The clinical utility of patients’ self-rated postoperative pain after major surgery – the perspective of healthcare professionals’

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Abstract

Patients’ pain intensity is the most clinically relevant pain dimension to monitor after major surgery, and assessments should, when cognition allows, be based on self-reports. The Numeric Rating Scale (NRS) is suitable in postoperative settings, yet, the implementation has shown varying results. Since research on the utility of pain scales is limited, knowledge based on healthcare professionals’ experiences is needed. Therefore, the aim of this thesis was to describe the clinical utility of patients’ self-rated postoperative pain after major surgery from the perspective of healthcare professionals.

The thesis is based on qualitative and quantitative methods. The aims of the qualitative studies were to describe how healthcare professionals perceive the use of pain scales in postoperative care (I) and, through considering critical incidents, to describe care experiences and actions taken by healthcare professionals when assessing postoperative pain (II). The participants in studies I (n=25) and II (n=24) were enrolled and registered nurses and physicians with clinical experience of pain scales in postoperative care. The aims of the quantitative studies were to determine the clinical applicability of NRS mode- and maximum- measures (III), and NRS mode- and median measures at rest and during activity (IV), when to describe patients’ postoperative pain on the first day after major surgery. A further aim was to determine the number of NRS ratings needed for the calculation of these measures (IV). The number of surgical and orthopaedic patients who completed study III was: n=157 and for study IV: n=479.

Studies I and II confirmed earlier findings of patients’ self-reported pain scores as a facilitator in the understanding of pain. Organizational routines, documentation devices, knowledge, clinical competence, continuity in care, collaborative actions, time, and individual habits were healthcare-related factors affecting the use of pain scales (I, II). Patient-related factors such as patients’ ability and willingness to communicate pain were facilitators, while disability, unwillingness to communicate or inconsistency in verbal communication with observed behaviours were barriers (II). Multi-dimensional communication approaches could bridge the patient-related barriers (I, II).
Studies III and IV showed acceptable reliability for the mode and median measures, based on daily calculations of patients’ self-rated pain scores at rest and during activity. Rank correlations for individual mode and median scores, based on four ratings, versus patients’ retrospective self-rated average pain, were moderate and strengthened with increased numbers of ratings. The Svensson method showed an individual variation within the expected outcome and a significant systematic group change towards a higher level of reported retrospective pain. The calculated pain measures, particularly concerning pain at rest, were generally lower than patients’ recall of pain.

In conclusion, the findings support earlier described beneficial effects of patients’ self-reported pain; however, present healthcare did not support the structured utilization of pain scales. The simple measurement characteristics of the NRS average pain measures suggest that patients’ pain can be followed until resolved. The measures could additionally become important patient-reported outcome measures and thus constitute new motivators to increase the utilization of pain scales.
Original studies

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

**Study I**


**Study II**


**Study III**


**Study IV**


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Author contributions

All authors have been continuously involved throughout the process of analysis in studies I-IV, and have contributed to the interpretation of data and intellectual content. Lotta Wikström had the main responsibility in studies I, II and IV. In study III the main responsibility was equally shared with Kerstin Eriksson.
Contents

Preface ............................................................................................................. 6
Introduction ....................................................................................................... 7
  Pain dimensions ............................................................................................ 9
Prevalence of postoperative pain ................................................................. 10
Pain assessment ............................................................................................. 12
Measurement of postoperative pain ............................................................. 14
Documentation of postoperative pain .......................................................... 15
Healthcare professionals’ roles in pain management ............................... 16
Rationale .......................................................................................................... 19
Conceptual framework .................................................................................. 21
  Care routines ............................................................................................... 21
  Communication ........................................................................................... 22
Methods .......................................................................................................... 24
  Design ......................................................................................................... 24
  Setting ....................................................................................................... 25
Participants ..................................................................................................... 25
Data collection ............................................................................................... 27
Data analysis .................................................................................................. 31
Quantitative methods .................................................................................... 33
Ethical considerations ................................................................................... 35
Results ............................................................................................................ 37
  Perceptions of the utility of pain scales (I) ................................................. 37
  Care experiences when assessing pain (II) ............................................... 39
  Care actions when assessing pain (II) ....................................................... 40
  Prevalence of pain (III, IV) ...................................................................... 41
The clinical applicability of daily summarized measures based on patients’ self-reported pain (III, IV) ........................................ 43

Discussion ........................................................................................................ 47
  Methodological aspects ................................................................................. 47
  Aspects of the results .................................................................................... 51

Theoretical reflection ...................................................................................... 58

Conclusions and clinical implications ............................................................ 62

Future research ............................................................................................... 65

Summary in Swedish ....................................................................................... 66

Acknowledgements ........................................................................................ 70

Referenses ......................................................................................................... 72
Preface

In my role as an acute pain nurse in an “Acute Pain Service Team”, I have a pre-understanding of the area studied in this thesis. The reason I faced the challenge of researching this area was my experienced difficulties implementing a structured use of patients’ self-rated pain scores in surgical wards. Healthcare professionals’, enrolled and registered nurses’ and physicians’ quality of assessments and documentation of pain varied widely, which consequently affected the understanding of patients’ pain. Despite the broad international and national clinical experience of the most common one-dimensional pain scales, their use was questioned. My clinical experience raised questions about finding reasons for why the assessment with pain scales was not attractive to everyone. What are the key ingredients in the assessment situation? Do healthcare professionals perceive that the pain scales contribute to the understanding of patients’ pain?

In the development of the scientific field of nursing, nurses have been inspired by several scientific approaches. I have been “brought up” with the Nordic tradition of caring science that is based on issues on life and human existence. The human being is seen as an entity, and in the art and act of caring, relationships and dialogues are central. Caring to me means to identify patients’ problems, needs and desires, and listening to and respecting the patient’s perspective. Philosophies of positivism, post-positivism, interpreting and critical and social constructivism have contributed to the multi-faceted research questions within Nordic caring research. The understanding of the danger of treating perceptions of the social world as objective, and neglecting subjective interpretations and corresponding context is the background to why nurse researchers often approach questions with various varying philosophical perspectives. The thesis has a clinical perspective; healthcare professionals’ perceptions, experiences and actions in pain assessment situations were explored and an approach aiming to optimize clinical use of patients’ self-rated pain was determined. The results will hopefully contribute to better utilization of pain scales in postoperative care.
Introduction

The prevalence of postoperative moderate to severe pain during the first days after major surgery is high (Fletcher, Fermian, Mardaye, & Aegerter, 2008; Gerbershagen, Aduckathil, van Wijck, Peelen, Kalkman, & Meissner, 2013). Awareness has increased that patients are continuously at risk of suffering from pain in the short-term perspective, and also risk developing long-term post-surgical health-related consequences (Liu & Wu, 2007; Althaus, Arránz, Becker, & Neugebauer, 2014). Therefore, acute pain services (Duncan, Day, Haigh, Gill, Nightingale, & NIPPS Group et al., 2014) and pain management programs have been developed (Larsen, Hansen, Söballe, & Kehlet, 2010; Spanjersberg, Reurings, Keus, & van Laarhoven, 2011). The rapid changes in recent years that have allowed shorter hospital stays (Larsen et al., 2010; Spanjersberg et al., 2011) however mean less time to get to know patients’ postoperative needs.

The assessment of postoperative pain is described as complex. The perception of pain is regarded as a multi-dimensional, personal and unique experience, related to tissue damage but also to human values as well as health status (Armstrong, 2003; Wolrich, Poots, Kuehler, Rice, Rahman, & Bantel, 2014; Kvachadze, Tsagareli, & Dumbadze, 2015). Additionally, the perception of pain varies according to the present situation (Armstrong, 2003). Therefore, a systematic assessment process of pain is described as essential to achieve the goals of pain relief (Gordon et al., 2005; Radnovich, Chapman, Gudin, Panchal, Webster, & Pergolizzi, 2014). Pain intensity has so far been considered to be the most clinically relevant dimension of the pain experience to monitor, regardless of the nature of pain. (Hjermstad et al., 2011).

The idea to promote the patient as an active participant in the assessment procedure started in the late 40s when Keele (1948) asked patients to rate their pain intensity on a one-dimensional verbal scale. Several decades later, the NRS has become one of the recommended scales for most settings (Hjermstad et al., 2011). However, the implementation of pain scales in postoperative care has shown varying degrees of success (Gunningberg & Idvall, 2007; Ene, Nordberg, Gaston Johansson, & Sjöström, 2008; Gordon et al., 2008). How healthcare professionals assess patients’ pain experiences has mainly been explored by nurse researchers (Manias, Bucknall, & Botti, 2004; Schafheutle, Cantrill, & Noyce, 2004; Kim, Sjöström, & Schwartz-Barcott, 2006; Harper, Ersser, &
Gobbi, 2007; Lauzon-Clabo, 2007; Rejeh, Ahmani, Mohammadi, Anoosheh, & Kazemnejad, 2008). This could be explained by the fact that nurses have the main responsibility for pain management after surgery (Hartog, Rothaug, Goettermann, Zimmer, & Meissner, 2010); however, research revealed different attitudes and assessing behaviours (Manias et al., 2004; Schafheutle et al., 2004; Kim et al., 2006; Layman Young, Horton, & Davidhizar, 2006; Harper et al., 2007; Lauzon-Clabo, 2007; Rejeh et al., 2008). Layman Young et al. (2006) found predominantly positive attitudes towards pain scales, while findings from nurses’ behaviours revealed that pain scales were seldom used (Manias et al., 2004; Gunningberg & Idvall, 2007; Ene et al., 2008).

Evidence indicate that an attentive approach from healthcare professionals towards patients’ pain (Dihle, Bjølseth, & Helseth, 2006; Hartog et al., 2010) and well-functioning communication between patients and healthcare professionals (Schwenkglenks et al., 2014) and between different healthcare professionals are strongly related to quality of care (Havens, Vasey, Gittell, & Lin, 2010). This knowledge has raised issues about the pain scales’ contribution to identifying and understanding patients’ pain. Since research on the utility of pain scales is limited, more knowledge based on healthcare professionals’ experiences of caring for patients in postoperative care is needed.
Background

Pain dimensions

The well-known definitions of pain have set the norms of how pain should be looked upon in healthcare. Mc Caffery (1968) revolutionized the field of pain by her statement that “pain is whatever the experiencing person says it is, existing whenever the person say it does”. The still prevailing definition of pain from 1986 describes this symptom as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (International Association for the Study of Pain [IASP], 1986). To include people who are not able to communicate verbally, Kaasalainen (2007) added non-verbal communication of pain to her definition of pain: “pain is an unpleasant subjective experience that can be communicated to others either through self-report when possible or through a set of pain-related behaviours”. Acute pain, equivalent to postoperative pain, is additionally described as “the normal predicted physiological response to an adverse chemical, thermal or mechanical stimulus associated with surgery, trauma and acute illness” (Carr & Goudas, 1999). In summary, the definitions have increased the awareness of the importance of listening to patients in pain, believing their descriptions and accepting their pain-related behaviours.

