established for pain treatment that consists of both pharmacologic and non-pharmacologic interventions.

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Chapter 10

Summary

Nederlandse samenvatting

Dankwoord

Curriculum Vitae



Summary

Many patients experience pain after surgery. Adequate pain treatment begins with a reliable pain assessment. The Numeric Rating Scale (NRS) is often used for this purpose; the patient is asked to score the pain on a scale from 0 to 10, where 0 indicates no pain and 10 indicates the worst imaginable pain.

The patient's NRS score is the leading indicator for postoperative pain treatment. Many guidelines for pain management recommend the prescription of analgesics on the basis of patients' NRS scores. Some choose a cut-off point of an NRS score higher than 4, and some choose a cut-off point of an NRS score higher than 3. In clinical practice, however, not all patients with an NRS score higher than the treatment threshold are willing to accept the analgesics offered, mostly because they consider the pain "bearable." This suggests that professionals and patients might perceive the necessity of pain treatment differently.

The general aim of the work presented in this thesis is to understand patients' postoperative pain scores in order to strengthen pain management.

Chapter 2 describes a study examining the NRS scores at which adult postoperative patients considered their pain bearable or not. Additionally, professionals working with postoperative patients are asked to relate the numbers of the NRS to bearable or unbearable pain on the Verbal Rating Scale (VRS). Therefore, we conducted a cross-sectional study. Most postoperative patients with NRS scores of 4–6 considered their pain bearable. Postoperative patients and Acute Pain Nurses (APNs) differed in their interpretation of the NRS scores. APNs assigned lower NRS scores to the VRS categories than patients and other professionals did. The findings suggest a potential risk of overtreatment if the pain is assessed by the NRS alone and treatment decisions are based solely on a patient's NRS response. Specifically asking patients whether the pain is bearable and whether they would like to receive additional analgesics might circumvent this problem.

In **Chapter 3**, a cross-sectional study is presented in which the diagnostic value of the NRS is measured by comparing it to bearable and unbearable pain in older patients (≥ 65 years). The NRS was insufficiently accurate close to guideline cut-off values for the administration of additional analgesics. When assessing postoperative pain in older patients using the NRS, a large group of older patients with bearable pain would be incorrectly classified as having unbearable pain. This misclassification can result in overtreatment with analgesics in older patients, which can result in potentially dangerous adverse effects. Therefore, pain treatment for older patients should be individualized, rather than the same cut-off score being used for all older patients.

In the previous studies, we assumed that bearable pain indicated a lack of desire for opioids; however, we were not sure. As the relation between NRS scores and the desire for opioids is uncertain, we investigated the ability of the NRS to discriminate between patients who desire opioids and patients who do not desire opioids in a cross-

sectional study (**Chapter 4**). A large variability exists concerning the NRS scores at which postoperative patients did or did not desire opioids. Only when patients scored an 8 or higher on the NRS did the majority express a need for opioids. Many patients did not desire opioids, because they considered their pain tolerable, even at an NRS score higher than 4. The NRS cut-off values commonly used by professionals do not reflect patients' wishes for additional opioids. There is a possible risk of overtreatment when healthcare providers rigidly follow guidelines on prescribing strong analgesics without questioning patients on their preference for pharmacological treatment.

For adequate pain treatment, it is necessary that patients and professionals share a common lexicon of pain referents. It is conceivable that some patients do not understand the assessment of pain on the NRS. In addition, to achieve clarity of understanding and communication with reference to pain and pain management, it is important that patients accept opioids when they are in pain. To that end, patient education can be helpful. Therefore, we made an educational film (<http://www.youtube.com/watch?v=2F4gbMgo4AQ&feature=youtu.be>). In **Chapter 5**, the effect of the film on the relation between patients' NRS scores and their desire for additional analgesics was examined using a randomized controlled trial. The intervention was an educational film about pain assessment and pain treatment. Patients in the control group watched a film about the infotainment system of the hospital, which contained internet, television, and telephones.

There was no significant difference in the proportion of discordant pain scores (NRS ≤ 4 and having a wish for opioids or NRS > 4 and having no wish for opioids) between the intervention and the control group. Educating patients on how to score pain on the NRS might not be sufficient to acquire "accurate" pain scores; nevertheless, many patients with NRS scores higher than 4 had no wish for opioids. However, patients in the intervention group had significantly higher knowledge and lower barriers to pain management than patients in the control group. No difference between the two groups was found concerning patients' fear before surgery. In conclusion, it is important to educate patients about pain and pain treatment so patients can make shared decisions with healthcare professionals about (non-) pharmacologic interventions. The video was not effective in educating patients about the use of the NRS, because patients continued to give high NRS scores while not expressing a desire for analgesics.

