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School of Health and Welfare

Doctoral Thesis

Postoperative pain assessment and impact of pain on early physical recovery, from the patients' perspective

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Jönköping University
School of Health and Welfare
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Abstract

Background: Pain is a common postoperative experience. Guidelines recommend performing regular pain assessments, which include self-rated pain and additional communication to capture patients' experiences. During hospitalisation, pain intensity is found to be a vital factor influencing other aspects of an early physical recovery, and is consequently an important item in questionnaires for recovery. These tools consist of extensive questionnaires which are difficult to use in everyday clinical work. A simplified method of monitoring postoperative recovery would benefit both patients and healthcare professionals.

Aim: The overall aim of this thesis was twofold: (A) to determine the ability of extending the use of pain ratings to reflect and predict early physical postoperative recovery and (B) to describe patients' perspectives on pain assessments.

Methods: The studies were carried out at one (I), three (IV) and four hospitals (II, III) involving general surgical and orthopaedic inpatients. Two quantitative methods were used based on data from questionnaires and medical records. They consisted of one cross-sectional study (I) and one study with repeated measures (IV). An association was sought between pain intensity and postoperative recovery on days 1 and 2 (I, IV), and prehospital data (IV). Two qualitative methods were used involving a phenomenographic (III) approach and Critical Incident Technique (IV), where semi-structured interviews were performed postoperatively and analysed inductively in accordance with the approach.

Results: An association was found between moderate/severe average pain intensity compiled from monitoring records and impact on early physical postoperative recovery on day 1 (I). Retrospective average pain intensity at rest and during activity reflected impact on recovery on postoperative day 1 (IV). Severe pain intensity at rest and during activity on postoperative day 1 predicted impact on physical recovery items on day 2 (IV).

The use of the Numeric Rating Scale (NRS 0-10) was considered to facilitate communication about pain, but to involve difficulties of interpretation and place demand on healthcare professionals and care routines (II). Patients' descriptions of their experiences when in need of describing pain indicated two main areas: patients' resources when needing to describe pain and ward resources for performing pain assessments (III). Descriptions of their actions

when they were in pain indicated two main areas: patients used active strategies when needing to describe pain or patients used passive strategies when needing to describe pain (III).

Conclusions: This thesis contributes to knowledge about the possibility of using patients' self-rated average pain intensity to reflect early physical postoperative recovery on day 1 and to predict recovery on the following day. The pain scale gave patients and healthcare professionals a shared vocabulary, which facilitated communication. Furthermore, dialogue during pain assessments was described as critical in ascertaining whether pain intensity had an impact on different aspects of physical recovery. Environmental factors such as the attitude of healthcare professionals, workload and staffing influenced how pain assessments were performed.

Original Studies

The thesis is based on the following studies, which are indicated by Roman numerals in the text:

I

Eriksson, K., Wikström, L., Lindblad-Fridh, M. & Broström, A. (2013). Using mode and maximum values from the Numeric Rating Scale when evaluating postoperative pain management and recovery. *J Clin Nurs, 22*(5-6), 638-647. doi: 10.1111/j.1365-2702.2012.04225.x

II

Eriksson, K., Wikström, L., Årestedt, K., Fridlund, B. & Broström, A. (2014). Numeric rating scale: patients' perceptions of its use in postoperative pain assessments. *Appl Nurs Res, 27*(1), 41-46. doi: 10.1016/j.apnr.2013.10.006

III

Eriksson, K., Wikström, L., Fridlund, B., Årestedt, K. & Broström, A. (2016). Patients' experiences and actions when describing pain after surgery - A critical incident technique analysis. *Int J Nurs Stud, 56*, 27-36. doi: 10.1016/j.ijnurstu.2015.12.008

IV

Eriksson K., Wikström L., Fridlund B., Årestedt K., Broström A. Pain ratings association with the prediction of early physical recovery after general and orthopaedic surgery - A quantitative study with repeated measures. Submitted to *J Adv Nurs.*

The articles have been reprinted with the kind permission of the respective journals.

Author contribution

All authors have been involved throughout the process of analysis in Studies I-IV, and have contributed to the interpretation of data, the intellectual content and finalising the manuscripts. Kerstin Eriksson took the main responsibility for Studies II, III and IV. In Study I, the main responsibility was shared equally with Lotta Wikström.

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Preface

Care for patients who have undergone surgery involves working with patients in pain or at risk of experiencing pain. In my work as a pain nurse in the "acute pain service" team, I meet these patients and face the challenge of trying to understand how they experience their pain. I also meet healthcare professionals who have issues in terms of comprehending what patients are communicating in their pain assessments. Everyday clinical practice is the starting point for this thesis and it is therefore pragmatic, so the overall aim was approached by using different paradigms. These paradigms are based on dissimilar ontological and epistemological bases, which mean that the methods for carrying out the specific aims differ. Using a post-positivist paradigm implies that studies are conducted on the basis of strict rules and well-defined variables, which seek the truth with the aim of controlling or predicting something. Using an interpretive paradigm, on the other hand, means that the studies are performed on the basis of subjects' experiences in order to explain and obtain a deeper understanding of a phenomenon. The results of this thesis will constitute the basis for further research in terms of identifying and eventually facilitating early physical postoperative recovery in patients. In addition, my doctoral research has given me new insights and knowledge in terms of patients' perspectives on pain assessment. This has helped me in individual encounters with patients and influenced descriptions of routines involved in my clinical work. Hopefully, other healthcare professionals will also find that this thesis facilitates their clinical work and encounters with patients.

Kerstin Eriksson
May 2017

Introduction

A large number of patients undergo different types of surgery every day. Many of them will experience pain [1, 2] where ongoing screening and assessment is needed [3]. National and international guidelines [3-5] recommend that postoperative pain assessments are performed several times a day. These assessments consist of several parts, one of which involves a patient's self-rated pain intensity [3, 5]. The purpose of pain assessments is to individualise pain management and thereby reduce suffering [6]. Guidelines for pain assessments are a way of developing a shared vocabulary, regardless of the healthcare professional with whom the patient is communicating. However, even though healthcare professionals follow guidelines for pain assessment, patients' responses may be difficult for them to understand [7]. An important basis for pain assessments is exchange of information. Two-way communication between patients and healthcare professionals is a prerequisite for information exchange [8]. Furthermore, proficient communication on the part of healthcare professionals allows patients to participate in decision-making [9], and facilitates sharing information in regard to assessing pain. However, there is few studies which describes patients' perspectives of using a pain scale, or their perspective on how the pain assessments are performed. More knowledge about patients' perspectives could help healthcare professionals communicate appropriately with patients in terms of assessing pain.

Pain and its management are vital elements in surgical guidelines for early and enhanced physical recovery after surgery [10-13]. In addition to facilitating mobilisation by optimising pain management, surgical guidelines focus on aspects such as gentle surgery, avoiding drainage, probes and fluid administration [14]. As well as these guidelines, validated recovery tools have been developed using patient questionnaires, and these monitor different dimensions which affect postoperative recovery [15, 16]. The recovery tools include physical, psychological and social dimensions[15, 16], of which the physical aspects of recovery are found to have the greatest impact in the first days after surgery [17]. The physical dimension includes pain, which is found to be a vital aspect during hospitalisation [18], since pain negatively influences sleep and mobilisation, for instance [3, 19, 20]. Extensive questionnaires administered soon after surgery, however, limit the number of patients who

manage to complete them [21]. Furthermore, patients receive a great deal of information regarding their surgery. It would be useful to avoid additional information and the requirement to fill in questionnaires. A simplified method of monitoring early physical postoperative recovery without having to complete questionnaires would help both patients and healthcare professionals. Patients' self-rated pain is collected and monitored every day. However, no one has determined the possibility of using self-rated pain to monitor early physical postoperative recovery in individual patients.

Background

Postoperative care

In Sweden, postoperative care is required for about 830 000 patients every year [22]. Postoperative care is defined as the care patients receive after surgery until discharge. The care is based on patients' needs, and may include monitoring vital signs, assessments, treatment, assistance or support to ensure patients are fit to go home [23]. Those who undergo minor as well as major surgery usually need care afterwards, which can vary in length from a few hours to weeks. Major surgery is defined by Weiser et al. [24] as any surgery which takes place in a hospital operating theatre which requires regional or general anaesthesia, or sedation. In this thesis, the definition of major surgery also includes a need to stay in hospital for at least 2 days, based on the current organisational and clinical care situation in Sweden. Furthermore, as patients undergoing orthopaedic surgery are found to have higher pain intensity than those undergoing general surgery, both surgical groups are included [25, 26]. Patients face difficulties during hospitalisation, as care is influenced not only by the surgery but also by aspects of the environment, which might include lack of continuity in healthcare professionals' work schedules[27]. This leads to an increased risk of conflicting responses and instructions [28], and is likely to affect pain management. Both patients and healthcare professionals describe that a heavy workload limits dialogue and patient participation [28, 29]. Furthermore, responsibility for pain management falls on nurses, as physicians are only present on the ward for short periods [30, 31].

The main postoperative pain experienced by patients is defined as acute, i.e. "Pain of recent onset and probable limited duration. It usually has an identifiable temporal and causal relationship to injury or disease" [32]. Another definition, which covers both acute and chronic pain, describes it as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" [33]. Implying pain is a subjective experience and cannot be directly observed by others [34] . Furthermore, the intensity of pain is not linked to the size of the incision or tissue trauma [35]. Acute pain is common after surgery [2, 25, 35, 36] and has been shown to restrict patients' physical recovery [20], which in turn increases the

risk of a prolonged hospital stay [37]. The purpose of pain management is to reduce pain, facilitate early physical recovery [38] and reduce the risk of complications related to severe pain [39, 40]. Acute pain consists mostly of nociceptive elements related to tissue damage, but also involves neuropathic elements [41]. Experiences of pain are affected by cognition, emotions and behaviour. Cognition includes beliefs, attitudes and patients' expectations of how they will experience pain. Cognition and emotions, as well as the environment, influence patients' behaviour when they are in pain [42]. Pain is therefore affected by a number of factors, physiological, psychological and social, which make the experience of pain complex [41].

Guidelines on pain medicine and surgical specialities provide recommendations and instructions for pain management and advocate multimodal treatment [4, 14, 23, 37, 41, 43]. Multimodal pain management is described as treatment involving two or more analgesics with different mechanisms of action, possibly in combination with non-pharmacological methods [23, 41, 44] (Table 1). Basic pharmacological treatment consists of paracetamol and non-inflammatory analgesics, including regional block or infiltration anaesthesia, as basic or supplemental pain treatment. For moderate to major surgery, pain treatment is complemented with opioids [4, 23, 44]. Breakthrough pain is managed with analgesics on demand, according to general directives available locally at each clinic [45]. In addition, non-pharmacological methods such as music, massage and transcutaneous electric nerve stimulation may be used [23, 46-48]. However, individual needs in terms of pain management can vary widely between patients [49, 50], and to capture these variations an individual pain assessment is required.

Table 1. Description of options for postoperative pain treatment inspired by Meissner et al. [37] and Gelinas et al.[46].

Systemic pharmacologic therapy	**Central and peripheral nerve block, local infiltration**	**Non-pharmacological therapies**
Paracetamol	epidural	TENS
NSAID	intrathecal	music
opioids	peripheral nerve blocks	massage
clonidine	paravertebral block	cooling
ketamine	transversus abdominal plane block	heating
gabapentin	intra-articular	distraction
	incisional	

Pain assessment

Patients undergoing surgery are a heterogeneous group who experience pain differently, and their pain may be affected by various factors. The patients differ in terms of age, gender, personal characteristics, comorbidities, type of surgery [51] and education level [52]. Pain intensity is perceived to be highest in young adults and decreases gradually with age [51, 53]. The role of gender in pain intensity has been debated. Gender has no clinical significance according to some studies [51, 54], while others demonstrate more intense pain in females [52, 53]. However, anxiety, other forms of mental distress or pre-existing pain are clearly found to increase the incidence of higher postoperative pain intensity [51]. Comorbidity measured according to the ASA level (American Society of Anesthesiologists' classification of physical status) has been shown to escalate the risk of complications [55] which may lead to greater postoperative pain [56]. Patients with lower levels of education are found to have a higher pain intensity [57]. They ask fewer questions than those with higher levels of education, have a different communication style and are less inclined to want to be involved in decision-making in terms of pain management [58]. Furthermore, low levels of education combined with increased comorbidity and postoperative pain increase the risk of chronic pain [52].

Although self-reported pain intensity is highlighted in the assessment of pain, there are other components to consider, such as location, onset, the nature of the pain, treatment and presence of chronic pain [5, 41, 43, 44]. Asking questions about where, when and how pain is experienced can provide information about several of these elements [5]. One aspect of the assessment allows patients to describe their pain and indicate goals, beliefs and expectations in terms of pain management [41, 43]. However, where patients are unwilling to share their experiences, healthcare professionals are unable to make a proper assessment of their pain. Another difficulty is that some patients give mixed signals, for example denying pain but behaving in a way that suggests they are in pain [7]. Furthermore, there are flaws in adherence to guidelines as not all healthcare professionals ask patients about pain or rate their pain on a scale [1, 59].

According to guidelines in different countries, regular pain assessments are recommended after surgery [4, 5, 41, 43, 44, 60]. The guidelines clearly specify that

a valid pain scale is to be used and the assessments performed both at rest and during activity [5, 41, 43, 44]. The number of assessments to be carried out every day is less clear. Some guidelines propose that assessments are to be performed at suitable intervals [3, 43, 60] while others note that the interval between assessments depends on different factors (e.g. type of surgery, pain intensity and patients' needs) [41, 44]. Swedish guidelines are distinct, however, and suggest every four hours [4]. All guidelines recommend that pain assessments be made at breakthrough pain, and before and after additional analgesics [5, 41, 44, 60]. In Sweden, acceptable pain intensity is considered to be three or less on an eleven-point scale [4, 5]. However, a study from the Netherlands revealed that many patients declined additional analgesics even when pain was higher than three, which meant that patients were at risk of being over-treated by using this cut-off point [61, 62]. Consequently, patients' self-rated pain intensity, like the pain experience itself, is subjective, making it difficult to define a specific limit for pain treatment. Despite these shortcomings, assessing pain intensity using a pain scale is recommended.