The overall perception of postoperative pain has been described as associated with the extent of tissue damage as well as disease characteristics such as severity of illness (Armstrong, 2003) and preoperative chronic pain conditions (Wolrich et al., 2014). Furthermore, the outcome of a pain experience, mainly studied in the context of cancer, is related to the individual’s perception of the meaning, which is believed to be a synthesis of pain occurrence, and the perceptions of intensity and distress (Armstrong, 2003). Additionally, the perception of pain includes the presence of other symptoms such as nausea and tiredness (Armstrong, 2003) often occurring during the postoperative period (Allvin, Ehnfors, Rawal, & Idvall, 2008). The emotional experience of a symptom, including feelings of vulnerability and sadness, is defined as distress. However, the association between distress pain occurrence and pain intensity shows contradictory results (Goodell et al., 2005; Falk et al., 2016). In the postoperative context, coping, expectations (Khan, Devereaux, Le Manach, & Busse, 2016), anxiety and pain catastrophizing (Theunissen, Peters, Bruce,
Gramke, & Marcus, 2012) are found to affect perceptions of pain and rates of chronic post-surgery pain conditions.

The differences in overall pain perception due to ethnicity have not been determined but available research explains ethnical group differences as being influenced by biological, social, cultural and psychological factors (Kvachadze et al., 2015). Also, the gender perspective has been focused upon in recent years. Experimental and clinical findings demonstrate that women may have a greater pain sensitivity than men, which means that they may experience more pain than men (Kvachadze et al., 2015). Furthermore, the findings of Chapman, Davis, Donaldson, Naylor, & Winchester, (2011,a) suggests that younger patients experience more pain initially, but their pain resolves more quickly. Factors influencing patients’ postoperative pain experience are presented in Figure 1.

Figure 1. Factors that influence the understanding of patients’ postoperative pain experience, inspired by Radnovich et al. (2014)

### Prevalence of postoperative pain

Reported proportions of patients with moderate to severe pain soon after general surgery varies; 41% (Sommer, de Rijke, van Kleef, Kessels, Peters, & Marcus,
2008) and 56% (Forsberg, Vikman, Wälivaara, & Engström, 2015) while the reported proportion of patients with moderate to severe pain after orthopaedic surgery is higher, 75% (Forsberg et al., 2015). Consequently, the prevalence of chronic post-surgical pain is less for patients who has undergone general surgery, 8-17% than orthopaedic surgery, 13-27% (Fletcher et al., 2015).

Pain is generally expected to last up to ten days after surgery (Chapman et al., 2011a); however, the postoperative pain trajectory is not the same for all patients. Orthopaedic joint replacements can cause pain many weeks after surgery (Andersen, Gaarn-Larsen, Kristensen, Husted, Otte, & Kehlet, 2009). Pain decreases for most patients, but up to 25% of the patients are shown to experience the same or worse pain six days after surgery (Chapman et al., 2011a). Multimodal analgesic techniques and non-pharmacological interventions (Table 1) are used to prevent and quickly reduce pain, preferably tailored to the specific surgery, individual clinical factors, and patient preferences (Chou et al., 2016). The aims are, in addition to pain reduction, to avoid associated side effects such as bladder and bowel dysfunction, ventilator depression (Chou et al., 2016) and long-term health-related problems such as chronic pain (Liu & Wu, 2007; Althaus et al., 2014). The prevailing definition of postoperative chronic pain, “pain that develops after surgery and lasts for at least two months” (Macrae 2001) is often referred to, but considered vague. When evaluating postoperative pain Liu & Wu (2007) suggest adding patient-reported outcome aspects such as recovery, quality of life and satisfaction.

Patients’ preoperative pain, surgical techniques, pre-emptive and postoperative pain management as well as patients’ psychosocial situation have been found to be associated with the development of postoperative chronic pain conditions (Kehlet, Jensen, & Woolf, 2006). However, patients with preoperative chronic pain normally have prolonged pain trajectories (Chapman et al., 2011a). Additionally, patients with preoperative opioid pharmacy are at risk of higher postoperative pain than the population with no opioid pharmacy (Chapman, Davis, Donaldson, Naylor, & Winchester, 2011b).
Table 1. Postoperative pain management that may be encountered in a multi-modal perioperative pain management regimen after major surgery

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<th>Treatment that may be encountered in a multi-modal perioperative pain management regimen at major surgery</th>
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**Pain assessment**

Effective postoperative pain management as a result of surgical-specific guidelines and attention to patients’ pain facilitates a comfortable recovery that promotes rapid discharge from hospital (Larsen et al., 2010; Spanjersberg et al., 2011). A systematic assessment process where the patients get involved as an active participant is described as essential to achieving pain relief and to experiencing minimal side effects from analgesia (Gordon et al., 2005). The process of assessing postoperative pain means to identify, recognize, describe, document and follow pain, also to select interventions, and evaluate the individual’s response to treatment i.e. comfort and functioning, along with vital parameters associated with the chosen treatment (Gordon et al., 2005; Swedish Society of Anaesthesia and Intensive care [SFAI], 2010). Patients’ levels of self-reported pain at rest and during activity are considered important parameters in the assessment of postoperative pain (Figure 2). However, verbally communicating patients should also be asked about their pain history. Age, sex, psychosocial features, and comorbid conditions (Figure 1) are additional important features to consider since patients’ self-ratings from one-dimensional pain scales alone cannot be used as the basis for treatment algorithms (Radnovich et al., 2014). Furthermore, when pain is unexpectedly high, the necessary exclusion of surgical-related complications means that pain
qualities, locality, pain at rest and during activity, and pain duration in relation to given analgesia are relevant factors to consider (Radnovich et al., 2014).

Figure 2. Dynamic features of pain that are taken into consideration when determining pain relieving actions, inspired by Radnovich et al., (2014)

Nurses’ course of actions when assessing patients’ postoperative pain were found by Kim et al. (2006) to include three different strategies, namely considering what the patient says (identifying the presence and severity of pain), how the patient looks (the corresponding individual expressions and pain experiences), and “how it usually is”, (the identification and validation of possible causes of pain). The findings of Lauzon-Clabo (2007) showed a similar pattern, illustrated in Figure 3. However, in observational studies, the most commonly identified assessment course of action was to ask simple questions such as: How are you? Do you need any pain killers? (Manias et al., 2004; Schafheutle et al., 2004). Pain was rarely assessed in terms of intensity, location or duration (Manias et al., 2004; Schafheutle et al., 2004). Therefore, it is argued that good quality patient-reported outcome measures, i.e. patients’ self-rated pain, are important in the prevention of post-surgery complications (Meissner et al., 2015).

Accurate pain assessments are also important for those who cannot describe their pain due to cognitive impairments (Hadjistavropoulos et al., 2014). In general, healthcare professionals’ assessments of patients’ behaviours are found
to be fairly accurate when healthcare professionals’ and patients’ own assessments are compared (Ruben, van Osch, & Blanch-Hartigan, 2015). Healthcare professionals’ accuracy may decrease when patients experience high levels of pain, when patients are old, and when cognitive impairments are present, which means that patients with high pain levels and patients who cannot express pain are vulnerable (Ruben et al., 2015).

![Figure 3. Modified model of nurses’ different orientations when assessing patients postoperative pain according to Lauzon-Clabo (2007) with the addition of Kim et al. (2006)](image)

**Measurement of postoperative pain**

The increased understanding of the clinical importance of assessing patients’ postoperative pain has led to the upgraded status of pain as “the fifth vital sign”, together with the other four vital signs (blood pressure, temperature, pulse rate and respiratory rate), which were already routinely assessed (Mc Caffrey, 1997; Lynch, 2001). Recommendations for regular assessments of patients’ pain
intensity have come to include screening for pain with a one-dimensional scale followed by a more thorough assessment (Lynch, 2001) (Figure 3). The American Pain Society [APS], (1995) pain quality indicators of worst and average NRS score derives from the multi-dimensional pain instrument of Brief Pain Inventory, originally developed for the assessment of chronic pain conditions (Daut, Ceeland, & Flanery, 1983). Psychometric tests of the one-dimensional NRS (0 = no pain, 10 = worst possible pain) have been repeated over the years and have shown robust validity and reliability for measuring pain intensity (Hjermstad et al., 2011). Because of its feasibility in many settings the NRS is now one of the dominant pain scales in clinical use. The NRS has also been shown to work well with older patients (Hjermstad et al., 2011).

The evidence of patients’ varying interpretations of pain scales is growing (Farrar, Pritchett, Robinson, Prakash, & Chapell, 2010; Eriksson, Årestedt, Fridlund, & Broström, 2017; Wolrich et al., 2014; van Dijk, Kappen, Schuurmans, & van Wijck, 2015). Scoring is suggested to be based on life experience, interpretation of end-point descriptions, and anticipated consequences (Farrar et al., 2010; van Dijk, Vervoort, van Wijck, Kalkman, & Schuurmans, 2016). Therefore, strict adherence to various NRS cut-off goals has been questioned due to the risks of opioid-related serious adverse effects (Gordon et al., 2005). Although research was limited, Farrar et al.’s (2010) findings indicate that the actual change between two or more pain scores could be used when evaluating pain management. However, the size of needed pain reduction is individual and depends on initial pain intensity. In general, a change of approximately 2.5 points on an 11-point scale seems to represent clinical significance for pain reduction.

**Documentation of postoperative pain**

Documentation of patients’ postoperative pain is included in a systematic process of adequate management of pain (Gordon et al., 2005; Gordon et al., 2008; Patient law, 2008:355). Different healthcare professions share responsibility for the documentation of patients’ pain to ensure patients’ pain control is provided under safe conditions. In Sweden, patients have access to their medical records; therefore, the terminology must be understandable for patients. Another aim of adequate documentation in medical records is to deliver a tool for quality measures or research (Patient law, 2008:355).
However, the use of structured nursing terminology is not well developed, which has affected the incidence of healthcare professionals’ documentation of patients self-reported pain (Saranto & Kinnunen, 2009). The documentation of pain in medical records has been deficient irrespective of whether the monitoring has been on paper or electronic (Fletcher et al., 2008; Carr et al., 2014; Samuels & Eckardt, 2014). Deficiencies in electronic documentation have been described as caused by poorly designed electronic medical records, EMR (Saranto & Kinnunen, 2009, Stevenson, Israelsson, Nilsson, Petersson, & Bath, 2016), which has resulted in difficulties recognizing patients’ postoperative pain traits (Carr et al., 2014; Samuels & Eckardt, 2014). Furthermore, reasons for the fragmented documentation in EMR are related to individual knowledge and given time frames for continuous documentation (Saranto & Kinnunen, 2009). The introduction of EMR has increased the time needed to learn how to document and find information needed in daily duties. An explanation for this is that the EMR designs have failed to support care processes that include frequent recordings of vital observations (Stevenson et al., 2016). Consequently, these design shortages may put patient safety at risk due to delayed transfer of information between healthcare professionals and perioperative care settings (Braaf, Riley, & Manias, 2015; Saranto & Kinnunen, 2009).