Many patients who report NRS scores > 4 refuse analgesics offered in accordance with the guidelines for pain management. One of the reasons is that patients consider their pain bearable. Another reason might be that barriers—such as fear of addiction and side effects and lack of knowledge about the negative consequences of pain—might play a role. Specific information given prior to surgery about pain and pain treatment might help patients obtain improved pain relief after surgery. **Chapter 6** considers the influence of written information on patients' knowledge, beliefs, and fear toward pain and pain treatment using a randomized controlled trial. Patients were either preoperatively exposed to information about the complications of postoperative pain or were not. In

the intervention group, patients' knowledge levels were significantly higher than in the control group. No differences were found in beliefs or fear. Informing patients before surgery about postoperative complications due to pain improves patients' knowledge. However, repeated exposure to such information might be necessary to effectively remove barriers to postoperative pain control.

In the previous study, 79% of the patients were neutral or agreed with the false statement that people become addicted to pain medicine easily. Patients' concerns about using analgesics have been cited as one of the major contributors to the problem of inadequate pain management. Nurses have a very important function in the treatment of patients' pain. Often, they have to administer prescribed drugs and choose the right dose for individual patients. Nurses can identify patients' beliefs that hamper the delivery of effective pain treatment and challenge those beliefs to try to change patients' refusal of analgesics. Therefore, nurses might not be hindered by barriers preventing adequate pain treatment. **Chapter 7** describes nurses' knowledge and beliefs toward pain and pain management. Nurses had high knowledge scores and low barriers toward pain management. Nurses who received additional pain education had higher knowledge scores and lower barriers compared with nurses who did not receive additional pain education. However, 51% of the nurses were neutral or agreed with the false statement that patients become addicted to pain medication easily. Ongoing additional pain education is necessary to change all nurses' negative beliefs about pain management.

Patients differ in how they interpret the NRS score. **Chapter 8** describes a qualitative study that provides insight into the process of how patients translate their current postoperative pain into a numeric rating score. Three main themes emerged that influenced the pain scores that patients reported to professionals: Score-related factors, intrapersonal factors, and the anticipated consequences of a given pain score. Anticipated consequences were analgesic administration—which could be desired or undesired—and possible judgments by professionals. We also propose a conceptual model for the relationship between factors that influence the pain rating process. When assigning an NRS score to their pain, patients process the first two themes in stages: They first weigh score-related factors and intrapersonal factors, and a preliminary pain score is “internally” set. Some patients undergo a last stage before reporting to the professional: Weighing the judgments by healthcare professionals and the anticipated consequences of reporting a particular NRS score against their actual desire for more or less analgesics. The proposed model could help professionals to understand the factors that influence a given NRS score and suggest the most appropriate questions for clarification. In this way, patients and professionals can arrive at a shared understanding of the pain score, resulting in a tailored decision regarding the most appropriate treatment for current postoperative pain, particularly related to the dosing and timing of opioid administration.

In **Chapter 9**, the main findings of the thesis are discussed. In addition, recommendations for clinical practice and future research are presented.

The results of our studies indicate that when assigning cut-off points to the treatment of pain without listening to the patient beyond the NRS score, a patient's unique pain experience might be misinterpreted, increasing the risk of undertreatment or overtreatment of pain. Therefore, professionals should always communicate with patients about the meaning of self-reported NRS scores without being judgmental. Rigid cut-off scores in guidelines for pain treatment should not be used for individual patients. A discussion about the cut-off score for a particular patient can possibly improve mutual understanding, leading to individualized interventions (pharmacologic and/or non-pharmacologic) and superior postoperative care.

Nederlandse samenvatting

Voor veel mensen is een operatie een pijnlijke ervaring. Een adequate pijnbehandeling begint met een betrouwbare inschatting van de pijn. Hiervoor wordt vaak de Numeric Rating Scale (NRS) gebruikt: de patiënt wordt gevraagd de pijn een getal te geven tussen 0 en 10, 0 is geen pijn en 10 is de ergst denkbare pijn.

In de behandeling van postoperatieve pijn is de NRS score van de patiënt het belangrijkste uitgangspunt. Veel protocollen voor pijnbehandeling bevelen het voorschrijven van analgetica aan op basis van de NRS score van patiënten. In deze protocollen wordt als grens voor acceptabele pijn een NRS score van 3 of 4 gekozen. Komt de NRS score boven deze grenswaarden dan wordt toediening van pijnmedicatie aanbevolen. In de praktijk zien we echter dat niet alle patiënten met een NRS score boven die grens de aangeboden analgetica willen gebruiken, vooral omdat ze de pijn nog als “draaglijk” ervaren. Dit impliceert dat professionals en patiënten de behoefte tot het gebruik van pijnstillers verschillend zien.