Pain scales

The purpose of using a pain scale is to develop a shared vocabulary between patients and healthcare professionals [61]. In most cases a unidimensional pain scale is sufficient, and measures self-reported pain intensity [63], though if the pain is complex, multi-dimensional aspects of pain are taken into consideration (e.g. physical, functional, psychological) [63, 64]. Three different unidimensional pain scales are commonly suggested in pain medicine and guidelines: the Numeric Rating Scale (NRS), the Visual Analogue Scale (VAS) and the Verbal Rating Scale (VRS) [4, 5, 34, 41, 43, 44, 63]. The eleven-point NRS is preferred by a heterogeneous age group of patients, regardless of the cause of pain (i.e. acute, chronic or cancer pain) [63], and is considered simple to use by both patients and healthcare professionals [34]. The NRS is available in different versions, from 0-10, from 0-20 or from 0-100. Zero indicates no pain, while the highest score (i.e. 10, 20, 100) is the outermost endpoint. A review of the endpoints of the NRS showed that almost all users labelled 0 as "no pain", but the label for the outermost endpoint varied. The most common was "worst pain imaginable". Other common labels included "maximum pain", "unbearable pain", "pain as bad as it could be" and "worst possible pain" [63]. The VAS consists of a plastic ruler with an unmarked 10 cm line, and it has a movable cursor. The beginning of the line is marked 'no

pain' and the outermost pain is at the other end of the scale. The back of the tool is often marked in millimetres, which means that response options can range from 0-10 or from 0-100. The VRS consists of descriptive words for varying the severity of the pain. It can involve four, five or 15 different words. One example of the VRS is a four-point scale using the words no, mild, moderate or severe pain [34]. All three pain scales (i.e. NRS, VAS and VRS) are valid and reliable, though the VRS is less sensitive to detecting changes [34, 65]. In clinical work, the NRS 0-10 is advocated as the most practical pain scale [34, 63-65], since it is easy to use, requires no additional material and can be used in follow-up phone calls after discharge [34, 64].

Postoperative recovery

Postoperative recovery is defined as "an energy-requiring process of returning to normality and wholeness", which results in "returning to preoperative levels of independence/dependence in activities of daily living" [20]. A casual description of postoperative recovery involves returning to preoperative conditions [18, 66]. Recovery is usually divided into three phases: in the recovery room, on the ward and at home [17]. On the ward, pain management is an important part of patients' early physical recovery, contributing to shorter hospital stays [67, 68]. However, patients are rarely recovered to preoperative level at discharge, so that their remaining recovery period takes place at home [17, 69]. Self-reporting tools have been developed to monitor patients' recovery. The tools each have a different focus depending on the situation. They can be specific to a particular form of surgery, a certain recovery phase, or inpatient or outpatient surgery [18].

Monitoring recovery

The recovery tools consist of extensive questionnaires containing one or several dimensions for measuring patient-oriented outcomes [70], such as physical symptoms and functions, psychological aspects, emotions, cognition and satisfaction [18]. However, almost all tools contain a physical dimension, and of all items pain is considered to be of great importance in terms of recovery [70]. Of 12 different tools for following postoperative recovery, QoR 40 is recommended during the hospital stay [70]. Strickland et al. identified three tools for monitoring recovery regarding major general and orthopaedic surgery: Quality of Recovery (QoR 40), Postoperative Quality

of Recovery Scale (PQRS) and Postoperative Recovery Profile (PRP) [71]. The physical dimension in these tools consists of pain, appetite changes, sleeping difficulties, mobilisation, personal hygiene [15, 16, 66], ability to breathe easily, feeling restless, feeling dizzy, itching, normal speech [16] and vital signs [66]. The psychological dimension includes emotions and cognition, and involves items such as feelings of anxiety, depression and loneliness [15, 16], bad dreams, feeling in control [16], ability to concentrate [15, 16, 66] and memory tests [66]. In the early phase, in other words the first days after surgery, recovery is largely influenced by the physical dimension. The psychological dimension plays a greater role in the following days of recovery [17]. Physical items are also used in tools which follow quality of pain management. One commonly-used questionnaire is the American Pain Society Pain Outcome Questionnaire-Revised (APS-POQ-R), developed for both medical and surgical patients [3]. Another tool is the European Registry Pain Out, an international quality improvement and registry project. The Pain Out questionnaire is partly built on the APS-POQ-R, and is aimed at both general surgery and orthopaedic patients [26] (Table 2).

Table 2. Approaches to measuring recovery after major general and orthopaedic surgery; developers, areas and items in each tool.

Tool	Authors et al. (reference)	Areas	Number of items
Quality of Recovery (QoR 40)	[16]	Pain, physical comfort, physical independence, psychological support, emotional state	40
Postoperative Quality of Recovery Scale (PQRS)	[66]	Physiology, nociceptive, emotional, activities of daily living, cognitive and overall patient perspective	18
Postoperative Recovery Profile (PRP)	[15, 20]	Physical symptoms, physical functions, psychological, social and activity	19
American Pain Society Pain Outcome Questionnaire-Revised (APS-POQ-R)	[3]	The interference of pain with activity, mood and sleep	20
Pain Out	[26]	The interference of pain with activity, mood, sleep and breathing or coughing	25

Communication

All care begins with communication, verbal and non-verbal [72], and in pain assessment communication is a key element [41, 43]. Communication has been summarised in three parts: the content of what is said, how the dialogue is structured and the values underpinning the dialogue [73]. An example of non-verbal components which affect communication involves the way we express ourselves with gestures, postures and facial expressions [58, 72]. In addition, when healthcare professionals focus on practical tasks, they give patients signals about what are important [31, 74-76]. Further components influencing communication include culture [42, 77], language [77], education [78], social background [42, 78], the generation gap, health problems [79] and workload [80]. If patients are capable of communicating pain, it is easier for healthcare professionals to recognise their problems, such as the pain itself and influences on their recovery. On the other hand, those who have difficulties describing pain, and who deny it despite having non-verbal signs of pain, require further dialogue with healthcare professionals to encourage them to reveal their experiences and needs [7]. However, one-way communication dominates in care, since information is gathered from or given to patients [8, 75]. Developing two-way communication is a more fruitful approach, leading to greater knowledge [8, 81], helping patients deal with their own pain and giving healthcare professionals a better understanding of patients' current and past experiences.

Rationale

Pain is a common problem after surgery, and guidelines have been produced recommending regular screening and assessment of pain. These assessments involve following patients' pain by using a validated pain scale to optimise treatment and reduce suffering. An integral part of the assessment is communication. However, patients are a heterogeneous group, consisting inter alia of different ages, personalities and experiences, which can all affect the assessment. Their views on using a pain scale and what influences their actions when they are in pain has still been insufficiently explored. Furthermore, pain has been found to be a major cause of delayed early physical recovery, leading to increased risk of complications. Guidelines aiming at enhanced and early recovery after surgery consider pain management an essential element in enabling patients to return to their preoperative activities. Several more or less extensive recovery tools have been developed, where patients rate the impact of various items on recovery. However, not all patients will be interested in completing extensive questionnaires, or have the energy to do it. A simplified measure, which is suitable for the majority of patients and allows daily measurement of recovery, would be valuable in clinical practice. One possible solution could be to use self-rated pain not only for pain management but also for reflecting and predicting recovery. Furthermore, predicting recovery facilitates healthcare planning for individual patients. If self-rating is to be of a suitable quality in terms of reflecting and predicting physical recovery, it requires patients' perspectives on pain assessment to be taken into account.

Aim

The overall aim of this thesis was twofold: (A) to determine the ability of extending the use of pain ratings to reflect and predict early physical postoperative recovery and (B) to describe patients' perspectives on pain assessments.

The specific aims of the different studies were:

- To study the relationship between average pain values and self-assessed ability for early postoperative physical recovery (I).
- To describe how patients perceive the use of the Numeric Rating Scale in postoperative pain assessments (II).
- To describe patients' experiences and actions when in need of describing pain after surgery (III).
- To compare different levels of self-rated pain and determine if they predict early physical recovery in patients undergoing general and orthopedic surgery (IV).

Conceptual framework

Shared decision-making

The World Health Organization emphasises patients' rights to be informed about - and participate in - care [82]. Patient participation plays an important role in healthcare organisations in different countries [22]. In Sweden, patients' rights have been strengthened in law, giving them the right to receive adapted information and to participate in decisions about care [83]. Participation is based on mutual exchange of information between patients and healthcare professionals, along with respect for each other's opinions [82, 84, 85]. Furthermore, participation includes the right to shared decision-making [84], an important element in person-centred care [37, 86, 87]. Shared decision-making means that, when they choose between different options, patients and healthcare professionals talk about pros and cons, an appraisal of the options is made, and finally patients are supported in making a decision [88, 89]. Patients being involved in decision-making leads to less conflict with healthcare professionals and contribute to greater success in pain management [37]. However, preferences vary in terms of participating in decisions [90, 91], and some patients need support to make shared decisions based on knowledge of the consequences and their individual needs [89, 92].

Shared decision-making is encouraged through supportive communication, trust and confidence between patients and healthcare professionals [93, 94]. However, patients have less power than healthcare professionals and power needs to be shared to ensure participation [28, 95]. Power can be given or taken away through the way in which communication takes place. Furthermore, continuity in relationships promotes participation, as do adequate and adapted information, inviting questions and a two-way communication process [9, 28, 96]. Despite the fact that patient participation is considered vital, healthcare professionals prioritise practical tasks rather than working towards dialogue and consensus with patients [76, 97]. In pain assessments dialogue is necessary to reach a common understanding of the pain patients have rated, and to share decisions about how the score is interpreted [61]. However, in practice healthcare professionals decide whether measures should be provided or not on the basis of the pain rating, without dialogue with the patient [61].

Methods

Design

This thesis is composed of four studies involving both quantitative and qualitative approaches (Table 3). The quantitative methodology (I and IV) is based on questionnaires and data from medical records. Study I was a one-centre study performed using a cross-sectional design. A study-specific questionnaire was constructed based on previous research on pain and recovery [4, 6, 15, 16, 67, 98-100]. In Study IV, the questionnaire was based on the NRS [4, 5, 41] and items derived from the recovery tool PRP, developed by Allvin et al. [15, 20]. The study was carried out using repeated measures, and was extended to a multicentre study. As self-rated pain was the basis for the hypothesis of using pain values to predict physical recovery, it was relevant to explore patients' perspectives on pain assessment. This provided the aims for Studies II and III, both of which involved qualitative approaches. These studies were based on interviews which improved knowledge on how to perform good quality pain assessments. In Study II, a phenomenographic approach was chosen to explore variations in patients' perceptions of the postoperative use of a pain scale (i.e. NRS). Critical Incident Technique (CIT) was used in Study III to identify critical incidents related to pain assessments.

Participants and settings

Data for Study I were collected at a county hospital in the south of Sweden between April and October 2009. Study IV involved three county hospitals from the same area, and data were collected between October 2012 and January 2015. Data collection for Studies II and III took place at one university and three county hospitals in the south of Sweden, with patients who had undergone major general or orthopaedic surgery. Study II was conducted between May and November 2012, and Study III between December 2013 and May 2014. Each county hospital in the studies had a catchment area of between 130 000 and 150 000, while the university hospital had about 900 000, with 300-400 and 600 beds respectively. Inclusion criteria for all studies involved patients with an expected length of hospital stay of 2 days or more, who had undergone general or orthopaedic

surgery, who were aged 18 years or older and who had a spoken and written understanding of the Swedish language. Exclusion criteria involved patients with cognitive impairment or in need of intensive postoperative care.

Table 3. Overview of methodological approaches in the four studies.

Study	Design	Sample and setting	Data collection	Data analyses
I	Cross-sectional	157 patients, after general or orthopaedic surgery, one county hospital	Questionnaires, monitoring records	Pearson chi-square test, Fisher's exact test, Spearman correlations
II	Explorative	25 patients, after general or orthopaedic surgery, one university and three county hospitals	Individual semi-structured interviews	Phenomenographic approach
III	Explorative	22 patients, general or orthopaedic surgery, one university and three county hospitals	Individual semi-structured interviews	Critical Incident Technique approach
IV	Repeated-measure	479 patients, after general or orthopaedic surgery, three county hospitals	Questionnaires	Friedman test, Wilcoxon signed-rank test, Binary logistic regression

Data collection

Questionnaires

The quantitative studies (I, IV) were conducted with questionnaires and data from medical records. In Study I, an information letter was given out about the study on postoperative day 1. In Study IV, patients were asked about participation as part of the enrolment call one to two weeks prior to surgery. Consent to participate involved patients completing a questionnaire about pain and items relating to physical symptoms, physical function and activity

during the enrolment call (IV) and on postoperative days 1 and 2 (I, IV). Specific socio-demographic data were gathered from the questionnaires, and clinical data were collected from medical records by research nurses (Table 4).

Table 4. Socio-demographic and clinical data for general and orthopaedic surgery patients in Studies I and IV.