**Healthcare professionals’ roles in pain management**

To provide pain relief is a humanitarian and ethical issue for healthcare professionals (Ferell, 2005; Kotalik, 2012). The Bioethical Principles of beneficence, non-maleficence, justice, and respect represent social justice and human rights that can support healthcare professionals in their daily clinical decision-making (Kotalik, 2012). Beyond the understanding of the physiologic aspects of pain, the three concepts of relationship, compassion, and respect, derived from Feminist Ethics can be applied to pain management, regardless of whether the care is performed by a man or a woman (Ferell, 2005). The awareness that illness, in this case pain, is not only a physiological event increases the importance of treating the person in pain with compassion and respect, and of taking an interest in the individual’s life experience (Ferell, 2005). The professional caring relationship with patients is determined by the healthcare professionals’ dissimilar responsibilities as well as the individual
interest in patients’ vulnerability when collecting different perspectives of patients’ pain (Martin et al., 2010).

**The collaborative role**

Collaboration between healthcare professionals has been shown to have a positive impact on quality of care (Havens et al., 2010; Martin, Ummenofer, Manser, & Spirig, 2010). The responsibilities held by the different professions mean that all healthcare professionals involved in the care of patients after surgery have an essential role to play in the pain assessment process (Gordon et al., 2005). Inter-professional collaboration have strong associations with information flow and the coordination of care (Havens et al., 2010; Martin et al., 2010), and is suggested to have great opportunities for improvement in postoperative settings (Meissner et al., 2015). Identified factors to enable good inter-professional collaboration are described as both structural (joint nurse/physician practice committees and integrated patient records) and relational (Havens et al., 2010; Martin et al., 2010) Figure 1. From the postoperative context, observations of nurses’ attention to patients’ pain expressions revealed the need for collaborative discussions between different healthcare professions to enhance the understanding of patients in pain (Manias et al., 2004).

![Figure 4](image-url) Modified model of relational coordination (Havens et al., 2010; Martin et al., 2010)
**The individual role**

The knowledge of every healthcare professional’s responsibilities constitutes an important ingredient of well-functioning care, Figure 4 (Havens et al., 2010; Martin et al., 2010). In the Swedish context of postoperative care the physicians described role is to conduct a deeper pain analysis, inform about the nature of pain, its consequences and available treatment alternatives (Table 1). Before surgery, they prescribe chosen peri- and postoperative treatments (Werner & Leden, 2012). Postoperatively, nurses have a key role in the assessment and documentation of patients’ pain. Furthermore, the nurses are responsible for the distribution and evaluation of prescribed treatment, are delegated to give treatment p.r.n and can also initiate use of non-pharmacological methods (Werner, & Leden, 2010), Table 1. The enrolled nurses have completed secondary school education and perform most of the “close patient care”. They provide patient support when patients are in pain and perform repeated postoperative pain assessments in post-surgical settings in Sweden. However, their perspective on the caring for patients in pain is not found in research.
Rationale

International and national guidelines advocate a thorough assessment of patients’ postoperative pain as the basis for decisions on analgesia needs. In the Swedish context, the closest team around patients who have undergone major surgery consists of three healthcare professions; the enrolled nurse, the registered nurse and the physician. In the aim to obtain pain management where the patient is an active participant, the healthcare professionals’ individual roles are equally as important as the coordination between the roles. Cultural norms have a great influence on the different accompanying roles in each profession, on the shaping of clinical care routines and the establishing of individual habits of when and how to assess patients’ postoperative pain. The outcome of these cultural norms, i.e. the degree of attentiveness of healthcare professionals to patients’ symptom experiences are often referred to by patients as their perceptions of the quality of care.

Regardless of the profession, the use of a validated pain scale when requesting and documenting patients’ pain is included in international and national guidelines on pain management. Although these recommendations exist, there is limited research concerning the utility of pain scales in the postoperative clinical context. Also, the understanding of how healthcare professionals choose communication approaches when assessing pain is sparse. Therefore, healthcare professionals’ perceptions and experiences of the use of pain scales, and from their point of view significant features in the process of pain assessment need to be explored.

Furthermore, it has been shown that documentation of patients’ postoperative pain scores is unstructured and hard to find in patients’ medical records, which consequently can delay care interventions and affect patient safety i.e. there can be unwanted effects from under- or over-treatment of pain. Clinical decisions based on patient-reported outcomes are known to improve patients’ involvement in decisions, which means that new motivational strategies are needed to improve clinical use of patients’ self-rated pain. Recent research suggests a simple approach, based on patient’s self-rated pain, to monitor patients’ postoperative pain scores in medical records. Structured monitoring of pain could contribute to increased motivation for clinical use of pain scales and collaborative actions towards patients’ pain in daily surgical activities.
Aim

The overall aim of this thesis is to describe the clinical utility of patients’ self-rated postoperative pain after major surgery from the perspective of healthcare professionals’.

The specific aims of the studies were:

- to describe how healthcare professionals perceive the use of pain scales in postoperative care (I).
- through considering critical incidents to describe care experiences and actions taken by healthcare professionals when assessing postoperative pain (II).
- to examine the clinical applicability of compiled mode and maximum values from the NRS by comparing the correspondence between patient perceptions of pain and pain values from monitoring records over 24 hours (III).
- to (1) determine if a central tendency, median, based on patients’ self-rated pain scores, is a clinically applicable daily measure to describe patients’ postoperative pain on the first day after major surgery, and; to (2) determine the number of self-ratings needed for the calculation of this measure (IV).
Conceptual framework

The concepts of care routines and communication were chosen to place the results in a wider theoretical context when discussing the results that emerged from the four studies. These concepts have a close relation to the clinical context, i.e. the healthcare professionals’ duties on general and orthopaedic surgery wards.

Care routines

The routine as a phenomenon is influenced by cultural norms and values (Becker, 2004). The care culture at workplaces consists of both organizational care routines and healthcare professional’s individual routines and habits (Rytterström, Unosson, & Arman, 2010). Organizational routines are described as contributing to stability, and enable coordination and consistency in an organization, and thus are slow to change (Becker, 2004). Healthcare professionals’ individual care routines and habits are shaped by the specific field in which they occur (Lauzon-Clabo, 2007; Nilsen, Roback, Broström, & Ellström, 2012) and are defined as being a response to the context, i.e. the guidelines describing care routines, values and beliefs in the actual care setting (Nilsen et al., 2012). Existing knowledge of behaviour formation is based on overall social cognitive theories (Nilsen et al., 2012), and behaviour changes are suggested to relate to perceived motivation, intentions, attitudes, and behaviour control (Becker 2004). Cultural and social norms unique to the specific setting can explain why certain pain assessment behaviours are given primacy and whether patients’ pain expressions are believed or not (Harper et al., 2007; Lauzon-Clabo, 2007).

A meaningful care routine has been described to be in harmony with one’s own cultural beliefs and is easy to adapt to (Rytterström et al., 2011). By learning and repeatedly performing routine tasks, they eventually become established habits. Gradually these habits become subconsciously performed (Becker, 2004). Ones established, the habits are beneficial for the individual because they utilize less time and cognitive resources (Becker, 2004) and behaviour consequences are well known (Nilsen et al., 2012). This comfortable “shortcut” in everyday practice can explain why habitual behaviours dominate healthcare
professionals’ daily practice and continue once they are settled, even when motivation is lost (Nilsen et al., 2012) or despite newly presented evidence (Becker, 2004).

**Communication**

The word communication comes from the Latin word “communicatio” which means “make common” (Fossum, 2013). Communication is the information component of interaction where the interaction is a kind of verbal or non-verbal action in which two or more objects have an effect upon one another (Fossum, 2013). Healthcare professionals’ communication is one of the fundamentals for the understanding of patient’s health condition (Arman, Ranheim, Rydenlund, Rytterström, & Rehnsfeldt, 2016). The idea of two-way dialogue means mutually participating to reach a common understanding; however, some asymmetries of influence and participation will always be present (Linell, 2004). The caring dialogue involves listening, engaging, and responding with empathy, being honest and trustworthy. It also encompasses eye contact, body language, tone, voice, and attitude (Waters & Whyte, 2012). To achieve an understanding of patients’ needs from a holistic perspective, three successive phases of communication have been described; orientation (getting to know each other), working (identifying patients’ reactions to their illness) and resolution (preparing the patient to move on) (Peplau, 1997). Additionally, an understanding between healthcare professionals and patients is achievable when the sense of the action becomes evident for both partners and goals are defined (Sieger, Fritz, & Them, 2012).

In healthcare, information transfer typically flows in one direction from the provider to the recipient (Lee & Garvin, 2003). The movement from information transfer to information exchange and understanding-orientated interactions, i.e. the two-way dialogue, is continuously problematized (Lee & Garvin, 2003; Liu, Gerdtz, & Manias, 2016). Reasonable causes of the dominating use of information transfer are healthcare professionals’ and patients’ different perspectives, along with unavoidable asymmetries in health conditions, medical knowledge and accompanying discourse, and participation status (Linell & Luckmann, 1991). How active the patients become in decisions (Chaboyer et al., 2016) and how they will perceive the quality of care (Schwenkglenks et al., 2014) are shown to be determined by the perceived
quality of the communication. Equal communication, where an agreement springs from a dialogue is however, still not obvious in care settings. Liu et al. (2016) have shown that vocabulary reflects the complex power relations between patients and healthcare professionals, and among healthcare professionals’ themselves. Healthcare professionals’ language in acute settings is still authoritative and instructive, while patients’ discourse is polite. In postoperative care, targeted questions have been shown to be most common when assessing patients’ pain (Manias et al., 2004; Schafheutle et al., 2004).

Among healthcare professionals, nurses have historically had a subservient role to physicians, which has given the physicians the power (Foronda, Mac Williams, & Mc Arthur, 2016). Identified frustrations in inter-professional communication are described as characterized by not only power relations but also the differences in how nurses and physicians are trained (Foronda et al., 2016). The differences in communication styles may generally be caused by the nurses’ focus on the holistic perspective in patients’ health condition while the physicians’ focus is on the objective structured essence (Foronda et al., 2016). However, these cultural professional differences can, if they are taken into consideration, have a broadening impact on perspectives in care and can benefit safe patient care (Martin et al., 2010; Foronda et al., 2016).
Methods

Design

To achieve the overall aim of the thesis, different qualitative and quantitative methods were used. The chosen explorative designs provided approaches to: find variations in the studied phenomena of healthcare professionals’ utility of patients’ self-reported pain (I), and to find variations in healthcare professionals’ experiences and actions when assessing postoperative pain (II). Furthermore, a cross-sectional design was used to study the agreement between two measures of patients’ self-rated pain (III). This was also the aim of the repeated measure design in study IV. An overview of the design, setting, participants, data collection and data analysis of study I-IV is presented in Table 2.