Het doel van dit proefschrift is te onderzoeken of er verschillen zitten in de interpretatie van de NRS score tussen patiënten en professionals en hoe die verschillen kunnen worden overbrugd, om zo de basis te leggen voor een betere behandeling van postoperatieve pijn.

In **hoofdstuk 2** wordt een cross-sectioneel onderzoek beschreven waarin postoperatieve patiënten NRS scores hebben gegeven aan hun pijn en of deze pijn draaglijk of ondraaglijk is. Tevens hebben we aan professionals gevraagd welke NRS scores zij draaglijke of ondraaglijke pijn vinden. De meeste postoperatieve patiënten met NRS 4–6 beschouwden dit als draaglijke pijn. Acute pijn verpleegkundigen en patiënten hadden een verschillende interpretatie van de NRS scores. Acute pijn verpleegkundigen kenden lagere NRS scores toe aan draaglijke pijn dan patiënten. Dit verschil vonden we niet bij andere professionals. De bevindingen impliceren een potentieel risico op overbehandeling als de pijnbehandeling uitsluitend gebaseerd wordt op de NRS score van de patiënt. Dit probleem kan omzeild worden door nadrukkelijk aan patiënten te vragen of de pijn draaglijk voor ze is en of ze extra pijnmedicatie voorgeschreven willen krijgen.

In **hoofdstuk 3** presenteren we een cross-sectionele studie waarin de diagnostische waarde van de NRS bepaald wordt door de NRS scores te vergelijken met draaglijke of ondraaglijke pijn bij oudere patiënten (≥ 65 jaar). De NRS is onvoldoende accuraat gebleken voor wat betreft de grens van 3 of 4 waarboven protocollen het toedienen van pijnmedicatie voorschrijven. Bij de beoordeling van postoperatieve pijn bij oudere patiënten door middel van de NRS werd de pijnbeleving van een grote groep oudere patiënten met draaglijke pijn onjuist geclassificeerd als ondraaglijke pijn. Deze misclassificatie kan leiden tot overbehandeling met pijnmedicatie bij oudere patiënten wat kan resulteren in potentiële gevaarlijke bijwerkingen. Daarom moet de behandeling van pijn bij oudere patiënten worden geïndividualiseerd, in plaats van het gebruiken van één ondergrens voor alle oudere patiënten.

In voorafgaande studies zijn we ervan uitgegaan dat draaglijke pijn hetzelfde is als geen wens voor pijnmedicatie, maar daar waren we niet van overtuigd. Omdat de relatie tussen de NRS scores en de wens voor (extra) opioïden niet duidelijk was, onderzochten we het vermogen van de NRS om onderscheid te maken tussen patiënten die wel of geen wens voor opioïden hadden. Hiervoor hebben we een cross-sectioneel onderzoek opgezet (**hoofdstuk 4**). We hebben een grote variatie gevonden vanaf welke NRS score postoperatieve patiënten behoefte hebben aan opioïden. Pas wanneer patiënten 8 of hoger scoorden op de NRS gaf de meerderheid een behoefte aan opioïden aan. Veel patiënten hadden geen wens voor opioïden omdat zij hun pijn draaglijk vonden, zelfs bij een NRS score hoger dan 4. De NRS grenswaarden die vaak worden gebruikt voor pijnbehandeling door professionals weerspiegelen de behoefte van patiënten aan opioïden niet. Er is een risico op overbehandeling wanneer professionals rigide de pijnprotocollen volgen zonder bij patiënten te achterhalen of zij (extra) pijnmedicatie toegediend willen krijgen.

Voor een adequate pijnbehandeling is het nodig dat professionals en patiënten op dezelfde manier naar de NRS score kijken. Het zou kunnen dat sommige patiënten de beoordeling van pijn op de NRS niet begrijpen. Bovendien is het belangrijk dat patiënten opioïden accepteren wanneer zij veel pijn hebben. Voorlichting aan patiënten over pijn en pijnbehandeling kan daarbij behulpzaam zijn. Daarom hebben wij een voorlichtingsfilm voor patiënten ontwikkeld (<http://www.youtube.com/watch?v=2F4gbMgo4AQ&feature=youtu.be>).