	Study I, n=157				**Study IV, n =479**			
Variables	**General surgery n=56**		**Orthopaedic n=101**		**General surgery n=190**		**Orthopaedic n=289**	
Age, median (range)	64	(31-83)	64	21-88)	67	(23-93)	66	(22-92)
Women, n (%)	13	(23)	58	(57)	54	(28)	157	(54)
Country of birth, n (%)								
Sweden	-	-	-	-	177	(93)	274	(95)
Others	-	-	-	-	13	(7)	14	(5)
Education, n (%)								
Elementary school	-	-	-	-	79	(42)	118	(41)
Secondary school	-	-	-	-	69	(37)	97	(34)
University	-	-	-	-	41	(22)	71	(25)
Preoperative intake of analgesia, n (%)								
Non-opioids	4	(7)	42	(42)	14	(7)	122	(42)
Opioids	6	(11)	29	(29)	9	(5)	57	(20)
Type of surgery, n (%)								
Urology	16	(29)	-	-	93	(49)	-	-
Lower abdominal	25	(45)	-	-	90	(47)	-	-
Other general surgery	15	(27)	-	-	7	(4)	-	-
Knee replacement	-	-	45	(45)	-	-	76	(26)
Hip replacement	-	-	19	(19)	-	-	149	(52)
Neck and back	-	-	20	(20)	-	-	49	(17)
Other orthopaedic surgery	-	-	13	(13)	-	-	15	(5)

Study I

A study-specific questionnaire with 11 questions was constructed by the research team based on guidelines and previous research [4, 6, 15, 16, 67, 98-100] (Appendix I). The questionnaire was answered retrospectively for the previous day. It consisted of questions about pain intensity (n=2), pain duration (n=2) and early physical recovery (n=7). Pain duration was measured with the NRS, and the response alternatives were divided into three levels (i.e. 0-3, 4-6, 7-10) according to earlier studies [19, 101], in which no pain and mild pain represented NRS 0-3, moderate pain 4-6 and severe pain 7-10. The division into three pain levels has previously shown differences in the outcomes reported by patients [19]. In the questionnaire, experiences of pain intensity were expressed according to the response options: "more than an hour", "less than an hour" or "not at all". The number of patients with severe pain intensity was low, resulting in merged groups; this meant that NRS 4-6 and 7-10 were merged into one group. Implying pain intensity consisted of two levels: NRS 0-3 and 4-10, enabling analysis of the relationship between pain intensity and physical recovery.

The influence of pain on physical recovery was measured with items focusing on changes in appetite, sleeping difficulties, movement in bed, mobilisation, exercise programmes and personal hygiene. Response options for these questions were: "not at all", "partial", "to a large extent" and "completely". As the proportion of patients who responded "completely" was low, the four response options for impact on recovery were dichotomised to enable comparison between pain intensity and impact on recovery. The response options "not at all" and "partial" formed one group, while "to a large extent" and "completely" formed the second group. Association between pain intensity and impact on physical recovery was analysed with data from the monitoring records. In preparation for the statistical analysis, the questionnaire was developed in collaboration with a statistician. Content validity of the questionnaire was ensured by basing questions on previous research and subsequently having them evaluated by five patients. Face validity was assessed by five patients, two pain nurses with long experience in the field and a researcher with a PhD.

Study IV

The questionnaire used in Study I was modified by the research team to facilitate statistical analysis in Study IV, helping to expand knowledge in the field (Appendix II). Apart from the NRS, three of five dimensions of the recovery tool PRP were used, which meant that the questionnaire contained 11 questions: two about pain and nine about early physical recovery. The questionnaire used the continuous NRS (0-10), and pain intensity was divided during the analysis. Patients reported their average pain intensity retrospectively, pending further research on calculating average pain from monitoring records and reducing drop-outs caused by documentation deficiencies. Few patients in the general surgery group had a pain intensity of NRS 7-10, which made it impossible to compare general and orthopaedic surgery, so the two surgery groups were merged in analysing the impact of pain intensity on physical recovery.

Physical recovery was measured using three dimensions: physical symptoms, physical function and activity [15, 20]. The psychological and social dimensions containing seven items were excluded, as according to Bowyer & Royse [17] these have a greater impact later in the recovery. In addition, two items focusing on sexual activity and re-establishing everyday life were omitted as recommended during hospitalisation [20]. The pain item from the PRP was also excluded because of the aim of determining future use of an average NRS value to reflect and predict recovery. Physical symptoms consisted of four items: nausea, fatigue, appetite changes and sleeping difficulties. Physical function comprised four items: gastrointestinal function, bladder function, mobilisation and muscle weakness. Activity consisted of one item: personal hygiene. The response options used to describe perceived impact of the various recovery items ranged from 0 to 3: “none”, “mild”, “moderate” and “severe”. The physical items in the PRP were used to demonstrate the impact of pain intensity on each physical item, and no summation of scores was made. As the proportion of patients who responded “severe” for the impact on physical recovery was low, the four response options for impact on recovery were dichotomised to enable comparison between pain intensity and impact on recovery. The PRP response options “none” and “mild” formed one group, while “moderate” and “severe” formed the other group. Content validity of the PRP was ensured through collaboration between researchers, healthcare professionals

and patients, while reliability was assessed by test-retest of a group of patients [20].

Interviews

The interviews took place between postoperative days one and five (II) or between days one and seven (III) in a separate room on the ward where patients were receiving care. The interviews were recorded and carried out face-to-face. They lasted up to 50 minutes and were later transcribed verbatim. Socio-demographic data for Studies II and III are shown in Table 5.

Table 5. Socio-demographic data for general and orthopaedic surgery patients in Studies II and III.

Variables	**Study II N=25**	**Study III N=22**
Age, years, n		
18-55	7	6
56-75	10	10
76-91	8	6
Education, n		
Elementary school	11	6
Secondary school	10	13
University	4	3

A phenomenographic approach was chosen to describe the perceptions of using the NRS for pain assessments (II). The approach was developed by Marton [102], and aims to find variations in perceptions of a phenomenon, particularly the variety of perceptions sought using this approach [103]. In phenomenography, a second-order perspective is sought on how something is perceived, while a first-order perspective describes what something is like [102]. The interview guide was based on the American Pain Society's recommendations for improving the quality of acute and cancer pain management [6]. As in previous research using a phenomenographic approach, data were collected using semi-structured interviews involving some key issues where the answers led to follow-up questions to clarify what was

meant [104]. The interview began with a broader question about what pain relief meant, before asking questions about the NRS (Table 6).

Table 6. The interview guide used in data collection with patients in postoperative care (N=25).

What does pain relief mean to you?
How do you perceive rating pain with the NRS?
How do you perceive rating pain with the NRS in relation to choice of treatment?
How do you perceive rating pain on the NRS several times a day?
How do you perceive your/your healthcare professionals' role in pain assessment?

The CIT was used to explore patients' experiences and actions when they were in pain (III). A critical incident is an event which the person describing it believes was crucial to the continued activity and outcome of the situation [105]. The semi-structured interview guide was built on a recommendation regarding quality in interviews with the CIT [106]. First of all, patients were requested to think about a postoperative situation where they had been in need of an analgesic. Secondly, they were asked to describe this situation as thoroughly as possible, giving both positive and negative experiences. Patients were asked for their experiences of pain as well as the action they took as a result of these experiences. Probing questions were asked according to patients' narratives (Table 7).

Table 7. The interview guide used in data collection with patients in postoperative care (N=22).

Think of a situation where you felt you were in need of an analgesic. Please describe what happened as thoroughly as possible.	
What did you/healthcare professionals do during the incident? What influenced the incident?	Probing questions such as: What happened next? What did you do next? What were you thinking? What do you mean? How did it affect you?

Data analysis

Quantitative method

Data were analysed using parametric and non-parametric methods depending on data level and distribution (I, IV). Descriptive statistics were used to present socio-demographic and clinical data. In Study I, associations between pain intensity and physical recovery were investigated between postoperative days 1 and 2, using the Pearson chi-square test or Fisher's exact test. Spearman correlation was used to determine any associations between documented pain from monitoring records and patients' retrospectively self-rated pain. In Study IV, pain intensity and impact on physical items were compared in terms of prehospital and postoperative data on days 1 and 2, using the Friedman test with the Wilcoxon signed-rank test as a post-hoc test. Association between pain intensity and impact on the different physical recovery items was investigated with binary logistic regression and presented with a 95% odds ratio and confidence interval. The three levels of pain intensity were used as the predictor variable, and the physical recovery items as the outcome variable. A *P*-value of <.05 overall was considered significant. The post-hoc tests used Bonferroni-corrected *P*-values, set at *P* <.017. The analyses were performed in SPSS (IBM Corporation, Amonk, NY, USA).

Qualitative method

Data from the interviews were read several times to obtain an overall view of the material, after which they were analysed inductively (II, III). Quotes were chosen which corresponded to each aim in the two studies. Similar quotes were gathered into groups and thereafter abstracted to two (II) or three (III) higher levels. Study II used the seven steps described by Sjöström & Dahlgren [104] to analyse phenomenography, while Study III employed the pattern presented by Fridlund et al. to analyse CIT [107].

Data analysis using the phenomenographic approach involved both an interpretive and a descriptive part (II). During the analysis, patients' perspectives of the phenomenon were maintained, specifically in order to distinguish a variety of perceptions. The data analysis is described in Table 8.

Table 8. The data analysis was performed in accordance with a phenomenographic approach [104].

Familiarisation	The 25 interviews (226 pages) were read and reread to become familiar with the material.
Compilation	Answers belonging to a particular area were compiled. 175 quotes were obtained in total, which corresponded to the aim of the study.
Condensation	Different quotes were amalgamated to obtain a representative description of pre-perceptions.
Grouping of similar answers	Similar quotes were grouped into 13 perceptions.
Comparison	To set clear distinctions between the groups, comparisons were made between them in order to explore similarities and differences in perceptions of the NRS.
Naming the categories	Appropriate labels were given to the descriptive categories, which described their content.
Contrastive comparison	The categories were compared so that they were clearly defined, and finally 3 descriptive categories emerged.

Analysis of data using the CIT approach aims to facilitate practical use of collected data without losing details (III). On the other hand, both positive and negative experiences are requested during the interviews, and the intention during the analytical work is to find neutral headlines in subcategories, categories and main areas [105]. However, Flanagan's description of the analysis process is vague, which is why an analytical model was used which has been developed in recent years [107] (Table 9). The model involved analysing the collected data twice, once to show patients' experiences and once to show actions taken as a result of these experiences.

Table 9. The data analysis was performed in accordance with the CIT approach [107].

The 22 interviews (418 pages) were read and reread to become familiar with the material. Answers belonging to a particular area were categorised. 451 quotes were obtained in total, which corresponded to the study aim, divided into 295 experiences and 156 actions. Comparisons were made between the groups in order to explore similarities and differences in incidents. Similar quotes were grouped together in subcategories: 12 as experiences and 15 as actions, forming four categories focusing on experiences and four categories focusing on actions. Appropriate labels were given to the subcategories to describe their content, and finally two main areas of experiences emerged and two main areas involving actions.

Ethical considerations

This thesis was guided by the ethical guidelines for nursing research in the Nordic countries [108]. These guidelines are built on the UN's Declaration of Human Rights [109] and the Helsinki Declaration [110], together with ethical principles defined by Beauchamp and Childress [111]. Permission for all studies was obtained from the Regional Ethics Review Board in Linköping, Sweden (I; No M249-09, II-IV; No 2012/40-31).

The principle of autonomy

Patients in all studies were given both oral and written information to enable them to decide whether to participate. The information sheet included data about the aim of the study, the selection of patients and what participation implied for the patient. The information gave the assurance that their participation was voluntary and that they could withdraw from the study without consequences for their care. The beneficence of the study was clarified, i.e. providing knowledge for healthcare, together with information on confidentiality of data. Patients were asked to participate before surgery (IV) or after surgery (I, II, III). There was a risk patients might feel obliged to participate, but they were repeatedly informed that participation was voluntary. However, in Study IV there was no attempt to check whether all healthcare professionals in the different wards ensured that this voluntary condition was fulfilled. During the interviews, open-ended questions were asked which allowed patients to choose how to respond, and in the questionnaires they could choose not to answer a question. The fact that some patients dropped out and withdrew their consent suggests that they did not feel forced to continue to participate.

The principle of beneficence and the principle of non-maleficence

There was no benefit from the studies for the participating patients except that some of them expressed their appreciation during the interviews (II, III) for being able to share their experiences and perceptions. In contrast to the researcher, it appeared that healthcare professionals seldom had time to listen to their narratives. To make the interviews as rich as possible, the studies were conducted while patients were still hospitalised, reducing the

risk of them forgetting details. On the other hand, if interviews had been conducted after discharge, patients might have found it easier to decline the invitation to participate. However, the benefit of conducting the studies while patients were hospitalised was considered to outweigh the risk of harming patients. In Studies II and III, several patients said they were happy to participate, and were pleased to contribute to improvements in postoperative pain management. The purpose of all the studies was ultimately to benefit other patients undergoing surgery and to help healthcare professionals improve the field in question through more efficient pain assessments and greater patient participation. There were low risks of harming patients, even though interviews and questionnaires can have an impact on integrity. None of the four studies contained obviously sensitive questions. If a patient seemed tired or appeared not to be feeling well, someone checked whether he/she wanted to continue to participate or to cancel (I-IV). The researcher had no caring relationship with the patients in the study, and all data were treated confidentially.

The principle of justice

Which patients were included (I, IV) was limited by ward resources. This meant that not all patients who met the criteria were offered an opportunity to participate, and that no attention was paid to socio-demographic background. The interviews involved purposeful sampling (i.e. variation in age, gender, education and surgery) in order to give different groups of patients a voice (II, III). The care of those who declined the invitation to participate was not affected in any way (I-IV).