Table 2: Overview of the design, setting, participants, data collection and analyses (I-IV)

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Setting</th>
<th>Participants</th>
<th>Data collection</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Explorative</td>
<td>one university three county hospitals</td>
<td>25 healthcare professionals</td>
<td>semi-structured interviews</td>
<td>Phenomenographic approach</td>
</tr>
<tr>
<td>II</td>
<td>Explorative</td>
<td>one university three county hospitals</td>
<td>24 healthcare professionals</td>
<td>semi-structured interviews</td>
<td>Critical Incident Technique</td>
</tr>
<tr>
<td>III</td>
<td>Cross-sectional</td>
<td>one county hospital</td>
<td>157 patients</td>
<td>questionnaire monitoring records</td>
<td>Spearman correlations</td>
</tr>
<tr>
<td>IV</td>
<td>Repeated measure</td>
<td>three county hospitals</td>
<td>479 patients</td>
<td>questionnaire study protocol</td>
<td>Spearman correlations Svensson method, free software program</td>
</tr>
</tbody>
</table>
Setting

The data was collected in the context of orthopaedic and surgical wards at one university and three county hospitals in the south of Sweden. The catchment areas were both rural and urban with 900,000 inhabitants. The number of beds in the four included hospitals varied between 300 and 600. Three of the hospitals had pain assessment routines with varying details, according to the guidelines of Allvin & Brantberg (2014). At the fourth hospital, there were healthcare professionals who used pain scales when assessing pain despite the lack of written routines.

Participants

Studies I and II

Healthcare professionals with knowledge of the area i.e. clinical experience of pain scales in postoperative, care were continuously recruited by research nurses at the included units. The selection was based on age, sex, healthcare profession and experience of orthopaedic or general surgery. In study I, a purposeful sample of 25 healthcare professionals was selected and included between June and November 2012. In study II, a strategic sample of 24 healthcare professionals was selected during a period of nine months between December 2013 and October 2014. Socio-demographic data are shown in Table 3.

Table 3: Socio-demographic data of healthcare professionals (I, II)

<table>
<thead>
<tr>
<th>Category</th>
<th>Study I</th>
<th>Study II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=25</td>
<td>N=24</td>
</tr>
<tr>
<td>Age; years M/[range]</td>
<td>41[23-63]</td>
<td>39[24-60]</td>
</tr>
<tr>
<td>Sex; male/female</td>
<td>6/19</td>
<td>7/17</td>
</tr>
<tr>
<td>Profession; enrolled nurses/nurses/physicians</td>
<td>6/15/4</td>
<td>7/11/6</td>
</tr>
<tr>
<td>Years of experience in postoperative care;</td>
<td>8/6/11</td>
<td>11/4/9</td>
</tr>
<tr>
<td>1-5/6-10/&gt;10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment; general surgery/orthopaedic</td>
<td>8/17</td>
<td>12/12</td>
</tr>
</tbody>
</table>
Studies III and IV

The convenience sampling consisted of the first consecutive patients undergoing major surgery who were expected to stay in hospital care for ≥2 days. Major surgery is a surgical procedure that often requires general anaesthesia, is extensive, involves removal of organs and requires postoperative hospital care (Encyclopedia, 2017). Inclusion criteria were patients 18 years or older, undergoing scheduled major general or orthopaedic surgery, expected to have a length of stay ≥2 days, orientated to time and environment, and able to understand both spoken and written Swedish language. The exclusion criterion was transfer to intensive care postoperatively. In study III, 190 patients were asked to participate, of whom 171 were enrolled between April and October in 2009. A total of 157 patients (54.8% male, mean age 63 years) completed the first study day i.e. postoperative day 2. Orthopaedic patients (64.3%) dominated the group. Missing data varied from 0-5%. A total of 71.9% of the patients who had completed the questions had ≥4 monitored pain ratings on postoperative day 1. In study IV, 582 patients were asked to participate, of whom 541 were enrolled from October 2012 until January 2015. A total of 479 patients (55.9% male, mean age 65.2 years) completed the study. Orthopaedic patients (60.3%) dominated the group. Patients’ self-rated pain was to be registered at rest and during activity in a study protocol (Appendix 2). The proportion of patients who had their pain scores registered ≥4 times was 81.6% at rest and 75.2 % during activity, and ≥6 times 29.0% at rest and 22.7% during activity. No patient had their scores registered more than nine times. Retrospective average pain at rest and during activity was reported by 97.9% and 97.3% patients respectively. Socio-demographic characteristics and clinical data are shown in Table 4.
### Table 4: Socio-demographic characteristics and clinical data of patients (III and IV)

<table>
<thead>
<tr>
<th>Category</th>
<th>III n=157</th>
<th>IV n=479</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery; general surgery/orthopaedic</td>
<td>56/101</td>
<td>190/289</td>
</tr>
<tr>
<td>Age; years m/range</td>
<td>63.3[21-88]</td>
<td>65.2[22-93]</td>
</tr>
<tr>
<td>Sex; male/female, n (%)</td>
<td>86(54.8)/71(45.2)</td>
<td>268(55.9)/211(44.1)</td>
</tr>
<tr>
<td>Country of birth; Sweden/other, n (%)</td>
<td>-</td>
<td>451(94.2)/27(5.6)</td>
</tr>
<tr>
<td>Preoperative pain:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 month prior to surgery, n (%)</td>
<td>85(54.1)</td>
<td>-</td>
</tr>
<tr>
<td>Daily intake of analgesia&lt;sup&gt;b&lt;/sup&gt;:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 months prior to surgery, n (%)</td>
<td>81(51.6)</td>
<td>210(44.0)</td>
</tr>
<tr>
<td>ASA&lt;sup&gt;a&lt;/sup&gt; I-II</td>
<td>-</td>
<td>407(85.0)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>elementary/ secondary school/ university, n (%)</td>
<td>-</td>
<td>197(41.1)/166(34.7) / 112(23.4)</td>
</tr>
<tr>
<td>Type of surgery, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urology</td>
<td>16(10.2)</td>
<td>93(19.4)</td>
</tr>
<tr>
<td>Abdominal</td>
<td>30(19.1)</td>
<td>89(18.6)</td>
</tr>
<tr>
<td>Vascular</td>
<td>5(3.2)</td>
<td>6(1.3)</td>
</tr>
<tr>
<td>Other general surgery</td>
<td>5(3.2)</td>
<td>2(0.4)</td>
</tr>
<tr>
<td>Knee replacement</td>
<td>45(28.7)</td>
<td>76(15.9)</td>
</tr>
<tr>
<td>Hip replacement</td>
<td>19(12.1)</td>
<td>149(31.1)</td>
</tr>
<tr>
<td>Neck and back</td>
<td>20(12.7)</td>
<td>49(10.2)</td>
</tr>
<tr>
<td>Other orthopaedic</td>
<td>17(10.8)</td>
<td>15(3.1)</td>
</tr>
<tr>
<td>Anaesthesia:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>regional/ sedation/ general, n (%)</td>
<td>-</td>
<td>245(51.1)/167(34.9) / 267(55.7)</td>
</tr>
<tr>
<td>Postoperative analgesia:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>opioids&lt;sup&gt;c&lt;/sup&gt;/epidurals, n (%)</td>
<td>-</td>
<td>362(77.5)/120(25.5)</td>
</tr>
</tbody>
</table>

<sup>a</sup>ASA, American Society of Anesthesiologists physical status classification, <sup>b</sup>Non-opioids: paracetamol, NSAIDs, opioids: codeine, tramadol, morphine, oxycodone, fentanyl, buprenorfin, <sup>c</sup>Opioids: tramadol, morphine, oxycodone.

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### Data collection

#### Qualitative data

In studies I and II, data consisted of interviews. The semi-structured interviews were designed in line with the traditions of the chosen qualitative approaches (Marton & Booth, 1997; Bradbury-Jones & Tranter, 2008). Arrangement with clinic managers allowed the participants to leave their work responsibilities...
during the interviews, and gave access to quiet rooms at their place of work. The interviews started with an informal chat where the importance of every person’s contribution, regardless of profession, was underlined. Furthermore, the significance of concrete self-perceived experiences was emphasized.

In study I, the interview guide (Table 5) was inspired by the pain assessment recommendations from the American Pain Society (Gordon et al., 2005). Reminders that perceptions were asked for and probing questions such as “How/What do you mean by that?”, “Could you explain more?” “Could you tell me how?” were used when needed. The interviews lasted between 20 and 40 minutes, were audiotaped and transcribed verbatim. The transcribed text comprised of 242 double-spaced pages (A4).

<table>
<thead>
<tr>
<th>Table 5: Interview guide used in the data collection with healthcare professionals (N=25) (I)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interview guide (I)</strong></td>
</tr>
<tr>
<td>How do you perceive the importance of assessment with a pain scale during the first postoperative days?</td>
</tr>
<tr>
<td>How do you perceive your responsibility/role in pain assessment?</td>
</tr>
<tr>
<td>How do you perceive the patients’ responsibility/role in pain assessment?</td>
</tr>
<tr>
<td>How do you perceive pain assessment in relation to action/pain treatment?</td>
</tr>
</tbody>
</table>

In study II, the interview guide (Table 6) was designed to elicit both positive and negative perspectives on the chosen incident, which was in line with the existing nursing research culture when using the Critical Incident Technique (CIT) (Bradbury-Jones & Tranter, 2008). Probing questions were used such as: “Can you describe more about what you or the patient said or did?” “Was there something affecting the assessment situation?”, “Why was this critical incident important to you?” The interviews lasted between 30 and 70 minutes, were audiotaped, and transcribed verbatim. The transcribed text comprised 535 double-spaced A4 pages.
Table 6: Interview guide used in the data collection with healthcare professionals (N=24) (II)

<table>
<thead>
<tr>
<th>Interview guide (II)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe an incident when a patient was in pain and you assessed the pain.</td>
<td></td>
</tr>
<tr>
<td>What contributed to your understanding of the patient’s pain?</td>
<td></td>
</tr>
<tr>
<td>How was the situation handled?</td>
<td></td>
</tr>
<tr>
<td>Did the event result in something positive or negative for the patient’s pain?</td>
<td></td>
</tr>
</tbody>
</table>

**Quantitative data**

In studies III and IV the socio-demographic and clinical data was collected by research nurses. The healthcare professionals who were responsible for the included patients’ care were instructed on postoperative day 1 to ask for and monitor the included patients’ self-rated pain (NRS) every fourth hour, when breakthrough pain occurred, and at reassessments (Appendix 2). If the patient was asleep, no assessment of pain was made. Additionally, questionnaires (Appendix 1-2) were delivered to the included patients on the morning of postoperative day 2, Table 7.