In **hoofdstuk 5** wordt door middel van een gerandomiseerde trial het effect onderzocht van deze voorlichtingsfilm op de relatie van de NRS scores van patiënten en hun wens voor (extra) pijnmedicatie. Ook is de kennis, houding en angst van patiënten onderzocht ten aanzien van pijn en pijnbehandeling. De interventie was een voorlichtingsfilm over pijnmeting en de behandeling van pijn. De patiënten in de controlegroep keken naar een film over het infotainment systeem van het ziekenhuis met internet, televisie en telefoon aan bed.

Er was geen significant verschil in aantal “inaccurate” pijnscores ($NRS \leq 4$ en wel een wens voor opioïden of $NRS > 4$ en geen wens voor opioïden) tussen de interventie- en de controlegroep. Het instrueren van patiënten over het scoren van pijn op de NRS was niet genoeg om accurate pijnscores te krijgen; nog steeds hadden veel patiënten met NRS scores hoger dan 4 geen wens voor opioïden. Patiënten in de interventiegroep scoorden wel significant hoger in kennis en lager in de weerstand tegen pijnmedicatie vergeleken met de controlegroep. We vonden geen verschil tussen de twee groepen met betrekking tot angst voor de operatie. De conclusie van dit onderzoek luidt dat het belangrijk is om patiënten voor te lichten over pijn en pijnbehandeling zodat zij een besluit kunnen nemen samen met professionals over de (niet)farmacologische pijnbehandeling na de operatie. De film is niet effectief gebleken in het voorlichten van patiënten over het gebruik van de NRS omdat veel patiënten hoge NRS scores blijven geven terwijl zij geen behoefte hebben aan (extra) pijnmedicatie.

Veel patiënten weigeren opioïden als hen dit aangeboden wordt bij een NRS score hoger dan 3 of 4 zoals de protocollen voorschrijven. Een van de redenen is dat patiënten hun pijn als draaglijk beschouwen. Andere redenen zijn dat patiënten bezorgd zijn over opioïden, zoals angst voor verslaving of bijwerkingen of niet weten dat pijn na de operatie ook complicaties kan veroorzaken. Specifieke informatie over pijn en pijnbehandeling aan patiënten kan bijdragen aan een adequate en veilige pijnbehandeling na de operatie. In **hoofdstuk 6** wordt door middel van een gerandomiseerde trial het effect onderzocht van schriftelijke informatie op de kennis, houding en angst van patiënten ten opzichte van pijn en pijnbehandeling. Patiënten kregen preoperatief wel of geen schriftelijke informatie over complicaties van postoperatieve pijn.

In de interventiegroep was het kennisniveau van de patiënten significant hoger dan in de controlegroep. Er werden geen verschillen gevonden in angst en houding ten opzichte van de pijnbehandeling. De conclusie van dit onderzoek luidt dat als patiënten voor de operatie geïnformeerd worden over complicaties van postoperatieve pijn er een toename in kennis optreedt. Misschien is herhaling van deze informatie nodig om een positievere houding te creëren tegenover pijnbehandeling zodat patiënten pijnmedicatie accepteren als dat nodig is.

In het vorige onderzoek was 79% van de patiënten neutraal of was het eens met de onjuiste stelling dat patiënten gemakkelijk verslaafd kunnen raken aan pijnmedicatie. De bezorgdheid van patiënten over het gebruik van opioïden kan een adequate pijnbehandeling in de weg staan. Verpleegkundigen hebben een belangrijke rol in de pijnbehandeling van patiënten. Zij zijn het vaak die de voorgeschreven pijnmedicatie toedienen in een voor de patiënt adequate dosis. Verpleegkundigen kunnen bij patiënten achterhalen of zij onnodig bezorgd zijn over pijnmedicatie wat voorkomt dat zij een adequate pijnbehandeling krijgen. Het is dan de taak van verpleegkundigen om deze bezorgdheid weg te nemen en een verandering te bewerkstelligen in het gedrag van patiënten zodat zij pijnmedicatie accepteren als dat nodig is. Daarom mogen verpleegkundigen zelf niet gehinderd worden door een negatieve houding die een adequate pijnbehandeling in de weg staat. **Hoofdstuk 7** beschrijft de kennis en houding van verpleegkundigen met betrekking tot pijn en pijnbehandeling.

Verpleegkundigen hadden een hoog kennisniveau en een positieve houding met betrekking tot pijn en pijnbehandeling. Verpleegkundigen die extra zijn opgeleid over pijn hadden een hoger kennisniveau en een positievere houding in vergelijking met verpleegkundigen zonder deze extra scholing. Echter, 51% van de verpleegkundigen was neutraal of was het eens met de onjuiste stelling dat patiënten gemakkelijk verslaafd kunnen raken aan pijnmedicatie na de operatie. Continuering van extra scholing over pijn aan verpleegkundigen is nodig om kennislacunes weg te nemen die een adequaat gebruik van pijnmedicatie kunnen hinderen.