Results

Using average and maximum values from the NRS when evaluating recovery (I)

The prevalence of average pain NRS ≥ 4 on postoperative days 1 and 2 was 43% and 31% respectively. Corresponding proportions of maximum pain were 73% and 67% respectively (Table 10). The proportion of patients who reported that pain influenced physical recovery "to a large extent" or "completely" was greater on postoperative day 1 compared to day 2 (Table 11). Significant differences were found between the two days regarding sleeping difficulties, exercise programmes (P <.001), mobilisation, movement in bed and personal hygiene (P <.01). On postoperative day 1, an association was found between compiled average pain from monitoring records and physical recovery in terms of appetite changes (P <.04), sleeping difficulties (P <.02) and mobilisation (P <.04). No significant differences were observed in any recovery item between those with prehospital pain and those without. The agreement between average pain (NRS 4-10) from monitoring records and retrospective average pain was r_s = .95 (P <.001) on postoperative day 1. Corresponding maximum pain (NRS 4-10) from monitoring records and retrospective reported maximum pain was r_s = .95 (P <.001) on day 1.

Table 10. Proportion of patients with average and maximum pain intensity of NRS 4-10 postoperatively.

Postoperative day	**Average pain, %**		**Maximum pain, %**	
	NRS ≥4	**NRS ≥7**	**NRS ≥4**	**NRS ≥7**
1	43	12	73	36
2	31	6	67	31

Table 11. Proportion of patients who self-rated impact on recovery "to a large extent" or "completely" postoperatively.

Recovery items	Proportions of patients, % day 1	day 2
Physical symptoms		
Appetite changes	9	5
Sleeping difficulties	35	24
Physical functions		
Mobilisation*	43	25
Movement in bed	33	29
Exercise programme	20	12
Activity		
Personal hygiene/ get dressed	36	16

* The question focused on walking.

Patients' perceptions of using the NRS in postoperative pain assessments (II)

Patients' perceptions about the NRS showed they considered that its implementation was the healthcare professionals' responsibility, which imposed a demand on care routines, and there were interpretation difficulties (Table 12). Nonetheless, they found using the NRS facilitated communication about pain, though they reported that a description of the pain was also required. Employing the NRS was considered easier when both partners had the same starting point, rather than describing pain in their own words. Rating pain made it easier to participate by referring to previous assessments, but not all respondents considered that there were advantages to using a pain scale. A sincere interest in patients' responses made patients feel secure and confident in their relationship with healthcare professionals. Although the NRS facilitated communication about pain, respondents considered that healthcare professionals needed to be responsive. Patients reported that it was difficult to know how much pain they were expected to handle, and raised the cut-off point for needing pain relief from one to six on the pain scale. The NRS was considered to support healthcare professionals

in selecting analgesics and dosage, as well as in terms of handing over to the next shift. Healthcare professionals were perceived to have the main responsibility for employing the NRS correctly, giving proper information and adapting the interval between assessments based on pain intensity. Patients' quotes are presented in Appendix III.

Table 12. Descriptive categories and perceptions from interviews with patients about their perceptions on the NRS pain scale.

Descriptive categories	**Perceptions**
Use of the NRS facilitated communication of pain	NRS facilitated descriptions of pain NRS facilitated participation NRS facilitated confidence NRS facilitated transferring of information between healthcare professionals
Use of the NRS put demands on healthcare professionals and care routines	NRS demanded healthcare professionals take responsibility NRS demanded clear information from healthcare professionals NRS demanded that healthcare professionals be responsiveness NRS demanded attention to the patients' needs
Use of the NRS contained interpretation difficulties	NRS alone was insufficient to describe pain NRS ratings were perceived as difficult NRS created uncertainty about how it was used by the healthcare professionals

Patients' experiences and actions when assessing pain after surgery (III)

Patients' experiences when in need of describing pain were affected by their own resources, i.e. their understanding of pain and their ability to cope with the situation (Table 12). Expectations and tolerance of postoperative pain varied, and influenced patients' experiences as well as the expected effect of

analgesics. Patients assumed their previous experience of non-opioid agents, which are administered at most three to four times per day, covered all analgesics. Furthermore, there were patients who assumed they were receiving optimal pain treatment, and the risk of side effects affected their motivation to take analgesics. Willingness to talk about and request analgesics was affected by healthcare professionals' attitudes. A fear of being perceived as complaining or arguing affected communication, and long waits for analgesics reduced confidence in healthcare professionals. Furthermore, patients described that care routines and healthcare professionals' working conditions affected the performance of pain assessments. Healthcare professionals asked questions about pain for one or two days after surgery, and then the questions ceased. Information about pain was described as deficient when healthcare professionals handed over to the next shift. Continuity in staffing facilitated communication about pain, but the performance of pain assessments depended on who was on duty. Patients reported that healthcare professionals' heavy workload influenced their willingness to approach staff for help.

When they were in pain, patients' strategies were both active and passive (Table 14). They adopted active strategies, such as informing healthcare professionals about their pain situation, and took measures to care for themselves (e.g. they avoided mobilisation). Active patients described their pain as well as requesting analgesics. Furthermore, they sought information from both fellow patients and healthcare professionals, adapted their activities in relation to the pain and took an active part in the treatment of pain. On the other hand, passive patients put up with pain until they were given the next dose of analgesics, and refrained from informing healthcare professionals. Patients described that lack of knowledge about pain management and their confidence in the competence of healthcare professionals meant they relied on the latter's judgement. Patients' quotes are presented in Appendices IV-V.

Table 13. Descriptive main areas, categories and subcategories from interviews with patients regarding experiences when in need of pain assessment.

Main area	**Category**	**Subcategory (**Number of quotes)
Patients' resources when needing to describe pain	Patients' understanding of pain	Patients' expectations of pain (19)
		Patients' expectations of pain treatment (30)
		Patients' awareness of analgesics side effects (5)
	Patients' ability to cope with their pain situation	Patients' tolerance for pain (32)
		Patients had difficulties describing their pain (12)
		Patients were influenced by healthcare professionals' attitude when assessing their pain (35)
Ward resources for performing pain assessments	Healthcare professionals' routines when assessing pain	Patients were asked about their pain (51)
		Patients were invited to get in touch when in pain (11)
		Patients were informed about pain and treatment (29)
	Healthcare professionals' working conditions affected patients' possibility to describe pain	Healthcare professionals' different procedures affected patients' ability to describe pain (24)
		Healthcare professionals' had different roles (24)
		Healthcare professionals' workload affected pain assessment (20)

Table 14. Descriptive main areas, categories and subcategories from interviews with patients regarding actions when in need of pain assessment.

Main area	**Category**	**Subcategory** (Number of quotes)
Patients used active strategies when needing to describe pain	Patients informed healthcare professionals about their pain	Patients told healthcare professionals they had pain (10)
		Patients described their pain in detail (17)
		Patients requested pain management (24)
	Patients performed self-care when in pain	Patients asked questions about pain and treatment (14)
		Patients distracted themselves from their pain (8)
		Patients avoided activity (9)
		Patients changed their position (8)
		Patients adjusted their treatment (9)
Patients used passive strategies when needing to describe pain	Patients endured pain	Patients "bit the bullet" (10)
		Patients waited for the pain to subside spontaneously (5)
		Patients waited for the next dose of analgesics (5)
		Patients hesitated to disturb overstrained healthcare professionals (6)
	Patients refrained from notifying healthcare professionals when in pain	Patients awaited to see the need for analgesics (13)
		Patients left the responsibility for their pain management to healthcare professionals (13)
		Patients take responsibility for shortcomings in pain management (5)

Association of pain ratings with the prediction of early physical recovery after surgery (IV)

The prevalence of average pain intensity NRS ≥4 during activity was high on postoperative days 1 and 2, at 72% and 61% respectively (Table 15). Differences in recovery were shown across the three time points (i.e.

prehospital, and postoperative days 1 and 2). Consistently, at all time points there was a greater impact on the three dimensions (i.e. physical symptoms, physical functions and activity) for orthopaedic patients compared to general surgery patients. The impact on recovery was greatest on postoperative day 1 for the two surgical specialities and lower for most items on day 2 compared to day 1. Furthermore, pain intensity was consistently higher in patients undergoing orthopaedic compared to general surgery at the three time points (P <.001).

Table 15. Proportion of patients who retrospectively reported average pain intensity as "moderate" or "severe" on postoperative days 1 and 2.

Postoperative day	**Pain at rest, %**		**Pain during activity, %**	
	NRS ≥4	**NRS ≥7**	**NRS ≥4**	**NRS ≥7**
1	42	9	72	36
2	28	4	61	20

Average pain intensity at rest on postoperative day 1 significantly reflected all measured items of recovery for the same day (Table 16). Pain intensity at rest predicted physical recovery on day 2, especially in terms of fatigue, sleeping difficulties and mobilisation, but also in terms of appetite changes, muscle weakness and personal hygiene (Table 17). Average pain intensity during activity on day 1 reflected all measured items except bladder function, and predicted physical recovery on day 2 except for nausea, appetite changes and bladder function. Severe pain intensity at rest and during activity (NRS 7-10) was shown to reflect and predict recovery better than moderate ratings (NRS 4-6) on both postoperative days 1 and 2, as it significantly reflected and predicted more physical recovery items. No change in results was found between average pain intensity at rest or during activity and recovery on postoperative day 2, excluding patients with moderate or severe prehospital impact on physical items.

Table 16. Associations between patients' retrospectively stated average pain intensity on day 1 and recovery day 1.

Recovery, day 1	Day 1 Average pain [a]	At rest			During activity		
		OR	95%CI	*P*-value	OR	95%CI	*P*-value
Nausea	NRS 4-6	2.07	1.25-3.42	.004	1.23	0.66-2.28	.511
	NRS 7-10	5.66	2.81-11.43	<.001	1.88	1.04-3.38	.037
Fatigue	NRS 4-6	2.07	1.38-3.10	<.001	2.25	1.36-3.73	.002
	NRS 7-10	7.67	3.41-17.29	<.001	4.59	2.76-7.63	<.001
Appetite changes	NRS 4-6	1.35	0.88-2.07	.165	1.85	1.09-3.13	.023
	NRS 7-10	4.87	2.42-9.79	<.001	2.43	1.44-4.09	<.001
Sleeping difficulties	NRS 4-6	3.84	5.51-5.87	<.001	4.01	2.25-7.15	<.001
	NRS 7-10	12.82	5.64-29.15	<.001	7.28	4.09-12.97	<.001
Gastrointestinal function	NRS 4-6	1.48	0.97-2.25	.068	1.78	1.06-2.99	.028
	NRS 7-10	2.40	1.22-4.75	.012	2.09	1.25-3.49	.005
Bladder function	NRS 4-6	2.04	0.98-4.24	.054	0.96	0.39-2.39	.930
	NRS 7-10	3.85	1.46-10.22	.007	1.48	0.65-3.38	.351
Mobilisation	NRS 4-6	3.24	2.14-4.91	<.001	2.24	1.34-3.75	.002
	NRS 7-10	4.99	2.38-10.43	<.001	7.50	4.42-12.73	<.001
Muscle weakness	NRS 4-6	2.54	1.67-3.88	<.001	2.41	1.36-4.26	<.001
	NRS 7-10	5.53	3.74-11.16	<.001	6.01	3.43-10.52	<.001
Personal hygiene	NRS 4-6	2.59	1.65-4.05	<.001	2.62	1.36-5.06	.004
	NRS 7-10	7.27	3.59-14.72	<.001	6.63	3.52-12.5	<.001

[a] NRS ratings 0-3 used as reference category.

Table 17. Associations between patients' retrospectively stated average pain intensity on day 1 and recovery day 2.

Recovery, day 2	Day 1 Average pain [a]	At rest OR	At rest 95%CI	At rest *P*-value	During activity OR	During activity 95%CI	During activity *P*-value
Nausea	NRS 4-6	1.30	0.74-2.29	.364	1.14	0.58-2.22	.075
	NRS 7-10	1.48	0.64-3.40	.349	1.02	0.51-2.01	.096
Fatigue	NRS 4-6	1.68	1.05-2.70	.031	1.84	1.01-3.35	.046
	NRS 7-10	4.30	2.08-8.86	<.001	2.96	1.64-5.35	<.001
Appetite changes	NRS 4-6	0.99	0.60-1.64	.974	1.23	0.69-2.19	.075
	NRS 7-10	2.27	1.13-4.59	.022	1.08	0.60-1.95	.784
Sleeping difficulties	NRS 4-6	1.77	1.08-2.89	.023	1.40	0.76-2.61	.282
	NRS 7-10	5.48	2.64-11.37	<.001	2.54	1.38-4.60	.003
Gastrointestinal function	NRS 4-6	0.92	0.58-1.46	.730	1.36	0.78-2.35	.277
	NRS 7-10	1.81	0.89-3.69	.101	1.85	1.07-3.20	.028
Bladder function	NRS 4-6	1.44	0.44-4.73	.550	0.46	0.12-1.69	.243
	NRS 7-10	2.90	0.71-11.75	.137	0.93	0.31-2.80	.898
Mobilisation [b]	NRS 4-6	1.92	1.19-3.07	.007	2.56	1.30-4.85	.006
	NRS 7-10	3.02	1.48-6.15	.002	5.69	2.97-10.88	<.001
Muscle weakness	NRS 4-6	172	1.03-2.87	.039	1.95	0.96-3.95	.063
	NRS 7-10	4.30	2.09-8.80	<.001	3.93	1.99-7.76	<.001
Personal hygiene	NRS 4-6	1.71	0.97-2.99	.063	1.10	0.52-2.33	.794
	NRS 7-10	4.94	2.36-10.31	<.001	2.94	1.48-5.85	.002

[a] NRS ratings 0-3 used as reference category.

Discussion

Methodological considerations

Validity in quantitative methods (I, IV)

Statistical validity

Statistical validity indicates whether the analytical method employed was appropriate for the research question [112]. Descriptive statistics were used to present socio-demographic and clinical data. Depending on distribution and data level, parametric or non-parametric statistics were used. Subjective experiences such as pain and physical recovery are regarded as ordinal data, and consequently analysed with non-parametric statistical tests.