Table 7: Data collection of patients’ NRS self-rated pain scores and patients’ retrospective self-rated pain (III, IV)

<table>
<thead>
<tr>
<th>Data collection (III,IV)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>III (n=157)</td>
<td>Measure I: repeated self-rated pain scores (NRS 0-10), collected on postoperative day 1</td>
</tr>
<tr>
<td></td>
<td>Measure II: retrospective self-rated pain (0-3, 4-6, 7-10) from postoperative day 1; collected day 2</td>
</tr>
<tr>
<td>IV (n=479)</td>
<td>Measure I: repeated self-rated pain scores at rest and during activity, collected postoperative day 1</td>
</tr>
<tr>
<td></td>
<td>Measure II: retrospective pain intensity from postoperative day 1; average pain scores at rest and during activity, collected day 2</td>
</tr>
</tbody>
</table>
**Self-reported pain**

In studies III and IV, the patients reported their postoperative pain experiences with the NRS, a pain-scale that is included in international (Gordon et al., 2005) and national (Brantberg & Allvin, 2016) guidelines of pain assessment. The NRS has been tested regarding construct validity and psychometric properties (Williamson & Hoggart, 2005) and is the scale preferred by most adults regardless of age and culture. It is thereby considered valid in most settings (Gagliese, Weizblit, Ellis, & Chan, 2005; Hjermstad et al., 2011). In line with the local guidelines at the included wards, the NRS with the anchors 0=No pain and 10=Worst possible pain was used.

**Questionnaires**

A questionnaire (Appendix 1) was constructed for study III. In this thesis, the results from three questions regarding retrospective perceptions of intensity and duration of pain were included. The NRS was dichotomized into the three groups of pain: mild pain (0-3), moderate pain (4-6) and severe pain (7-10), which were seen in studies measuring pain (Melotti et al., 2005; Zelman, Dukes, Brandenburg, Bostrom, & Gore, 2005; Couceiro, Valença, Lima, de Menezes, & Raposo, 2009). In the created groups; NRS 0-3, 4-6 and 7-10, the three alternatives of duration of pain; >1 hour, <1hour or no pain were asked for. The questions were based on guidelines (APS, 1995; Gordon et al., 2005) and literature of relevance (Jensen & Karoly, 2001; Williamsson & Hoggart, 2005). Face and content validity were assessed by the research group, patients and different professionals with experience of postoperative care. The questionnaire (Appendix 2) from study III was further developed in study IV by the research team. Statisticians involved in the construction of the instruments, mainly assessed analysis possibilities. In this thesis, the results from two questions regarding retrospective perceptions of pain intensity at rest and during activity were used in study IV. The remaining questions in Appendices I and II were used in other studies about patients’ pain and recovery; Postoperative pain assessment and impact on early physical recovery, from the patients’ perspective (Eriksson et al., 2017).
Data analysis

Qualitative (I)

Perceptions of the surrounding world i.e. how various aspects of the phenomenon (pain assessment with one-dimensional pain scales) were understood by healthcare professionals were explored with a phenomenographic approach. This approach differentiates between the first order perspectives i.e. the real facts that can be observed, and the second order perspective i.e. how something is perceived or understood (Marton & Both, 1997). The aim is to explore and understand the nature of an individual’s different understandings of the studied phenomena (Sjöström & Dahlgren, 2002). Data analysis was performed in accordance with the phenomenographic tradition (Sjöström & Dahlgren, 2002) (Table 8). The underlying structure of variance i.e. the second order perspective was sought in collected data (Marton & Both, 1997). The corresponding statements were condensed and grouped into 13 descriptive perceptions. After thorough discussions, the perceptions were compared regarding similarities and differences and were grouped into different distinct perceptions. The perceptions that related to each other formed the descriptive categories. Lastly, the structure of the phenomenographic outcome space was investigated to identify the internal hierarchical relations between the emerged categories (Larsson & Holmström, 2007).
Table 8: The phenomenographic data analysis approach according to Sjöström & Dahlgren, 2002 and Larsson & Holmström, 2007, (I)

<table>
<thead>
<tr>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Familiarization.</strong> Collected data was read several times to obtain a sense of the whole.</td>
</tr>
<tr>
<td><strong>Compilation.</strong> A total of 420 significant statements corresponding to the aim of this study were identified.</td>
</tr>
<tr>
<td><strong>Condensation.</strong> Statements were reduced.</td>
</tr>
<tr>
<td><strong>Grouping.</strong> Groupings into 17 pre-perceptions were made.</td>
</tr>
<tr>
<td><strong>Comparison.</strong> The included statements in the pre-perceptions were thoughtfully read to ensure similarities within the perception and differences between the perceptions.</td>
</tr>
<tr>
<td><strong>Naming.</strong> Perceptions and the emerged descriptive categories were named with adequate levels of abstraction.</td>
</tr>
<tr>
<td><strong>Contrastive comparison.</strong> The obtained descriptive perceptions and categories were compared in terms of similarities and differences. Four descriptive categories and 13 perceptions were established.</td>
</tr>
<tr>
<td><strong>Hierarchical relations.</strong> Investigation of the hierarchical relations between the four categories was carried out.</td>
</tr>
</tbody>
</table>

**Qualitative (II)**

Collected positive and negative critical incidents were explored with the CIT. A critical incident describes a retrospectively significant experience, in this study the assessment of a patient in pain followed by a human behaviour, i.e. actions taken to understand a patient’s pain, that is crucial for the outcome of the described incident (Flanagan, 1954). The context, i.e., information about locality, involved persons and their activities’, in which the incident occurred is of importance as the aim of the CIT approach is to provide behavioural solutions to practical and clinical problems (Flanagan, 1954; Bradbury-Jones & Tranter, 2008). The identified incidents were classified either as a care experience or a care action. These two groups were analysed separately, according to the framework of Fridlund, Henricsson, & Mårtensson, (2017). Care experiences represented critical incidents affecting the pain assessment situation, while care actions represented actions taken to understand patients’ postoperative pain. Finally, the distinct separated but related subcategories were grouped into descriptive categories and main areas (Table 9).
Table 9: The CIT approach data analysis according to Fridlund et al., (2017), (II)

<table>
<thead>
<tr>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis initially involved familiarization with the 24 transcribed interviews of 535 double-spaced A4 pages by reading them several times.</td>
</tr>
<tr>
<td>486 critical incidents were identified and defined either as a care experience (205) or a care action (281).</td>
</tr>
<tr>
<td>Two groups of descriptive subcategories were formed and further analysed separately; 14 care experiences and 19 care actions.</td>
</tr>
<tr>
<td>Four categories of care experiences and six care actions emerged and were finally abstracted to main areas; two care experiences and three care actions.</td>
</tr>
<tr>
<td>Naming of the categories reflected the distinct differences of the categories and the level of abstraction to emphasize their essence.</td>
</tr>
</tbody>
</table>

Quantitative methods

In study III, descriptive statistics described demographic and clinical data. The agreement of individual calculated mode and maximum measures from the monitoring records versus the retrospective stated pain (>1 hour, < 1 hour, no pain in the created groups of NRS 0-3, 4-6, 7-10) was analysed by Kappa statistics, measuring inter-rater agreement of qualitative items. Due to the low frequency of patients who rated NRS 7-10, the three response alternatives (NRS 0-3, 4-6, 7-10) were dichotomized into two groups, those with an NRS score of 0-3 and those with score of 4-10, where 0-3 is considered mild- and 4-10 moderate to severe pain. IBM SPSS Statistics 21 (IBM Corp, Armonk, NY) was used for the analyses of the data.

In study IV, descriptive statistics were used to describe socio-demographic and clinical data. The prevalence of pre- and postoperative pain, day 1, was reported as median and quartiles. Non-parametric tests (Mann-Whitney U test, Wilcoxon Rank Test) were used to test for differences of pain between the groups of general- and orthopedic surgery. To determine the associations between the individual calculated mode and median scores from measure I and retrospective self-rated average pain scores from measure II (Table 7), Spearman rank correlations were used based on four to nine self-rated pain scores from measure I. Created groups of patients who had exact 4, 4-9, 5-9 and 6-9 recorded ratings were analysed separately. Patients who had fewer than four ratings were deemed inappropriate to include in statistical analyses and were
therefore excluded. IBM SPSS Statistics (IBM Corp, Armonk, NY) was used for the analyses of the data. To determine patterns for change between the measures, analyses to measure pairwise agreements, systematic disagreements and individual variability separately were performed with the Svensson’ Method in a free software program (Avdic & Svensson, 2010).
Ethical considerations

In this thesis, ethical guidelines based on the Declaration of Helsinki were followed. Approval from the Regional Ethical Review Board in Linköping, Sweden (No. M249-09 and No 2012/40-31) was obtained to perform the four studies. Researcher guidance using the four main principles, respect for autonomy, non-maleficence, beneficence and the principle of justice was deemed applicable in this thesis (Northern Nurses Federation 2003; The World Medical Association [WMA], 2013).

*Respect for autonomy*

Patients who were not able to comprehend information were not included. This is an ethical dilemma as their needs are difficult to identify. However, a deeper knowledge of different communication approaches in assessments of pain can be transferable to this group of patients. Voluntariness was highlighted during the whole inclusion process and at collection of data. To avoid participants’ dependence on the researcher, the researcher did not collect data when a care (Studies III, IV) or close professional (Study I, II) relationship existed.

*Non-maleficence - Beneficence*

The risk of harm was deemed small. Data were reported in such a manner that no individual could be identified. The benefits of obtaining a deeper knowledge of how to assess patients’ postoperative pain were considered to weigh up potential risks. Included patients expressed a sincere interest in contributing to a deeper knowledge as future patients can benefit from the increased understanding of postoperative pain experiences. Furthermore, the interviewed healthcare professionals described positive effects of being interviewed, which is consistent with other researchers’ experiences (Doody & Noonan, 2013). However, it is known that interviews with healthcare professionals may reveal bad performances that could cause feelings of failure (Doody & Noonan, 2013). As the interviewer could foresee this dilemma the interviewer consciously remained neutral to given descriptions and non-verbal behaviour.
The principle of justice

Persons eligible for the four studies were asked for participation regardless of ethnicity, sex, or socio-economic status. Participating patients in study III and IV were more likely to have opportunities to express their pain during their first postoperative days. This was related to the study protocol where healthcare professionals were asked to assess and document patients’ self-rated pain frequently. The reporting of results in peer-reviewed journals and the spreading of results at national and international conferences justify the involvement of patients and healthcare professionals.
Results

Perceptions of the utility of pain scales (I)

In summary, healthcare professionals’ perception of the utility of pain scales was that the scales facilitated the understanding and treatment of postoperative pain. Thus, pain assessments demanded a multi-dimensional communication approach and were affected by work situations (Table 10).

Pain scales facilitated the understanding of patients’ pain. Patients’ monitored pain scores visualized pain severity trajectories and served as a common language. Individualized intervals of assessing pain made it possible to find patients who were in pain; moreover, pain in different situations became known. Pain scales facilitated treatment of pain by healthcare professionals being “one step ahead” in controlling pain. Furthermore, repeated pain scores were useful when choosing pain-relieving strategies. The effort to keep patients’ pain scores low, with respect to side effects and ability to mobilize, facilitated patient comfort, and enabled patients to return home. The understanding of patients’ self-rated pain however demanded a multi-dimensional approach. Dialogues were used to reach mutual understanding of the meaning of patient’s pain scores. Furthermore, observations of behaviours and vital signs were needed to avoid neglecting patients who did not want to talk about their pain.