Patiënten verschillen in het interpreteren van de NRS scores. **Hoofdstuk 8** beschrijft een kwalitatieve studie naar de factoren die bepalen hoe patiënten hun postoperatieve pijn

vertalen in NRS scores. Deze factoren zijn onder te verdelen in drie hoofdthema's: score-gerelateerde factoren, persoonlijke patiënt factoren en de te verwachten consequenties van een bepaalde pijnscore. Deze consequenties hebben betrekking op het toedienen van pijnmedicatie (juist wel of juist geen pijnmedicatie toegediend willen krijgen) en het mogelijke oordeel van professionals. Hieruit is een model voortgekomen dat de relatie laat zien tussen de factoren die het proces beïnvloeden van het geven van een NRS score. Bij het toekennen van een NRS score aan de pijn, gaan patiënten door de eerste twee thema's als fasen en komen zij tot een voorlopige pijnscore. Sommige patiënten gaan door een laatste fase voordat zij de pijnscore aan de professional vertellen. Zij bedenken welke gevolgen het geven van een bepaalde NRS score zou kunnen hebben op het oordeel van de professional en op de toediening van meer of minder pijnmedicatie. Het voorgestelde model kan professionals helpen om de factoren en het proces te begrijpen die leiden tot een bepaalde NRS score. Daardoor kan de professional gericht vragen stellen die duidelijkheid kunnen geven over de NRS score van de patiënt. Hierdoor komen patiënten en professionals tot een gezamenlijk begrip van de pijnscore van de patiënt wat leidt tot een pijnbehandeling die past bij de individuele patiënt.

In **hoofdstuk 9** worden de belangrijkste bevindingen van dit proefschrift besproken. Daarnaast worden aanbevelingen voor de klinische praktijk en toekomstig onderzoek gepresenteerd.

De resultaten van dit proefschrift tonen aan dat, hoewel de NRS een waardevol instrument is, het rigide gebruiken van NRS scores in de postoperatieve pijnbehandeling kan leiden tot over- of onderbehandeling. Als een verpleegkundige alleen een NRS score vraagt, zonder te luisteren naar het verhaal van de patiënt over de betekenis hiervan, kan de unieke pijnervaring van de patiënt verkeerd geïnterpreteerd worden. Daarom moeten professionals altijd communiceren met de patiënt over de betekenis van de zelf-gerapporteerde NRS score zonder hier een oordeel aan te verbinden. Rigide NRS grenswaarden in protocollen voor pijnbehandeling moeten niet gebruikt worden voor de individuele patiënt. Daarom adviseren wij dat verpleegkundigen vragen naar de individuele grenswaarde voor de pijnbehandeling van de patiënt. Praten met de patiënt over de NRS score leidt tot meer wederzijdse begrip en tot op maat gesneden interventies (farmacologisch en/of niet-farmacologisch) en uiteindelijk tot betere postoperatieve zorg.

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Curriculum Vitae

Jacqueline Francina Maria van Dijk was born in Vleuten-de Meern, the Netherlands, on June 25, 1962. After graduating from secondary school at St-Gregorius College in Utrecht, she started her nursing education at Utrecht's Oudenrijn Hospital, which she completed in 1984. Thereafter, she worked as a nurse at several hospitals in Utrecht. In 1986, she ended up at the High Care Department at the former University Medical Center (UMC) in Utrecht, and she obtained her Certificate of Intensive Care (IC) Nursing. During her work as an IC nurse, Jacqueline achieved her bachelor's degree in nursing (HBO-V) and her qualification for teaching bachelor's courses at the University of Applied Sciences in Diemen.

After working as a nurse at the psychiatric hospital Willem Arntsz Huis in Utrecht for one year, Jacqueline resumed working as an IC nurse at the UMC's Post Anesthesia Care Unit. From 2000 to 2004, she studied nursing science at the Faculty of Health Science, Utrecht University. In 2005, she had the opportunity to work as a pain nurse at the UMC's Pain Clinic and established the Acute Pain Service together with Anne Mieke Karsch, anesthesiologist and pain physician. At the end of 2007, Jacqueline was invited to start a PhD program and completed the master epidemiology at the University of Utrecht in 2012. Jacqueline has continued to work at the UMC's Pain Clinic in Utrecht.



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