Internal validity

Internal validity indicates whether the structure of a study measures what it intends to do, and that findings are not due to uncontrolled factors [113]. Patients were selected from two surgical groups which differed in terms of presence of pain, pain intensity and use of analgesics both pre- and postoperatively. There were few patients with severe pain in the general surgery group, so general and orthopaedic surgeries were merged into one group to enable analysis of the impact of pain intensity on early physical recovery. This can be regarded as a limitation. However, the overall aim was not to examine whether the ability to predict recovery differed between the two surgical groups but to compare the impact of pain intensity on physical recovery. The pain scale (NRS) used in both studies (I, IV) is recommended in guidelines for pain assessments [5, 41, 43, 60, 114] and has good validity and reliability [115]. Patients were also familiar with the pain scale since the NRS was already in use in the hospitals included in the study, and this supported reliability. Furthermore, the low proportion of drop-outs strengthens reliability in both studies (I=8% and IV=11.5%).

In Study I, an eleven-item questionnaire was constructed on the basis of previous research, guidelines and recovery tools [4, 6, 15, 16, 20, 67, 98-100]. The questionnaire was prepared by two nurses with many years of experience in the field, and reviewed by a PhD nurse, a statistician and five patients for

face and content validity. Nonetheless, the questionnaire did not undergo extensive testing, so there may have been weaknesses in validity and reliability. To strengthen the internal validity in Study IV, three of five dimensions from the PRP were used in the questionnaire, comprising 11 items to measure the impact of pain intensity on early physical recovery. The PRP was developed in a Swedish context. It shows good reliability in terms of extensive measurements [15, 20], and has been employed in several studies [25, 116, 117]. The exclusion of two dimensions (i.e. psychological and social) can be considered a threat to validity, but no summation of scores from the PRP was made. The developers of the PRP worked with healthcare professionals and patients to validate separately each of the items they included [20]. Consequently, omitting two dimensions from the PRP should not affect validity. The aim of limiting the questions was also to enable more patients to participate, such as the elderly, severely ill or the most fatigued patients, and this, in turn, improved the internal validity. One threat to validity was the use of retrospectively reported average pain intensity in Study IV. However, the correlation between documented pain intensity from monitoring records and retrospectively stated pain intensity was high in Study I. In addition, there is a lack of knowledge about how many documented pain ratings are needed per day to be able to compile an average value for each patient. Self-reported average pain intensity at rest and during activity, both given retrospectively, have also been used previously [118]. An advantage of using data based on reporting average pain intensity retrospectively is that any deficiencies in documentation do not affect the data collection. Furthermore, patients tend to retain the memory of their experience of pain for several days [64], as has been noted above.

External validity

External validity indicates whether the findings can be generalised to other groups and areas [113]. Both general and orthopaedic surgery were included to improve generalisability (I, IV). Study IV was also extended to three hospitals, including six wards with a large sample size, in order to enhance validity. A threat to generalisability is that all hospitals were located in the same area in the southeast part of Sweden. Nor were any of the hospitals major ones. Furthermore, in terms of the preoperative data, more patients who had undergone general surgery had a shorter estimated length of stay compared to those in orthopaedic surgery. This made it more difficult to

recruit these patients, which obstructed the aim of comparing recovery between the two groups of surgical patients, thus weakening the validity. However, excluding patients with impact on physical items during the prehospital period did not affect the statistical analysis, suggesting that pain intensity predicts physical recovery regardless of the type of surgery.

Trustworthiness in qualitative methods (II, III)

Trustworthiness in qualitative research consist of four components: credibility, dependability, confirmability and transferability [113].

Credibility

Credibility describes how true the findings are considered to be [113]. It was supported by the different skills of the research team members, both in terms of their extensive experience of phenomenography and CIT and their many years of experience in the research field. This enabled appropriate interview guides to be developed (II, III) and facilitated analysis of the findings. The results were strengthened by the wide variety of perceptions described (II), as well as by the large number of incidents (III). In some interviews, credibility may have been affected by the different educational levels of the interviewers and patients. The fact that the interviewer was aware of this meant that questions were asked using everyday words to avoid language barriers. According to Belenky et al., critical thinking is dependent on developing knowledge which benefits from higher education [81]. In some interviews, a number of supplementary questions were asked which could have depended on the performance of the interviews but also on patients' ability to reflect critically. Furthermore, confidence in authority may mean that patients did not question the actions of healthcare professionals [81].

Dependability

Dependability describes the accuracy of the findings [113]. A prior understanding of the area in question, along with good knowledge of phenomenography and CIT in the research group (II, III) strengthened dependability. On the other hand, the analysis could have been influenced by preconceptions, though this risk was reduced through continuous discussions within the research group. Study II was also made more dependable by following a developed process in the analysis [104]. Likewise, the analysis in

Study III followed a pattern used in previous studies with CIT [107], as well as following recommended procedures in the interviews (II, III) [102, 105].

Confirmability

Confirmability describes the neutrality of the findings [113]. To maintain confirmability, all interviews (II, III) were recorded and transcribed verbatim to avoid distorting the data. Subsequently, data were read several times to understand what the patients wanted to convey in their quotes. Data were discussed and reviewed by the members of the research group during the analyses to preserve neutrality. In addition, significant quotes were presented in the studies (II, III), along with a clear description of the analytical processes (Appendices III-V), to enable the reader to assess the analyses.

Transferability

Transferability describes the ability to apply the findings to other contexts [113]. Through a meticulous description of the sample, along with a careful description of the approaches used in the studies (II, III), the reader can determine whether the findings can be applied in a different context. Although there are a variety of perceptions, these are not endless [104]. This, together with the number of perceptions (II) and incidents (III) in the studies, makes it likely that results can be transferred to similar contexts in Western countries.

Discussion of the results

The overall aim of this thesis was twofold: to determine the ability of extending the use of pain ratings to reflect and predict postoperative early physical recovery (I, IV) and to describe patients' perspectives on pain assessments (II, III).

In Studies I and IV, an association was found between average pain intensity and recovery for postoperative day 1. Pain intensity had a significant impact on all three dimensions (i.e. physical symptoms, physical functions and activity) (I, IV). In addition, average pain intensity on postoperative day 1 predicted recovery for all three dimensions on the following day (IV). Patients described that dialogue was the basis for pain assessment (II, III) and that the pain scale facilitated communication (II), while healthcare organisation had an impact on the assessments (III). Furthermore, perceptions, experiences and strategies varied between the patients who had to be taken into consideration by healthcare professionals in their encounters with individual patients (II, III).

Influence of pain intensity on physical postoperative recovery

Pain intensity had a significant impact on physical recovery in the studies (I, IV), which is in line with earlier research concluding that reducing physical symptoms and functions is important in promoting recovery during hospital stays [69]. Numerous studies have focused on finding a comprehensive recovery tool which includes as many items as possible that can affect patients' recovery after surgery [16, 20, 66]. However, during hospitalisation, it is advantageous to both patients and healthcare professionals if recovery can be monitored in as many patients as possible without having to complete extensive questionnaires. Since both patients[74, 119] and healthcare professionals [120] suggested that practical tasks limited the time available to healthcare professionals for communication (III). If additional tasks such as handing out questionnaires can be avoided where healthcare professionals are concerned, they will have more time to communicate with patients about the things patients consider important. Pain appears as an item in most recovery tools [16, 20, 66]. Recovery items are in turn used to evaluate pain management [3, 26]. The dual use of pain (i.e. in recovery tools and in evaluating pain management) indicates that it is a factor of substantial

importance in early physical recovery after surgery. Therefore, national and international guidelines stress that pain assessments should be performed regularly at both rest and during activity [4, 5, 26, 41, 43, 44, 60]. Furthermore, pain assessments performed in a structured way led to confidence in healthcare professionals (II). Compliance with guidelines for pain assessment gives patients an opportunity to share decision-making in care, which is a legal right in Sweden [83]. Consequently, there should be regular pain assessments, as these are also appreciated by patients (II, III). Pain intensity is therefore an appropriate indicator for monitoring early physical recovery. However, as retrospective average pain intensity was used in Study IV, further studies are needed using compiled average pain intensity from monitoring records before it can be implemented in clinical use.

One key finding was that average pain intensity can predict recovery (IV). No other measurement method has been found which focuses on predicting impact on early physical recovery. Alternatively, average pain intensity at rest or during activity on postoperative day 1 was associated with most of the recovery items on day 2. The relationship was evident for fatigue, sleeping difficulties, mobilisation, muscle weakness and personal hygiene. Interestingly, average pain intensity at rest and during activity on day 1 had a strong impact on sleeping difficulties on both days 1 and 2. Sleeping difficulties (i.e. sleep disruptions) have been shown to lead to reduced physiological pain control, thereby increasing pain intensity. There is also a suggestion that postoperative sleeping difficulties play a part in the development of chronic pain [121]. A number of factors affect postoperative sleeping patterns, such as preoperative pain and chronic sleeping problems, as well as postoperative pain and the surgical trauma itself. Sleep disruption may continue for several nights after surgery [121]. Consequently, it becomes crucial to reduce pain intensity to improve sleep and thus physiological pain control. Furthermore, average pain intensity during activity primarily had an impact on mobilisation on postoperative days 1 and 2. One way patients described taking care of themselves was by avoiding mobilisation (III). The surgical guidelines recommend reducing pain intensity in order to promote mobilisation and therefore enhance recovery [14]. Monitoring pain intensity is therefore important. However, some existing recovery tools do not follow recovery at the individual level, but aim instead to compare groups of patients [18]. Using average pain intensity to reflect and predict early physical recovery could be seen as an imprecise way of measuring recovery for the

individual patient. For example, severe average pain intensity informs healthcare professionals that there is a relationship with physical recovery but provides no information on which aspect of recovery it influences. Increased average pain intensity at rest or during activity could therefore be regarded as a warning sign that recovery could be affected and a more detailed investigation is required, in other words, a two-way form of communication where patients can share how pain intensity impacts on the different recovery items. If the objective is to measure the impact of specific items in recovery, a comprehensive tool can be used [18]. However, routine use of extensive questionnaires is difficult, since many patients are fatigued after surgery and healthcare professionals have many other tasks. In clinical practice it can be sufficient to know that recovery is affected, and information about the way in which it is affected (e.g. impact on sleep and mobilisation) can be collected in direct dialogue with patients.

The prevalence of average pain intensity ≥4 between the two studies (I, IV) was approximately the same despite the fact that Study I was conducted at one hospital and Study IV at three hospitals about 3 year later. This can be seen as an indication that the prevalence of moderate to severe pain is common in the region studied, and no sign of improvement occurred between the measurements. In Study I, maximum pain was requested, as this was assumed to correspond to pain during activity, while in Study IV the focus was on average pain intensity during activity. Although pain intensity was requested in slightly different ways, the prevalence of pain intensity NRS ≥4 was quite similar. On postoperative day 1, an average pain intensity of NRS ≥4 was presented during activity in about 75% of cases (I, IV), which is in line with a study by Wadensten et al.[1]. Consistently, more patients who had undergone orthopaedic as opposed to general surgery experienced severe pain intensity (IV), as shown in previous research [25, 26]. Despite many years of efforts to improve pain treatment, a great deal of patients experience severe postoperative pain [122]. However, improvements in pain management are difficult to implement [37], as well as new guidelines, and this has led to extensive research on the subject [123]. Implementation models describe different stages in the process and consist of practical support in terms of introducing an innovation [123]. The process before implementation takes place is the most comprehensive. It is therefore necessary to provide conditions for changes to be incorporated into care routines [124]. However, the sheer numbers of guidelines in general make them

problematic to handle in everyday clinical practice [125]. This can result in difficulties in implementing new guidelines or changing routines when guidelines are updated. This, along with lack of time, may contribute to healthcare professionals' not prioritising preparation for changing routines. Another barrier in terms of implementing guidelines and routines involves the difficulty of breaking old habits. It has been suggested that alternating the context or routines could simplify the process of change [123], for example, performing pain assessments at the same time as carrying out vital parameter checks.

Using pain ratings to reflect and predict physical recovery gives self-rated pain a dual role (i.e. monitoring pain management and physical recovery), which can improve motivation to follow guidelines in pain assessment. Furthermore, where average pain intensity is used in clinical practice, it should be compiled from self-reported pain ratings from each patient's monitoring record. Documenting compiled average pain values in electronic medical records can enable each patient or group of patients to be followed during the first few days after surgery without the patients having to complete a questionnaire. This means that the electronic data record has to be adapted to facilitate regular documentation of pain intensity several times a day, as well as automatically creating an average pain intensity value for every patient each day. Pain assessment is a challenging task and requires knowledge about the guidelines and what might affect communication, as well as an understanding of patients' different perspectives on pain assessment. Where average pain intensity is used to reflect and predict physical recovery, pain assessments need to be conducted according to established guidelines, focusing on aspects such as intensity, onset, location, quality, impact, barriers, previous experiences and treatment [5, 43, 44].

Performing the pain assessment

The findings showed that shared decision-making in pain assessment was facilitated by using a pain scale (II, III). However, not all patients reported that rating pain simplified the dialogue. There were probably a number of reasons for the diverse perceptions of using a pain scale. Eldh et al. found that a vital element in shared decisions involved obtaining knowledge on the basis of individual needs and not standard information [95]. This means information based on each patient as a unique person who requires different

kinds of knowledge. Knowledge exchange can start by asking whether the patient wants to begin with his/her questions rather than providing information from a checklist. Lack of information and knowledge about the purpose of the pain scale and how to use it could be two reasons why patients did not consider it meaningful to rate pain (II). An additional reason may be the level of development of patients' critical thinking. Belenky et al. described progress in knowledge as consisting of five different developmental stages [81]. In the lower stages, there is great confidence in authorities. During the pain assessment, patients in the lower stages of knowledge development may hand over decision-making to healthcare professionals. Previous research has concluded that patients need to be encouraged to think critically and make independent decisions about care [92, 126], suggesting that healthcare professionals are responsible for ascertaining whether patients have sufficient knowledge of the pain scale and the purpose of the assessments to enable shared decision-making. Apart from higher education levels, Yek et al. found that willingness to be involved in shared decision-making was higher in those in employments and in younger patients [127]. This means that healthcare professionals should be aware that older patients, those who are unemployed or have a lower educational level may need more support in terms of participating in share decision-making. Furthermore, patients with a lower educational level communicate differently to those with higher educational levels [58], which increases the risk of healthcare professionals misunderstanding their message.