The utility of pain scales was affected by work situations. The healthcare professionals, who considered themselves to possess knowledge of pain scales, described spending time explaining and motivating patients’ pain-scoring. They were also aware of the risk of adding their own values to patients’ ratings, and of patients comparing their ratings with those of others. Encouragement from the ward management and combined pain assessments with other care routines constituted stimulating factors, while established habits of excluding pain scales and poorly designed EMR were perceived as barriers.
Table 10: Healthcare professionals’ perceptions of the use of pain scales in postoperative pain assessments, (I)

<table>
<thead>
<tr>
<th>Descriptive categories</th>
<th>Perceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of pain scales facilitated the understanding of patients’ pain</td>
<td>Pain scales facilitated the discovery of pain</td>
</tr>
<tr>
<td></td>
<td>Pain scales visualized the pain progress</td>
</tr>
<tr>
<td></td>
<td>Pain scales facilitated handover between healthcare professionals</td>
</tr>
<tr>
<td>The use of pain scales facilitated treatment of pain</td>
<td>Pain scales facilitated prevention of pain</td>
</tr>
<tr>
<td></td>
<td>Pain scales facilitated choice of pain treatment</td>
</tr>
<tr>
<td></td>
<td>Pain scales facilitated evaluation of pain treatment</td>
</tr>
<tr>
<td>The use of pain scales demanded a multi-dimensional approach</td>
<td>Pain scales demanded additional assurance of patients’ understanding</td>
</tr>
<tr>
<td></td>
<td>Pain scale interpretation demanded additional dialogue</td>
</tr>
<tr>
<td></td>
<td>Pain scale interpretation demanded additional observations</td>
</tr>
<tr>
<td>The use of pain scales was affected by work situations</td>
<td>Pain scale usage was affected by healthcare professionals’ knowledge</td>
</tr>
<tr>
<td></td>
<td>Pain scale usage was affected by habits of healthcare professionals</td>
</tr>
<tr>
<td></td>
<td>Pain scale usage was affected by management</td>
</tr>
<tr>
<td></td>
<td>Pain scale usage was affected by prioritizing of tasks</td>
</tr>
</tbody>
</table>

The internal relationship between the descriptive categories was of a logical hierarchical form, as illustrated in Figure 6. The perception that pain scales facilitate treatment of pain is dependent on the perception that pain scales facilitate the understanding of patients’ pain experience. To use the pain scales properly, several factors (Table 10) were needed concerning the work situation. Furthermore, the insight of the additional multi-dimensional communication approach, tailored to the patients’ communication abilities, determined the outcome of the understanding of pain, i.e. facilitated pain treatment decisions.
Care experiences when assessing pain (II)

Healthcare professionals’ descriptions of their care experiences revealed the importance of the understanding of patients’ wide variation of pain expressions and communication ability. Healthcare professionals’ clinical competence and work conditions determined whether the understanding of patients’ pain expressions was achieved (Table 9).

*Patients’ communication abilities* affected healthcare professionals understanding of patients’ pain. Detailed descriptions that matched behaviours facilitated healthcare professionals’ assessment, while various patient-related barriers, i.e. mismatching pain scores with observed behaviours, patients’ pre- or post-surgery health conditions, language deficiencies, patients’ unwillingness to report pain hindered efficient communication.

*Healthcare resources* i.e. healthcare professionals’ clinical competence and working conditions determined the level of healthcare professionals’ performance in pain assessments. Clinical competence contributed to the skills of sensing patients’ pain during care, while clinical decisions became troublesome when patients responded differently to the majority and when experiences of effects from analgesia were restricting. High turnover of
healthcare professionals put patients at risk for having to repeat their history of pain, while continuity of care increased knowledge of patients’ pain (Table 11).

Table 11: Healthcare professionals’ experiences when assessing postoperative pain, (II)

<table>
<thead>
<tr>
<th>Main areas</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients’ communication abilities</td>
<td>Patients’ pain expressions</td>
</tr>
<tr>
<td></td>
<td>Patients’ barriers to pain expressions</td>
</tr>
<tr>
<td>Healthcare resources</td>
<td>Healthcare professionals’ clinical competence</td>
</tr>
<tr>
<td></td>
<td>Healthcare professionals’ working conditions</td>
</tr>
</tbody>
</table>

**Care actions when assessing pain (II)**

Healthcare professionals described the actions of gathering facts, adapting to patients’ communication abilities, and the utilizing of healthcare resources (Table 12).

*Information* on patients’ pain was normally *collected* by asking questions while observing pain expressions. Whether the observations were made with or without conscious reflections, patient’s pain at rest and during activity was the basis for clinical decisions. Pain qualities were exclusively investigated when pain was unexpected. Ideally, patients’ narratives were listened to and confirmed, but limited time could necessitate leading questions. The given time frames normally resulted in patient’s previous experiences being given less attention. Healthcare professionals adapted to patients’ communication abilities when assessing pain, which meant that their actions were aimed at getting to know their patients’ personalities and their ability to use pain scales. If patients’ self-rated pain scores were not understandable, their understanding of the NRS scoring was ascertained. Healthcare professionals’ actions to ensure their understanding of patients’ pain expressions were associated with the importance of safe administration of analgesia. Patients who were perceived to have unintelligible pain expressions were offered analgesia and observed either in agreement or unknowingly.

*The use of surrounding healthcare resources* was described as increasing the quality of pain assessments in difficult situations. A well-functioning collaboration between internal resources i.e. enrolled nurses, nurses and
physicians normally fulfilled significant needs. When usual postoperative analgesia was insufficient, acute pain specialists contributed time and knowledge. Also, relatives, physiotherapists and social workers were asked to add their perspectives on patients’ pain.

Table 12: Healthcare professionals’ actions when assessing postoperative pain, (II)

<table>
<thead>
<tr>
<th>Main areas</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare professionals gather facts about patients’</td>
<td>Healthcare professionals gather information from patients’ pain expressions</td>
</tr>
<tr>
<td>pain manifestations</td>
<td>Health care professionals gather information about patients’ pain treatment</td>
</tr>
<tr>
<td>Healthcare professionals’ adaptations to patients’</td>
<td>Healthcare professionals ensure patients understand pain assessments</td>
</tr>
<tr>
<td>communication abilities</td>
<td>Healthcare professionals ensure they understand patients’ pain expressions</td>
</tr>
<tr>
<td>Healthcare professionals use healthcare resources</td>
<td>Healthcare professionals collaborate</td>
</tr>
<tr>
<td></td>
<td>Healthcare professionals consult external care resources</td>
</tr>
</tbody>
</table>

Prevalence of pain (III, IV)

In study III, when the NRS was dichotomized into NRS 0-3 (mild pain) and 7-10 (moderate- to severe pain), 43% of the patients had experienced average (mode) moderate to severe pain. Maximum moderate to severe pain was experienced by 73% of the patients (III) and by 74% during activity (IV). In study IV, the whole range of the NRS was used. The proportions of patients who experienced average (mode) of moderate to severe pain at rest were 22% and on activity 57%.

The orthopaedic patients were found to experience more pain before and after surgery compared to the general surgical patients (IV) (Table 13), while the orthopaedic group experienced significantly lower postoperative pain than preoperatively, Wilcoxon Rank Test \( p < .001 \). Furthermore, patients’ pain at rest was significantly lower than during activity in the general surgery group and the orthopaedic group, Wilcoxon Rank Test \( p < .001 \).
Table 13: Pre- and postoperative pain for the total sample and the general and orthopaedic surgery groups, NRS md, (q1-q3) and retrospective average pain (q1-q3), (IV)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Total N=479</th>
<th>General surgery n=190</th>
<th>Orthopaedic surgery n=289</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>n</td>
<td>Measure I</td>
<td>Measure II</td>
</tr>
<tr>
<td>Prehospital pain at rest md (q1-q3)</td>
<td>474</td>
<td>2(0-5)</td>
<td>-</td>
</tr>
<tr>
<td>Prehospital pain during activity md (q1-q3)</td>
<td>469</td>
<td>6(1-8)</td>
<td>-</td>
</tr>
<tr>
<td>Postoperative pain at rest md (q1-q3)</td>
<td>469</td>
<td>2(0-4)</td>
<td>3(2-5)&lt;sup&gt;***&lt;/sup&gt;</td>
</tr>
<tr>
<td>Postoperative pain during activity md (q1-q3)</td>
<td>466</td>
<td>4(3-7)</td>
<td>5(3-7)&lt;sup&gt;***&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>Mann-Whitney U test, <sup>***</sup> = <.001, Wilcoxon Rank Test
The clinical applicability of daily summarized measures based on patients’ self-reported pain (III, IV)

Alternative daily measures, based on patients’ self-rated pain after major general and orthopaedic surgery with the NRS were explored in studies III and IV. The calculation of average measures from patients’ self-rated pain showed acceptable reliability when the whole range of the scale was used (III, IV). When the scale was dichotomized into the groups of 0-3 and 4-10, reliability increased (III).

The mode (III, IV) and maximum measures (III)

The results (III) demonstrated high reliability for daily mode and maximum measures, based on ≥4 pain scores, of postoperative pain when the created groups of NRS 0-3, 4-6 and 7-10 were dichotomized into the groups of 0-3 and 4-10. Patients reported pain scores (measure I), showed a strong correlation versus their retrospective reported pain on postoperative day 1 (measure II); mode: $r_s=.95, (p<.001)$ and maximum: $r_s=.95 (p<.001)$. Correlational strength decreased when the NRS groups of 0-3, 4-6 and 7-10 were analysed, mode: $r_s=.37$, maximum: $r_s=.53$.

In study IV the measures were changed to pain at rest and during activity. Additional analyses of data from the sample in study IV showed that the mode measures from postoperative day 1, had acceptable reliability when the full range of the NRS was used. Rank correlations for the calculated individual mode scores (measure I), based on four ratings, versus retrospective average reported pain (measure II) were, $r_s=.51 (p <.001)$ at rest and $r_s=.57 (p <.001)$ during activity. A “trend” towards increased correlational strength up to $r_s=.61 (p <.001)$ at rest and $r_s=.60 (p <.001)$ during activity was seen with strengthened with increased numbers of ratings (Table 14).

The median measures at rest and during activity (Study IV)

The results demonstrated acceptable reliability for the median measures at rest and during activity the day after surgery when the full range of the NRS was
used. Rank correlations for the calculated individual median scores (measure I) versus retrospective average reported pain (measure II) showed the same pattern as for the mode measure i.e. a “trend” towards increased correlational strength with increased number of pain ratings (Table 14). The differences between measures I and II at rest were due to patients significantly higher reported retrospective average pain compared to the median pain that was calculated from the pain ratings “right now” in measures I and IV (Table 15).