Inadequate knowledge of pain assessments and management was demonstrated (e.g. the purpose of assessments, what is assessed and how it will be used) (II, III), yet knowledge has been found to be a prerequisite for shared decision-making [128, 129]. Acquiring knowledge is considered complex and is influenced by many factors, such as ability and motivation in terms of seeking knowledge and evaluating the information obtained [130]. Prior to surgery, patients receive considerable information in a number of areas (e.g. pain assessment and treatment). During the pain assessments, patients' willingness to share decision-making may depend on their receptiveness to given knowledge, indicating that information needs to be repeated after surgery. In addition to insufficient knowledge on the part of patients, pain assessments were influenced by healthcare professionals' responsiveness and attitudes (II, III). This is in line with other studies which found that non-verbal forms of communication, such as listening and allowing time for

reflection, play a role in shared decision-making [28, 131]. According to Siouta et al., healthcare professionals dominate the dialogues, but need to take a step back and listen to what patients want to say [132].

Shared decision-making is also influenced by an unequal balance of power [28, 133]. Patients are in a position of dependency in relation to healthcare professionals. This skewed balance of power can be reduced by good communication and mutual respect for each other's knowledge. Strong divergent opinions among healthcare professionals are a major barrier to implementing shared decision-making, and withhold power from patients [134]. Patients described that healthcare professionals had different ways to accomplish the pain assessments, which meant that opportunities for patients to be involved depended on who they encountered. There was a clear imbalance of power, as patients were afraid of conflict with healthcare professionals (III), so that patients stopped asking questions or stopped asking for help when they were in pain. This imbalance can be illustrated by healthcare professionals speaking in an authoritative way to maintain power [135]. Van Dijk et al. found that some patients assess the anticipated consequences before rating their pain, and estimate how the score they give will be viewed by healthcare professionals and which analgesics they will be offered [61]. In other words, scores are given on the basis of what they consider socially acceptable and what will correspond to healthcare professionals' expectations. Patients perceived that using a pain scale made it easier to communicate pain because they could refer to previous ratings (II). This may also depend on their experience of being able to influence the situation, giving them some power. If the use of a pain scale can transfer more power to patients, it is an added justification for its use in postoperative care.

Patients did not consider it sufficient to describe pain simply in terms of a score, and felt that a description was also needed which could, for example, communicate where and how the pain was experienced (II). Variations in pain intensity made it difficult to rate pain and to know the level of pain intensity patients were expected to handle (III). According to guidelines, asking only for rated pain scores does not provide a complete picture of the pain the patient is experiencing [5, 41, 43]. Descriptions of pain should be requested, along with the meaning patients attribute to the pain they have rated. Thereafter, a shared decision-making process can be established (i.e. covering the ways in which pain should be addressed). Ideally, pain

management leads to the disappearance of all pain. However, treating pain is a balance between alleviating it and potential side effects. According to previous research, patients need knowledge about the pros and cons of different choices when they share decisions about steps to be taken in pain management [37, 89]. A first step could involve improving routines for exchanging information and knowledge with patients, and raising awareness among healthcare professionals about how the balance of power is affected by the way they communicate. Shared decision-making can facilitate an improved balance of power, though according to Lloyd et al. this is a long-term process that can take years before it becomes an integral part of work [134].

The influence of the environment on pain assessment

Healthcare professionals' heavy workload was considered to affect the pain assessments (III). This was in line with several studies which found that increased workload led to a focus on practical tasks rather than interaction and communication [27, 29, 76]. Consequently, attention to patients' physical recovery is also at risk, as it is affected by the workload. Furthermore, patients made use of different strategies to cope with pain; some actively sought knowledge and tactics to deal with the situation while others endured the pain passively (III). One tactic for encouraging more patients to be actively involved in shared decision-making is to allow those who want to, and are able to be responsible for their own intake of analgesics at breakthrough pain. This could be quite acceptable for those who are capable, as they will manage their own analgesics assessments after discharge. Instead, healthcare professionals often deal with tasks patients would otherwise manage [119]. Allowing patients to be in charge of analgesics might also be beneficial for their physical recovery where they are able to take analgesics before pain intensity escalates. In this way, the waiting time for analgesics at breakthrough pain will be reduced to zero, and the process will also reduce the need for healthcare professionals to interrupt their duties. In addition, it will support patients in terms of believing in their own ability, giving them security during their hospital stay and confidence when they are about to be discharged.

Patients expressed uncertainty about the use of the pain ratings and the procedures on the ward by healthcare professionals (II, III). They were also

instructed to inform healthcare professionals before the pain increased too much (II). This created uncertainty about how much pain they were expected to handle. One simple way of informing patients about this is to explain that pain intensity should not be so great that it prevents them from sleeping or moving around. Uncertainty involves patients waiting passively in their beds for instructions [27], which may in turn influence their physical recovery. Another aspect was that pain assessments were considered to be influenced by a lack of continuity in staffing (III). This, in turn, was shown to increase the risk of conflicting information being given to patients, complicating their ability to make shared decisions [28, 96]. Furthermore, patients and healthcare professionals who had become more familiar with each other did not need as thorough descriptions of the pain as they did at first. Confidence and trust in healthcare professionals also influenced pain assessments (II, III). Trust is considered to be developed over time in a relationship [28, 131], yet as long as there is a shortage of healthcare professionals, it will be difficult to achieve any continuity in staffing. This places demands on those who are on duty in terms of using communication skills to build trust with patients. A successful way of sharing decisions is to encourage patients to have confidence in their own ability [136, 137], supporting them when they are in pain and in controlling the pain. However, guidelines for enhanced recovery, such as ERAS (Enhanced Recovery After Surgery), where patients are expected to follow a path [10-13] (e.g. choice of methods for pain treatment), may conflict with shared decision-making [92, 138, 139] . They could cause problems because healthcare professionals may be more anxious to achieve organisational goals (e.g. to make patients mobile in a given number of hours) than to help patients achieve their goals. Where healthcare professionals focus on trying to fulfil organisational goals, patients are at risk of being persuaded to make decisions which follow guidelines and general directives, rather than those which correspond to their needs [92, 138]. Healthcare professionals have to consider what controls the agenda: the patients' goals or the goals of the organisation.

Patients reported gaps in pain assessment when healthcare professionals handed over to another shift (II, III). In hospitals, healthcare professionals work around the clock in three shifts. It is therefore useful that pain assessment is documented in the medical record to communicate the information to the next shift. However, there are shortcomings in documentation of completed pain assessments [28, 37], even though careful

documentation is of great value in combatting lack of continuity in work schedules. In spite of the fact that pain assessments had been carried out, patients described that they thought the information had not been passed on to the next shift. This may be due to the fact that electronic medical records are not accessible close to the patient and therefore the data are not added. Another reason for inadequate documentation may be that it is not used by other healthcare professionals and is consequently not considered a meaningful use of time. Documentation of pain assessments and adherence to guidelines is also considered to be a patient safety issue related to the increased risk of chronic pain [36]. As far as is known, there is no structured way of documenting conditions for physical postoperative recovery in medical records. Workload, staffing and procedures are organisational issues at different levels within the organisation. One way of making patients feel safe is through greater continuity in staffing, which is a management issue. Implementation of new working methods requires reflection, perseverance and support from project management and hospital management [124]. The leadership at various levels in the organisation is important in terms of whether changes can be implemented, as well as in terms of economic and political incentives [140].

Theoretical reflection

The starting point for this thesis involves patients who have undergone surgery. It focuses on pain assessments and the impact of pain intensity on early physical recovery. An association was determined between postoperative pain intensity and its impact on recovery. The level of pain intensity had the ability both to reflect and to predict recovery. Physical recovery is facilitated by reducing pain intensity in patients. Figure 1 shows an overview of factors which influence pain assessments and the impact of pain intensity on early physical recovery. Identifying the intensity of pain with regular assessments is an appropriate way of drawing attention to conditions for physical recovery, and alerting healthcare professionals to act. It presupposes that quality pain assessments are undertaken according to guidelines (e.g. intensity, location, impact, barriers and previous treatment) to ensure the reflection and prediction of physical recovery are trustworthy. The pain assessments are affected by the patient, healthcare professionals and environmental factors. These three main groups interact with each other, though the possible existence of a hierarchical order has not been explored. Factors which affect pain assessments from the point of view of patients include, for example, knowledge, strategies and willingness to use a pain scale. Knowledge about pain, its management and the strategy used (i.e. active or passive) influences whether patients inform healthcare professionals about unpleasant intensive pain. Beliefs about - or past experiences of - care can affect patients' readiness to use a pain scale. However, willingness to rate pain can make it easier for healthcare professionals to understand patients' experience of pain, and facilitate shared decision-making. Where the intensity of pain rises above a certain level patients may move from a passive to an active strategy. Healthcare professionals, on the other hand, influence the assessment of pain by factors such as attitudes, responsiveness, communication skills, habits and adherence to guidelines. Responsiveness implies that healthcare professionals can read between the lines in terms of what a patient wishes to communicate, and at the same time indicates a sincere interest in the patient's response. Interest and commitment in terms of meeting an individual patient's needs will depend on work and life experience. Furthermore, norms and social cues among those involved affect how communication is understood. Two-way communication provides a good

basis for both patients and healthcare professionals in terms of making a shared decision about further actions. One aspect of skilful communication is that it is carried out in both directions, and involves collaboration between the patient and healthcare professionals, as well as respect for each other's knowledge. Another factor involves adhering to guidelines, which creates a sense of security in patients. Adhering to guidelines also helps patients understand why the pain scale is used, and they know they will be asked about pain and pain intensity. The performance of pain assessments is affected by environmental factors, such as continuity in working schedule, workload and procedures. High workloads make patients reluctant to inform healthcare professionals about their pain, while low workloads may allow healthcare professionals to allocate more time to communication during the pain assessments. Continuity in care helps patients to describe their pain, and these descriptions do not need to be as detailed every time, but nevertheless increase patients' feelings of security and confidence. Other factors which influence pain assessments include procedures, such as transferring information about completed pain assessments to the next shift. Early physical recovery is affected by the intensity of pain, but also how patients and healthcare professionals manage the situation. In summary, shared decision-making in pain assessment is a complex interplay between the different elements involved. Given the complexity of the situation, future research could benefit from focusing on these different aspects.

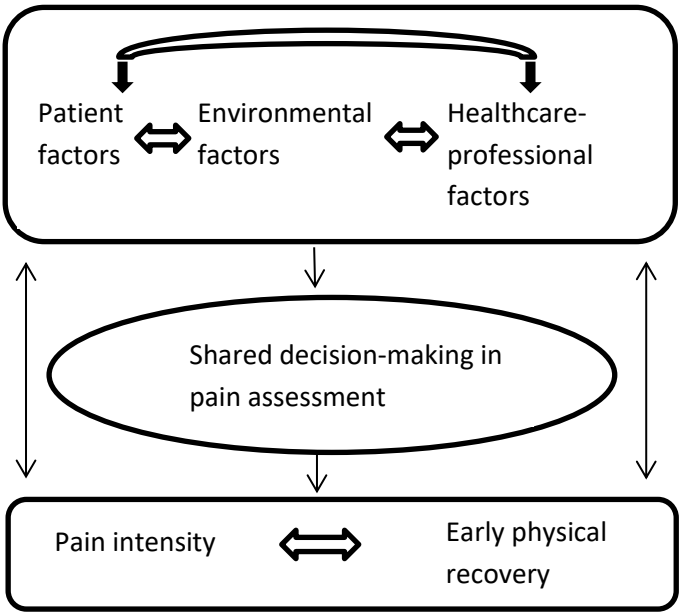


Figure 1. Factors affecting shared decision-making during pain assessment depend on factors involving patients, healthcare professionals and the environment. The intensity of pain and early physical recovery also affect both patients and healthcare professionals.

Conclusions

This thesis shows that pain intensity is clearly associated with early physical recovery after surgery. This contributes to knowledge about the possibility of using patients' self-rated average pain intensity at rest and during activity to reflect physical recovery on postoperative day 1 and predict recovery the following day. Employing average pain intensity as a measure will enable healthcare professionals to follow most patients' physical recovery in everyday clinical practice. Adhering to guidelines allows data collection without questionnaires, thereby reducing the burden on patients and healthcare professionals. In addition, if healthcare professionals are alerted to patients at risk of complications related to severe pain, they may ultimately be more likely to take action.

The use of patients' self-reported scores from the NRS requires quality pain assessments to be undertaken according to guidelines and with knowledge about communication. This thesis provides insight into patients' perspectives on these assessments, where knowledge has previously been limited. Employing a pain scale provided a shared vocabulary between healthcare professionals and patients, facilitating dialogue. It can also increase patients' powers in relation to healthcare professionals. Patients described how exchange of information between healthcare professionals was simplified when shifts changed. The threshold for needing pain treatment varied greatly. Since the Swedish guidelines recommend treatment where pain intensity is above three, healthcare professionals need to be aware of this to avoid under or over-treatment. Two-way communication with patients was found to be vital to ascertain how pain intensity influences the different recovery items. Patients also described that environmental factors influenced pain assessments, such as staffing, workload and work procedures.