### Table 14: Spearman rank correlations between individual average scores (Mode and Md) from measure I, versus retrospective average pain from measure II, pain at rest and during activity (IV)

<table>
<thead>
<tr>
<th>Number of pain ratings</th>
<th>4&lt;sup&gt;a&lt;/sup&gt;</th>
<th>4-9&lt;sup&gt;b&lt;/sup&gt;</th>
<th>5-9&lt;sup&gt;c&lt;/sup&gt;</th>
<th>6-9&lt;sup&gt;d&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (Mode) pain at rest</td>
<td>.51 **</td>
<td>.60 **</td>
<td>.60 **</td>
<td>.61 **</td>
</tr>
<tr>
<td>Average (Mode) pain on activity</td>
<td>.57 **</td>
<td>.61 **</td>
<td>.62 **</td>
<td>.60 **</td>
</tr>
<tr>
<td>Average (Md) pain at rest</td>
<td>.61 **</td>
<td>.64 **</td>
<td>.67 **</td>
<td>.68 **</td>
</tr>
<tr>
<td>Average (Md) pain on activity</td>
<td>.57 **</td>
<td>.64 **</td>
<td>.66 **</td>
<td>.62 **</td>
</tr>
</tbody>
</table>

Patients with: <sup>a</sup> exactly four, <sup>b</sup> four to nine, <sup>c</sup> five to nine, <sup>d</sup> six to nine self-ratings of pain.

The Svensson’ method (IV) was used to further explain patterns of change between the two measures (Table 15). Percentage of agreement was 27% at rest and 26% during activity. The systematic group changes (RP) at rest were significant and demonstrated higher recalled pain scores in measure II at rest compared with the individually summarized medians from postoperative day 1, measure I. No concentration (RC) to a certain score on the NRS was seen and the individual variation (RRV) 0.18 was within the expected outcome. During activity, there was no significant systematic group change (RP) or concentration (RC) to a certain NRS score. The individual variation (RRV) 0.23 was close to the expected outcome of 0.20. These results suggest that both group and individual variations in reported pain caused disagreements between the two measures at rest while individual variations were the main source of disagreements during activity.
Table 15: The Svensson analyses of patterns of change between measures I and II (IV)

<table>
<thead>
<tr>
<th></th>
<th>Percentage Agreement, PA</th>
<th>Relative Position, RP (95% CI)</th>
<th>Relative Concentration, RC (95% CI)</th>
<th>Relative Rank Variation, RRV (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain at rest</td>
<td>27</td>
<td>0.18</td>
<td>0.06</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CI: 0.13–0.24</td>
<td>CI: -0.01–0.13</td>
<td>CI: 0.13–0.22</td>
</tr>
<tr>
<td>Pain on activity</td>
<td>26</td>
<td>-0.09</td>
<td>-0.06</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CI: -0.14–0.05</td>
<td>CI: -0.14–0.03</td>
<td>CI: 0.16–0.29</td>
</tr>
</tbody>
</table>

The patterns of change are visualized in Figures 7a and b. The staples representing proportions of patients (measures I and II) for each score on the NRS show that the majority of patients who reported no pain to the nurses, with a median of NRS 0, retrospectively reported higher average pain scores. Additionally, the proportion of patients who obtained high pain scores, median of 7-10, was lower than was retrospectively reported.
Figure 7: Proportion of patients with average pain, NRS 0-10 in measures I and II, a: at rest and b: on activity.
Discussion

Methodological aspects

This thesis involves the collection of ordinal data (NRS 0-10) and data from semi-structured interviews with two different philosophical approaches. Whether results are verified as the truth depends on how truth is defined. In the shift from the strict positivism paradigm to the post positivism paradigm, which is still valid, the interpretation process of research results came to include the skills and experiences the researchers possess (Holloway & Wheeler, 2009), which means that research is significant regardless of whether the results are based on quantitative or qualitative data (Polit & Beck, 2017). Acknowledged concepts of validity, reliability and generalization are applied to quantitative data (Polit & Beck, 2017) and trustworthiness for qualitative data in this thesis (Holloway & Wheeler, 2009).

Trustworthiness (Study I, II)

The qualitative terms of credibility, dependability, confirmability and transferability derives from the corresponding quantitative terms in quantitative research; internal validity, reliability, objectivity and generalizability (Polit & Beck, 2017).

Credibility refers to the truth of interpretation of data (Holloway & Wheeler, 2009). The composition of the research team, which consisted of researchers with experience of acute postoperative pain services and qualitative research, met the expectations of research qualities within the chosen qualitative methods (Flanagan, 1954; Sjöström & Dahlgren, 2002; Holloway, & Wheeler, 2009) Interviews were conducted by the main researcher who initially had limited experience of interviewing, which may have affected the quality of the first interviews. However, accurate collection and interpretation of data was continuously evaluated by involving the whole research team in the different steps of research production until consensus was reached.

Dependability refers to the stability of the research process (Sjöström & Dahlgren, 2002;). The aims of the studies were, after careful screening, decided
to be appropriate to the phenomenographic (Study I) and CIT (Study II) approaches of qualitative research (Flanagan, 1954; Sjöström & Dahlgren 2002). By having frequent meetings of the research group during the analysis process a high inter-subjective agreement was reached. The interview guides and all steps in the analysis were described carefully to enable replication of the studies.

*Confirmability* refers to the objectivity of data and that the findings reflect the participants’ statements in a truthful way (Holloway & Wheeler, 2009). To reach confirmability, the objectivity of data was taken into account throughout the whole research process. Pre-understanding is described as having beneficial effects in the chosen qualitative approaches (Flanagan, 1954; Marton & Booth, 1997) However, the research team had a continuous awareness of that pre-understanding can affect the objective understandings in the collection and interpretations of data. The researchers with experience of qualitative research continuously contributed with their objective methodological perspectives. Additionally, the accompanying quotes in studies I and II made it possible to evaluate the relevance of the findings.

*Transferability* means the extent to which the audience may generalize the results to their own context (Holloway & Wheeler, 2009). Only some of the studied care units involved enrolled nurses in routines of assessing pain, and few physicians had experience of using pain scales. This explained the choice of a purposeful sampling in study I although a strategic choice is the preferred method of including informants (Flanagan, 1954; Marton & Booth, 1997).

It is possible to transfer phenomenographic and CIT findings to similar settings, bearing in mind that humans vary in their way of experiencing a phenomenon, which means that further perceptions and critical incidents may exist (Flanagan, 1954; Marton & Booth, 1997). The fact that the participants in Studies I and II represented three professions with varying responsibilities from six surgical and orthopaedic settings at four different hospitals was considered to increase the ability to describe a wide perspective of pain assessments.
Validity issues (Studies III, IV)

The statistical validity refers to the choice of statistical analyses in relation to collected data (Kimberlin-Winterstein, 2008). Pain intensity is the most clinically relevant dimension of the pain experience, regardless of the nature of pain, and assessments should be based on self-reports (Hjermstad et al., 2011). To ask patients to convert their pain into an NRS score however involves various threats to the statistical validity due to the fluctuation of postoperative pain and individual interpretations of the NRS (Wolrich, et al., 2014). This means that exact scoring is not possible. Therefore, the statistical rationale was based on the perspective that self-rated pain represented by numerical scores provides more valid results when analysed as ordinal data. Furthermore, the sample size in study III limited the possibilities to utilize the full range of NRS due to the skewed distribution of data. Because of the low proportion of patients scoring NRS 7-10 in study III, the sample size in study IV was increased.

The internal validity refers to the degree to which the results are free from uncontrolled factors i.e. to ensure that instruments measures what they are supposed to measure (Polit & Beck, 2017). The healthcare professionals’ busy environment, theoretical knowledge and clinical experiences of using the NRS could have had effects on the quality of patients self-rated pain scores in measure I (III; IV). However, these circumstances reflect the clinical reality. The questionnaires were constructed for Studies III and IV (Appendix 1, 2). No extensive testing was made, which may have affected the validity and reliability negatively. However, the questions of retrospective pain used in this thesis followed guidelines (APS, 1995; Gordon et al., 2005, Brantberg & Allvin, 2016) and were based on the thoroughly validated NRS that is considered reliable for the measuring of pain intensity (Williamson & Hoggart, 2005; Hjermstad et al., 2011). Furthermore, the internal response rate was high for both questionnaires, which indicated that the questions caused only minor difficulties as regards answering.

The external validity refers to the extent of generalizability of research. It means the transferring of results to other settings or samples (Polit & Beck, 2017), in this case to healthcare professionals caring for patients undergoing major orthopaedic or general surgery in Western countries. There are cultural and gender differences in how pain is experienced and expressed that inevitably affect the actions needed to take in the pain assessment situation (Kvachadze et
al., 2015). However, the NRS is described to apply to different cultures and settings (Williamson & Hoggart, 2005; Hjermstad et al., 2011). The variation of the enrolled patients in studies III and IV in terms of sex, age, education, comorbidity, different types of surgery and postoperative pain management, together with the high prevalence of patients with preoperative analgesia such as opioids contribute to the external validity. Also, the fact that data was collected in clinical settings in which the pain measures (mode, md and maximum) were intended to be used without having to implement new routines on pain assessments increased the generalizability to other settings.

Inter-rater reliability refers to the equivalence of scores obtained by an instrument (Polit & Beck, 2017); in this case the NRS, when used by different persons. One can assume that patients’ willingness to report truthful pain scores is associated with the healthcare professionals’ pain assessment performance. Therefore, the designs (III, IV) encouraged the collection of frequent patient self-rated pain scores. Furthermore, the limit of four pain scores in analyses was set to achieve reliable individual measures (mode, md and maximum) that corresponded to patients’ experienced pain intensity.

The reliability of a test-retest design depends on the timing of the second measure (Kimberlin & Winterstein, 2008). Memory of pain is associated with individual sensory-affective and psychological factors and may change over time (Khoshnejad, Fortin, Rohani, Duncan, & Rainville, 2014). However, patients are likely to give reliable reports of pain intensity for the previous 24 hours (Breivik, Borchgrevink, Allen, Rosseland, Romundstad, Hals, Kvarstein, & Stubhaug, 2008). Conclusively, a short time-frame between the measures in studies III and IV was deemed to limit the effects of patients’ possible memory disorders.
Aspects of the results

The main objective of this thesis was to explore healthcare professionals’ use of pain scales in pain assessments. The results are discussed in relation to the main perspectives that became evident in healthcare professionals clinical utilization of pain scales. The discussion starts with the organizational perspective, followed by the collaborative and individual perspectives.