Clinical and research implications

- Greater shared decision-making in pain assessment can be achieved by giving patients the opportunity to communicate the meaning of the pain they have rated, and by allowing patients to share what they consider vital information in the assessment.
- A fixed pain threshold, where patients are given analgesics when pain levels rise above three on the NRS, can lead to under- or over-treatment of pain, as patients placed the threshold for requiring analgesics at different pain scores.
- Patients' uncertainty and insecurity can be reduced when healthcare professionals follow guidelines for pain assessment, leading to increased confidence in healthcare professionals.
- Trust in healthcare professionals can also be enhanced by shortening the waiting time for analgesics. At breakthrough pain, patients who are willing to take charge of their intake of analgesics no longer have to wait to take them.
- If performance of pain assessment can be improved, and information transferred to the next shift, patients should be able to access appropriate treatment more quickly, thereby reduce suffering, creating fewer complications and facilitating physical postoperative recovery.
- General and orthopaedic patients' self-reported average pain intensity using the NRS reflects and predicts early physical recovery after surgery.
- In future, it will be beneficial to explore the association between compiled average pain intensity from monitoring records and patients' retrospective average pain intensity, since retrospective pain scores were used in this thesis.
- In future, it will be useful to explore whether ability to reflect and predict physical recovery differs between general and orthopaedic patients.
- In future, it will be useful to explore whether corresponding ratings of nausea (0-10), compiled by average nausea intensity, can reflect impact on nausea, appetite changes and gastrointestinal function on postoperative day 1, as well as the ability to predict the impact of these recovery items the following day.

Summary in Swedish

Svensk sammanfattning

Introduktion

Ett stort antal patienter genomgår olika typer av kirurgi varje dag och många av dem kommer att uppleva postoperativ smärta. För att fånga upp dessa patienter behöver smärta regelbundet efterfrågas och en bedömning göras. En smärtbedömning består av flera delar, varav en del innebär att patienten själv skattar sin smärtintensitet. Enligt nationella och internationella riktlinjer rekommenderas postoperativ smärtbedömning flera gånger dagligen. Målet med riktlinjerna syftar till att få ett gemensamt språk oavsett vem patienten möter och att kunna individualisera smärtbehandlingen. En viktig grund i smärtbedömning är utbytet av information mellan patient och vårdpersonal, vilket förutsätter en tvåvägs-kommunikation. Om vårdpersonalen är skicklig i att kommunicera med patienten kommer det att gynna att ett beslut fattas gemensamt av patient och vårdpersonal, så kallat delat beslutsfattande.

I de kirurgiska riktlinjer som utarbetats är smärta och hur den ska behandlas en väsentlig del. Detta för att ge snabb och förbättrad återhämtning efter ett operativt ingrepp. Förutom att underlätta mobilisering genom att optimera smärtbehandlingen fokuserar de kirurgiska riktlinjerna på exempelvis skonsam kirurgi, undvikande av dränage, sonder och infusioner. Utöver kirurgiska riktlinjer har tidigare olika verktyg utvecklats för att följa postoperativ återhämtning. Dessa återhämtningsverktyg innefattar dimensioner såsom fysiska, psykologiska och sociala aspekter, av vilka den fysiska har störst betydelse de första dagarna postoperativt. Den fysiska dimensionen inkluderar smärta vilket är en viktig faktor eftersom smärta bland annat påverkar sömn och förmåga att vara uppe i rörelse. Att använda ett återhämtningsverktyg innebär att ett omfattande frågeformulär fylls i av patienterna. Idag finns inget enkelt sätt att följa patienters återhämtning efter en operation. Att be patienter fylla i ett frågeformulär de första dagarna efter en operation kan begränsa vilka som orkar fullfölja uppgiften. Detta är ett komplicerat och svårt sätt att följa återhämtning. En enkel metod för att övervaka tidig fysisk återhämtning utan användning av frågeformulär skulle underlätta för både patienter och vårdpersonal. Idag ombeds patienter

muntligen att skatta sin smärtintensitet på en smärtskala flera gånger per dag och svaren dokumenteras i patientens journal. Smärta är vanligt efter kirurgi och påverkar den fysiska återhämtningen negativt, vilket ökar risken för långvarig smärta. Om återhämtningen kan övervakas och prediceras blir vårdpersonal uppmärksammad på vilka patienter de behöver lägga extra fokus på. Syftet med avhandlingen har varit att fastställa möjligheten att använda patienters skattade smärtvärden för att spegla och förutsäga återhämtningen samt att undersöka patienternas perspektiv på smärtbedömning.

Metoder

Avhandlingens fyra studier består av både kvantitativa och kvalitativa ansatser. De kvantitativa är baserade på frågeformulär och journaluppgifter. Studie I genomfördes med en tvärsnittsdesign med ett framtaget frågeformulär med elva frågor baserade på tidigare forskning avseende smärta och återhämtning. Frågor om smärtintensitet besvarades med instrumentet Numeric Rating Scale (NRS) där smärta skattades på en elva-gradig skala där 0 är ingen smärta och 10 motsvarar värsta tänkbara smärta. Svarsalternativen delades in i tre nivåer, lindring smärta motsvarade 0-3, måttlig smärta 4-6 och svår smärta 7-10. Frågor om tidig fysisk återhämtning utgjordes av frågor gällande aptitförändringar, sömnsvårigheter, förmåga till rörelse i sängen, vara uppe i rörelse, träningsprogram och personlig hygien. Frågeformuläret besvarades av patienter postoperativt dag 1 och 2. I studie IV bestod frågeformuläret av elva frågor med tre av fem dimensioner från återhämtnings-verktyget Postoperative Recovery Profile (PRP) samt genom mätning av smärtintensitet med NRS. Studien genomfördes med en design med upprepade mätningar där datainsamling genomfördes 1-2 veckor preoperativt samt postoperativ dag 1 och 2. Patienter angav retrospektivt genomsnittlig smärtintensitet i både i vila och vid aktivitet. Svarsalternativen var hela den kontinuerliga smärtskalan NRS (0-10). Fysisk återhämtning mättes med tre av fem dimensioner från PRP dvs. fysiska symtom, fysiska funktioner och aktivitet medan den psykologiska och sociala dimensionen utlämnades. Fysiska symtom innehöll frågor om illamående, orkeslöshet, aptitförändringar och sömnsvårigheter. Fysisk funktion bestod av frågor avseende mag-tarmkanalens funktion, blåsfunktion, förmåga till att vara uppe i rörelse och muskelsvaghet. Dimensionen aktivitet bestod av en fråga om personlig hygien. Eftersom studierna (I, IV) byggde på hypotesen att det

är möjligt att använda patienters skattade smärtintensitet för att spegla och förutsäga tidig fysisk återhämtning var det relevant att undersöka patienters perspektiv på smärtbedömning. Det ledde till syftena för studie II och III, där patienters perspektiv på smärtbedömning undersöktes med kvalitativa tillvägagångssätt. Dessa studier byggde på semi-strukturerade intervjuer för att få kunskap om hur smärtbedömning ska utföras för att uppnå kvalitet. Genom en kvalitativ metod (fenomenongrafi) undersöktes patienters uppfattningar av att använda en smärtskala postoperativt (II). En annan kvalitativ metod (kritisk incident teknik) användes med syfte att beskriva patienters upplevelser och hantering av avgörande händelser i samband med smärtbedömning (III). Datainsamlingen för studie I genomfördes på ett länssjukhus i sydöstra regionen i Sverige. I studie IV utvidgades datainsamlingen till en multicenterstudie och tre länssjukhus inkluderades. Studierna II och III utfördes på tre länssjukhus och ett universitetsjukhus. Inklusionskriterier för samtliga studier var; en förväntad vårdtid på minst 2 dygn, genomgått kirurgiskt eller ortopediskt ingrepp, patient 18 år eller äldre och förstå det svenska språket både talat och skrivet. Exklusionskriterier var nedsatt kognitiv förmåga eller i behov av intensivvård postoperativt.

Resultat

Andelen patienter som uppgav att smärtintensiteten påverkade återhämtningen var störst postoperativ dag 1 jämfört med dag 2 (I, IV). Den genomsnittliga smärtintensiteten från övervakningsjournalen postoperativ dag 1, speglade fysisk återhämtning beträffande aptitförändringar, sömnsvårigheter, förmåga att vara uppe i rörelse och till att genomföra träningsprogram (I). Genomsnittlig smärtintensitet i vila speglande samtliga områden i den fysiska återhämtningen (dvs. fysiska symtom, fysiska funktioner och aktivitet) postoperativ dag 1 (IV). Smärtintensiteten i vila dag 1 förutsa återhämtningen dag 2, framför allt avseende orkeslöshet, sömnsvårigheter, vara uppe i rörelse men även för aptitförändringar, muskelsvaghet och personlig hygien. Genomsnittlig smärtintensitet vid aktivitet dag 1 speglade alla delar av återhämtningen samma dag förutom blåsfunktion. Dessutom förutsågs återhämtningen för dag 2 för alla områden (dvs. fysiska symtom, fysiska funktioner och aktivitet) med undantag av delarna som avsåg illamående, aptitförändringar och blåsfunktion. Hög smärtintensitet (NRS 7-10) visade sig ha bättre förmåga att förutsäga återhämtningen jämfört med måttliga skattningar (NRS 4-6), både

postoperativ dag 1 och 2 genom att spegla och förutsäga fler delar av återhämtningen.

Patienterna (II) beskrev att deras uppfattning av användningen av NRS var att det ställde krav på vårdpersonal och vårdrutiner, dvs. att information gavs om metoden och att NRS användes på rätt sätt. Tillämpningen av NRS underlättade kommunikationen trots att patienter beskrev att smärtan även behövde beskrivas i ord samt att det fanns tolkningssvårigheter. Genom att använda NRS uppgav patienter att båda parter hade samma utgångspunkt jämfört med när smärta enbart beskrevs med egna ord. Skattning av smärta gjorde det lättare att vara delaktig i smärtbedömningen genom att kunna referera till tidigare bedömningar. Ett uppriktigt intresse och lyhördhet hos vårdpersonalen för patientens svar gav en känsla av trygghet och förtroende. Patienter beskrev att det var svårt att veta hur mycket smärta de förväntades kunna hantera. Deras uppfattningar av när smärtbehandling behövdes varierade mellan ett och sex på smärtskalan. NRS beskrevs av patienterna stödja vårdpersonalens val av analgetika och doser samt utgöra ett stöd vid överrapportering till nästa skift.

Patienters erfarenheter när de var i behov av att beskriva sin smärta påverkades av vilka resurser det hade, dvs. förståelsen för smärta tillsammans med förmåga att hantera den (III). Förväntningar och tolerans för smärta varierade och påverkade upplevelsen likaså den förväntade effekten av analgetika. Patienter förväntade sig få optimal smärtbehandling men risken för biverkningar påverkade deras vilja att ta analgetika. Tidigare erfarenheter av icke-opioider ledde till att analgetika förmodades kunna intas som mest tre till fyra gånger per dag. Av rädsla för att uppfattas gnällig eller komma i konflikt med vårdpersonal påverkades intresset för att kommunicera smärta och be om analgetika. Frågor om smärta ställdes av vårdpersonalen under en till två dagar postoperativt, sen upphörde frågorna. Vårdpersonalens arbetssituation och vårdrutiner påverkade hur smärtbedömningarna utfördes. Kontinuitet i bemanningen underlättade kommunikationen om smärta medan hur smärtbedömningen utfördes berodde på vem som var i tjänst. Hög arbetsbelastning hos vårdpersonalen påverkade om patienten bad om hjälp. I samband med skiftbyte av vårdpersonal beskrevs bristande överrapporteringen av smärta. Förtroendet för vårdpersonalen minskade vid långa väntetider på analgetika.

Utifrån sin erfarenhet av smärta hanterade patienterna sina upplevelser med aktiva eller passiva strategier (III). De med aktiva strategier berättade och beskrev sin smärta för vårdpersonalen samt bad om analgetika. Information söktes från vårdpersonal och medpatienter. Egenvård bedrevs genom att distrahera sig från smärtan, att vara i rörelse eller ta medhavda analgetika. Dessutom användes hjälpmedel för att minska smärtan och aktiviteter anpassades utifrån smärtintensitet. Patienter med passiva strategier stod ut med smärtan och avstod från att informera vårdpersonalen. De beskrev att den egna kunskapsbristen om smärtbehandling gjorde att de hade förtroende för vårdpersonalens kompetens och litade på deras omdöme.

Slutsatser

Den här avhandlingen visar att smärtintensitet har ett tydligt samband med tidig fysisk återhämtning efter kirurgi. Den bidrar med kunskap om möjligheten att använda patienters självskattade genomsnittliga smärtintensitet för att spegla fysisk återhämtning postoperativ dag 1 och förutsäga återhämtningen dag 2. Användning av genomsnittlig smärtintensitet som mätmetod gör att återhämtningen kan följas för de flesta patienter i klinisk verksamhet. Följsamhet till riktlinjer avseende smärtbedömning möjliggör datainsamling utan frågeformulär och minskar därmed bördan på patient och vårdpersonal. Vårdpersonal uppmärksammas på vilka patienter som har risk för att få komplikationer relaterat till hög smärtintensitet. Dessutom hjälper det vårdpersonal vidta åtgärd i tid.

Användning av patienters självskattade värden från NRS kräver att smärtbedömning görs med kvalitet. Den här avhandlingen ger insikter i patienters perspektiv på smärtbedömning, vilket det tidigare funnits begränsad kunskap om. Med användning av en smärtskala erhölls ett gemensamt språk med vårdpersonalen, vilket underlättade dialogen. Patienter beskrev att det också förenklade utbytet av information mellan vårdpersonal vid skiftbyten. Tröskeln för när smärtbehandling behövs varierade stort mellan patienterna. Eftersom svenska riktlinjer rekommenderar behandling när smärtintensiteten är över tre, är medvetenhet om detta bland vårdpersonal nödvändig för att undvika under- eller överbehandling. En dialog med patienter är avgörande för att förvissa sig om smärtintensitetens påverkan på de olika delarna i den fysiska återhämtningen. Dessutom uppgavs faktorer i omgivningen påverka

smärtbedömningen, såsom bemanning, arbetsbelastning, vårdpersonalens attityder och arbetsrutiner.

Konsekvens

- Delat beslutsfattande kan ökas vid smärtbedömning genom att ge patienter möjlighet att kommunicera vad det skattade värdet betyder för dem och genom att låta patienter delge vad de anser betydelsefullt vid bedömningen.
- Ett tröskelvärde, där smärta över tre på smärtskalan innebär att analgetika ges, kan leda till under- eller överbehandling av smärta eftersom patienter sätter gränsen för behov av analgetika vid olika värden.
- Genom att följa satta riktlinjer för smärtbedömning kan patienters osäkerhet och otrygghet minskas och leda till ökat förtroende för vårdpersonalen.
- Förbättrad tillit till vårdpersonal kan uppnås genom att korta väntetiden på analgetika. Väntetid på analgetika vid smärtgenombrott kan undvikas för de patienter som själva kan och vill ansvara för intag av analgetika.
- Genom att förbättra smärtbedömningen samt att informationen överförs till nästa arbetsskift kan leda att patienter snabbare får rätt behandling. Det kan även ge färre komplikationer postoperativt men även underlätta patienters fysiska återhämtning.
- Kirurg- och ortopedpatienters självskattade genomsnittliga smärtintensitet med NRS speglar och förutsäger tidig fysisk återhämtning efter kirurgi.
- En jämförelse av sammanställd genomsnittlig smärta från övervakningsjournalen med patienters retrospektivt angivna genomsnittliga smärtintensitet behövs eftersom retrospektiva smärtvärden har använts i avhandlingen.
- Framtida forskning behövs där förmågan att reflektera och förutsäga fysisk återhämtning undersöks för att fastställa om den skiljer sig åt mellan kirurg- och ortopedpatienter.

- Likaså skulle det vara av värde att undersöka om motsvarande skattning av illamående (NRS 0-10) sammanställd i en genomsnittlig intensitet kan reflektera illamående postoperativt och därmed synliggöra eventuellt problem som illamående medför.

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Appendix

Appendix I

A questionnaire (II) to measure patient reported recovery developed by the research team. (Eriksson et al 2013).

	Har du haft en smärta de sista 6 månaderna som inneburit att du dagligen tagit smärtstillande läkemedel?	□ Ja □ Nej
	Om du svarat ja på frågan ovan, vilket/vilka smärtstillande läkemedel har du använt dagligen?	
	Vilken smärtnivå har du i genomsnitt upplevt de senaste 4 veckorna? Ringa in det alternativ som stämmer bäst för dig. 0= ingen smärta, 10 västra tänkbara smärta.	
	I vila	0 1 2 3 4 5 6 7 8 9 10
	I aktivitet (dagliga sysslor, gång, fritidsaktivitet)	0 1 2 3 4 5 6 7 8 9 10
1	Hade du smärta?	□ Ja □ Nej
2	Upplevde du någon gång att din smärtnivå hade en styrka inom intervallet 0-3?	□ Ja, mer än 1 timme □ Ja, mindre än 1 timme □ Nej
3	Upplevde du någon gång att din smärtnivå hade en styrka inom intervallet 4-6?	□ Ja, mer än 1 timme □ Ja, mindre än 1 timme □ Nej
4	Upplevde du någon gång att din smärtnivå hade en styrka inom intervallet 7-10?	□ Ja, mer än 1 timme □ Ja, mindre än 1 timme □ Nej
5	Har smärtan hindrat dig från att sköta din hygien och klä på/av dig?	□ Inte alls □ Delvis □ Till stor del □ Helt och hållet
6	Har smärtan hindrat dig från att röra dig i sängen?	□ Inte alls □ Delvis □ Till stor del □ Helt och hållet
7	Har smärtan hindrat dig från att vara uppe och gå?	□ Inte alls □ Delvis □ Till stor del □ Helt och hållet
8	Har du fått tränings- eller mobiliseringsprogram att följa efter din operation eller mål med hur länge du ska vara uppe ur sängen?	□ Ja □ Nej, om nej fortsätt till fråga 10
9	Har smärtan hindrat dig från att utföra träningsprogrammet eller uppnå målet med hur länge du ska vara uppe ur sängen?	□ Inte alls □ Delvis □ Till stor del □ Helt och hållet
10	Har smärtan påverkat din förmåga att äta eller dricka?	□ Inte alls □ Delvis □ Till stor del □ Helt och hållet
11	Har smärtan påverkat din sömn?	□ Inte alls □ Delvis □ Till stor del □ Helt och hållet

Appendix II

A questionnaire to measure patient reported recovery build on the PRP questionnaire (Allvin et al 2009).

	Hur bedömer du i genomsnitt din smärta första dygnet efter operation i vila?	0 1 2 3 4 5 6 7 8 9 10
	Hur bedömer du i genomsnitt din smärta första dygnet efter operation när du var i rörelse?	0 1 2 3 4 5 6 7 8 9 10
	Just nu upplever jag en/ett …… som är:	
1	illamående	□ Svår □ Medelsvår □ Lindrig □ Inget
2	orkeslöshet	□ Svår □ Medelsvår □ Lindrig □ Inget
3	påverkan på min aptit	□ Svår □ Medelsvår □ Lindrig □ Inget
4	sömnsvårighet	□ Svår □ Medelsvår □ Lindrig □ Inget
5	rubbning i min mag-tarmfunktion	□ Svår □ Medelsvår □ Lindrig □ Inget
6	problem med att tömma urinblåsa	□ Svår □ Medelsvår □ Lindrig □ Inget
7	problem med att vara uppe och i rörelse	□ Svår □ Medelsvår □ Lindrig □ Inget
8	muskelsvaghet	□ Svår □ Medelsvår □ Lindrig □ Inget
9	svårighet med att sköta min personliga hygien	□ Svår □ Medelsvår □ Lindrig □ Inget

Appendix III

Study II. Quotations/ perceptions from the performed interviews with patients about the NRS.

Quotations	Perceptions
"It's good actually. Not only like saying you've a lot of pain, it's a little clearer in some way." (female, age 32, general surgery).	NRS facilitated the descriptions of pain
"I also have to signal when there's something they can't guess. I think a co-operation between patient and nurse is probably the optimal type." (female, age 53, general surgery).	NRS facilitated participation
"It has a bit to do with concern for the patient. Maybe I can't get more medicine, but only someone asking that's pain relief". "Yes that someone cares." (female, age 80, general surgery,).	NRS facilitated confidence
"Yes, of course they benefit from knowing, there'll be a change of staff, so like they'll know in a different way. Then you like transfer the number, it's easier transferring if someone has listened to 10 patients it's easier to transfer a number of course." (man, age 68, orthopedic surgery).	NRS facilitated transferring of information between the healthcare professionals
"I think well when you're in hospital that it's like the healthcare that uses that instrument (reflecting on who has the main responsibility for pain assessment). It's nothing I have come here and invent that now you're going to ask me about it and in that way, eh." (man, age 43, orthopedic surgery).	NRS demanded the healthcare professionals' take responsibility
"If you just know what you'll rate so then it's okay, but if you don't get the right perception of what to rate it won't be quite right" (female, age 68, orthopedic surgery).	NRS demanded clear information from the healthcare professionals'
"They must like take over the responsibility and read the patient if he says it isn't too bad pain but we see that he's having problems here so we must do something. It's no easy job" (man, age 78, general surgery).	NRS demanded the healthcare professionals' responsiveness
"…well it's often a limited period of time, maybe once an hour or every two hours. It's very difficult to say that this is what it's like it depends completely on what operation took place and how painful it is in this case" (man, age 57, orthopedic surgery).	NRS demanded attention to the patients' needs
"I don't think there's a problem there (using numbers), but I think they say less. I think they say quite a lot but I think they like say more when you describe how you experience it in words" (man, age 67, general surgery).	NRS alone was insufficient to describe pain
"With painkillers it has been quite low and without it has been well moderate. It's very difficult, a three with painkillers and somewhat more without me having painkillers. It's difficult to know if it is a one, two, three or five, I think." (female, age 68, orthopedic surgery).	NRS ratings were perceived as difficult
"They asked me and I said: well I'm about 5-6." Wow, do you have so much pain" they said and I realized my pain wasn't so bad. They use it like, they compare them, so they relate it to like then they've some sort of norm in their heads so to speak." (man, age 57, orthopedic surgery).	NRS created uncertainty about how it was used by the healthcare professionals

Appendix IV

Study III. Quotations, subcategories, from interviews with patients about experiences when in pain after surgery.

Quotations; experiences described by patients during the performed interviews (interview number)	**Subcategory (**number of incidents)
”I have been prepared for pain, perhaps therefore I do not have much pain” (16) male, age 68, general surgery	Patients’ expectations of pain (19)
”There should be some hours between (analgesics), you should not take too often…There is pain but then I have to endure until it is time to get some more” (15) female, age 77, orthopaedic surgery	Patients’ expectations of pain treatment (30)
”It (analgesics) does not help against the pain, I refused a couple of times and said, “I do not need more morphine for I will become weird in the head” (6) female, age 48, general surgery	Patients’ awareness of analgesics side effects (5)
“You must have some pain, when it became uncomfortable I call on staff” (12) male, age 61, general surgery	Patients’ tolerance for pain (32)
”It is different types of pain, nagging that lasts all the time. It is terribly painful when the pain feels like stabbing a few seconds and then perhaps it does not hurt... In that way it is very difficult to communicate with the scale” (1) female, age 54, orthopaedic surgery	Patients had difficulties describing their pain (12)
“You feel what attitude they have, if it feels good, then I take it for granted they want to help in the best way” (1) female, age 54, orthopaedic surgery	Patients were influenced by healthcare professionals’ attitude when assessing their pain (35)
”They asked with this 0-10 and it started on the 8th. They asked step by step until it got better and I was down to two and it felt good” (20) male, age 78, general surgery	Patients were asked about their pain (51)
”They said all the time, “Give us a call before it becomes too much” (8) female, age 34, general surgery	Patients were invited to get in touch when in pain (11)
“They said that it would hurt.. they said it makes you feel good to get up and walk.. then the body will recover more quickly” (24) female, age 52, general surgery	Patients were informed about pain and treatment (29)
“One expects if you get a specific treatment by a person and then suddenly the day after there is a different treatment”. (7) male, age 45, orthopaedic surgery	Healthcare professionals’ different procedures affected patients’ ability to describe pain (24)
”The nurses wanted to talk to the doctors, it was true all the time; No, I will talk to the doctor first” (6) female, age 48, general surgery	Healthcare professionals had different roles (24)
”They are running and chasing. There are not many who have time to stop, both the staff in the ward and the doctors” (13) male, age 61, general surgery	Healthcare professionals' workload affected pain assessment (20)

Appendix V

Study III. Quotations, subcategories, from interviews with patients about actions when in pain after surgery.

Quotations; actions described by patients during the performed interviews	Subcategory (number of actions)
”I said, I am still feeling (pain)"(6) female, age 48, general surgery	Patients told healthcare professionals they had pain (10)
”I said I had pain in my chest. I have terrible pain and need help as soon as possible " (13) male, age 61, general surgery	Patients described their pain in detail (17)
”First, I get the medication I should have, and then I ask if I can get two extra painkillers. Yes it is ok, they said"(9) female, age 62, orthopaedic surgery	Patients requested pain management (24)
”I have expressed my disappointment a few times. It makes no difference to take these pills, they do not help anyway. You must give me something stronger” (7) male, age 45, orthopaedic surgery	Patients asked questions about pain and treatment (14)
”I put the concentration on the other things to survive. It sounds drastic, saying ‘survive’ but it was all about to get focus on something else than pain” (11) male, age 58, orthopaedic surgery	Patients distracted themselves from their pain (8)
”They (staff) want you to exercise more; I usually do that when medicine has had its effect. It feels best when it does not hurt " (19) male, age 59, general surgery	Patients avoided activity (9)
”The pain disappears temporarily or intermittently if you change location” (21) male, age 71, orthopaedic surgery	Patients changed their position (8)
”I wait a while because I felt that the morphine took my head” (6) female, age 48, general surgery	Patients adjusted their treatment (9)
”I cried out, not that I screamed I tried to control myself” (18) male, age 91, orthopaedic surgery	Patients “ bit the bullet” (10)
”There has to be some (pain), I know that there has to be, but it will end sometime I thought " (9) female, age 62, orthopaedic surgery	Patients waited for the pain to subside spontaneously (5)
“I could not call (on the staff) twice an hour, but I knew that in two, three hours, or about an hour or so they would come with new medication. I waited until then” (19) male, age 59, general surgery	Patients waited for the next dose of analgesics (5)
”The assistants are even now busy and running about” (4) male, age 80, general surgery	Patients hesitated to disturb overstrained healthcare professionals (6)
“I thought, I will not take any (pills) in the morning as I have done for many days. I’ll wait a while and see how it feels and if I feel I need something I’ll ask for two (pills)” (1) female, age 54 , general surgery	Patients awaited to see the need for analgesics (13)
”They (the staff) come with their syringes. They know it better than me. It is they who decide. I cannot decide” (4) male, age 80, general surgery	Patients left the responsibility for their pain management to healthcare professionals (13)
”Then it depends on how clear I am, I was perhaps not clear with my signals” (6) female, age 48, general surgery	Patients take responsibility for shortcomings in pain management (5)