Pain assessment— the organizational perspective

The findings in studies I and II showed that organizational support from clinical management such as care goals, guidelines, scheduling allowing continuity in care, and well-designed EMR has an impact on how healthcare professionals perceive the clinical use of patients’ self-rated pain scores. These findings are supported by results from research areas involving organizational routines (Becker 2004; Martin et al., 2010), perioperative care (Spanjersberg et al., 2011, Liu et al., 2016) and pain management (Gordon et al., 2005). Knowledge from these areas concludes that set goals, high quality guidelines and knowledge of each other’s responsibilities are considered to facilitate fruitful collaboration. Furthermore, standards of management include well-functioning organizational routines and information systems (Martins et al., 2010). The results from studies I and II showed that the quality of pain assessment guidelines in the studied settings varied, which consequently meant that the healthcare professionals’ routines when assessing pain were partly based on their individual knowledge. Additionally, the findings of restricted possibilities to monitor patients’ pain scores at rest and during activity in EMR (I) confirm earlier findings of difficulties in documenting care processes in EMR (Saranto & Kinnunen, 2009, Stevenson et al., 2016). Stevenson et al, (2016) found that the quality of monitoring of vital signs was increased by choosing paper protocols despite access to EMR. Fragmented documentation may lead to verbal transfer of patient information which implies a risk that information is lost (Chard & Makary, 2015). As a consequence, the frequent information transfers in postoperative care settings are a major risk to quality of care (Braaf et al., 2015). Conclusively, these findings suggested that there was a need to find a summarized measure from patients self-reported pain scores to monitor in medical records.
The explored daily average (mode and median) pain intensity measures from patients’ self-rated pain scores at rest and during activity was shown to possess acceptable reliability (III, IV). The findings (IV) revealed the need for frequent high quality pain assessments (4-9 ratings) irrespective of level of pain intensity, to ensure the quality of reports of patients’ pain in medical records. The average measures at rest and during activity were more thoroughly investigated (IV) than the maximum measure. Therefore, the average measures should preferably be used together in reports of patients’ summarized daily pain. Long clinical experience of postoperative pain in postoperative settings inspired the development of both the mode and the median measures. The mode measures would be most applicable if patients self-reported pain scores were monitored using paper monitoring sheets. In a busy clinical context, it is easy to quickly obtain an overview of what score is the most common. However, the development of the monitoring of patient-reported outcomes in electronic devices is ongoing (Lavallee, et al., 2016). Therefore, when it is possible to add a calculator function to the EMR application, the median measures are deemed more applicable to the EMR.

Healthcare professionals awareness that regular monitoring of patients’ self-rated pain scores could be used for quality measures was limited (I). There are various suggested patient-reported pain measures for the evaluation of quality of pain management (Gordon et al., 1995; Gordon et al., 2005 and Gunningberg & Idvall 2007; Rothaug et al., 2013). However, recent research has identified the need for early identification of patients with persistent severe pain after surgery (Althaus et al., 2014; Radnovich et al., 2014). Additionally, the busy clinical working environment means that organizational routines should create value, i.e. “provide the best patient outcomes (quality) using the least available resources” (Samuels & Manworren 2014). Daily monitoring of average pain measures in the EMR until pain resolves could constitute an approach to meet these calls for patient-reported outcome measures.

Severe pain is evident not only after major, but also after minor surgery (Gerbershagen et al., 2013), which implies a wider field of use for the average pain intensity measures. Additionally, surgical procedures are being continuously developed, which suggests that improved understanding of pain resolution is continuously required (Althaus et al., 2014; Gerbershagen et al., 2013). However, the time spent receiving hospital care after surgery has in general become short, which indicates the need for continuing to report pain.
from home, regardless of the type of surgical procedure. Patients’ willingness to share their symptom experiences by using new technologies is found to be high, especially if the information is used in dialogue with the treating provider when needed (Lavallee et al., 2016). However, technological, and logistical barriers need to be surmounted before the summarized average measures can be further investigated in clinical practice.

**Pain assessment – the collaborative perspective**

The findings in studies I and II confirmed that healthcare professionals perceived patients’ self-rated pain scores to be a valid common language when patients’ pain was communicated between healthcare professionals. The pain scores were considered to help avoid misunderstandings in information transfer because of differences in the valuation of the descriptive meaning of words. The transfers of care information in surgical settings are complex due to the frequent transport of patients through different departments along the perioperative path (Braaf et al., 2015). The effects of using patients’ monitored pain-scores at handovers are sparse evaluated. The healthcare professionals described that patients’ frequent monitored pain scores in medical records could motivate pain management actions (II) which is in line with Ene et al. (2008) who demonstrated that the consequence of excluding of patients' pain scores could result in less use of analgesics. The handover is defined as a “multi-functional communication process where individual and collaborative clinical knowledge is produced” (Buus, Hoeck, & Hamilton, 2016), ideally resulting in improved prioritizing of care as well as increased patient satisfaction (Anderson, Malone, Shanahan, & Manning, 2015). When healthcare professionals choose bedside handovers, the patient perspective is available in the transfer of information because of the possibility for verbal, written or visual communication (Anderson et al., 2015). However, questions regarding the need for educational efforts in communication have been raised because patients’ active involvement in decisions has been shown to be lower than expected (Anderson et al., 2015; Liu et al., 2016). From the healthcare perspective, an identified power imbalance in between healthcare professionals (Linell & Luckman., 1991; Foronda et al., 2016) and their professional authority can explain patients’ hesitation regarding active involvement in care (Joseph-Williams, Elwyn, & Edwards, 2014). Clinical implementation of the developed daily average NRS
measures (III, IV) may constitute important motivating keys for healthcare professionals to encourage patients to communicate pain.

The healthcare professionals described that patients’ frequent monitored pain scores in medical records had a supporting function when patients’ analgesia needs had to be explained to each other (II). This is in line with Foronda et al.’s (2016) conclusion that healthcare professionals who use a structured communication style are better equipped to overcome communication barriers. Foronda et al. (2016) identified communication barriers between different professions as being caused by different training. In general, physicians are trained to be highly objective and specific, while nurses speak in a more narrative style. To achieve mutual understanding between healthcare professionals, structured transfer of patient information is recommended (Anderson et al., 2015; Chard & Makary, 2015). The structured use of patients’ self-reported outcome measures may constitute a common base in dialogues. However, healthcare professionals also stated that continuous sharing of clinical experiences at ward-rounds and handovers was highly applicable to postoperative pain due to the various dimensions of pain (II). The findings reflected a problem-solving working climate when patients’ pain-scoring was difficult to understand, which is in line with the concepts of inter-professional collaboration (Martin et al., 2010) and relational coordination (Havens et al., 2010), highlighting the benefits of considering different professions’ perspectives in problem-solving.

Healthcare professionals found that patients’ pain-scoring sometimes mismatched their behavioural pain expressions and therefore hesitated to use pain scales (I, II). On the other hand, the findings (I) also revealed that the use of pain scales could find patients who did not talk about their pain because of various barriers, e.g. pre- or postoperative cognitive impairments, side effects from analgesia, fears or language deficiencies. The understanding of patients’ pain experience is important because of its association to the initial ability to recover (Allvin et al., 2008). The increased evidence of associations between persistent postoperative pain and prolonged recovery has highlighted the importance of reducing postoperative pain intensity in the first 24 hours after surgery. The initial pain resolution is considered easy to clinically identify (Althaus et al., 2014; Fletcher et al., 2015). However, patients’ preoperative chronic pain levels are important to bear in mind (Pogatzki-Zahn et al., 2015). It might not be fair to expect to reach pain scores far below preoperative levels.
although the results from the orthopaedic group (IV), consistent with the results of Pogatzki-Zahn, Kutschar, Nestler, & Osterbrink (2015), showed that patients’ preoperative average pain levels could be decreased on the first postoperative day. Knowledgeable healthcare professionals and multi-modal postoperative pain management strategies in the first days after surgery can explain these effects (Pogatzki-Zahn et al., 2015). Nevertheless, patients with persistent high levels of postoperative pain, despite multi-modal pain management and no signs of post-surgical complication, should be further examined for neuropathic pain conditions (Radnovich et al., 2014). The findings (II) showed that when pain-competence outside the surgical team was needed, the organization of acute pain services contributed with their pain assessment and management competences. Unfortunately, the Acute Pain Service (APS) provision is highly variable and not available in every hospital (Duncan et al., 2014; Meissner et al., 2015).

**Pain assessment– the individual perspective**

The findings in studies I and II confirmed earlier described benefits of patients’ self-rated pain scores in the aim of controlling patients’ postoperative pain, i.e. keeping patients’ pain scores low (Mc Caffrey, 1997; Lynch, 2001; Gordon et al., 2005; Layman Young et al., 2006). However, healthcare professionals’ perceptions of the professional responsibility to balance pain relief with potential side effects and to be observant for any post-surgical complications were also identified (II). To avoid fatal side effects from pain management, the importance of ensuring proper understanding of patients’ pain at times when patients’ pain scores “mismatched” observed pain behaviours was claimed (I, II). Active assurance meant to observe patients’ pain-related behaviours during care and to ask for patients’ descriptions of pain (I, II), which is in line with earlier findings of nurses’ pain assessment behaviours (Kim et al., 2006; Lauzon-Clabo, 2007). However, self-perceived lack of experience and knowledge of how to handle mismatching pain scores with observed behaviours created uncertainty (I, II). Research on clinical reasoning gives solid confirmation of the importance of both individual knowledge and professional experience in care decisions (Norman, Monteiro, Sherbino, Ilgen, Schmidt, & Mamede, 2017). Clinical reasoning means to assess a situation by systematic gathering and checking of information accuracy and reliability, and to identify
missing information (Lee, Lee, Bae, & Seo, 2016). Beyond the knowledge of surgical care, assessment and management of pain the numerous patient-related communication barriers (II, Jacobsen, Mølrup, Chirrup, & Sjögren, 2008; van Dijk et al., 2016) suggest that healthcare professionals in each assessment situation need to choose applicable communication approaches to be able to collect appropriate information from patients in pain.

Healthcare professionals were aware of the benefits of obtaining mutual understanding by listening to the patients’ perspective of pain; however, perceived lack of time was described as a reason why communication was reduced to leading questions (II). Paying attention to patients’ individual verbal and behavioural expressions, and needs by listening to their stories is in line with central principles of person-centred care. To give patients time has been shown to have strong associations with patients’ perceptions of quality of care and person-centeredness (Edvardsson, Watt, & Pearce, 2016). Schwenkglenk et al., (2014) finding of that patients’ perceive that pain intensity is subordinated to healthcare professionals’ attention to pain supports the importance of taking time to communicate. A complicating factor is to find those patients who adjust their NRS scoring in accordance with anticipated consequences such as desired/undesired analgesia administration and possible judgements by healthcare professionals (van Dijk et al., 2016). Therefore, in addition to the collection of pain scores, the understanding of patients’ experiences of analgesia and postoperative recovery is most important as patients’ attitudes and fears can be revealed. Moreover, by informing about the effects on recovery such as the decreased risk of post-surgery complications and giving patients time to talk about their situation, patients “power” to influence decisions increases (Joseph-Williams et al., 2014). However, busy working conditions and lack of continuity in scheduling were described as reasons why collected information was at times restricted to what analgesia had been given during the last few hours (II). These findings are confirmed by earlier findings of effects from time constraints on the inclusion of new evidence in routines (Becker, 2004). Without access to the history of pain, patients’ pain scores might be misunderstood. Van Dijk et al., (2016) found that patients might assign a low score on the NRS because they do not want to be perceived as weak or bother busy nurses. On the other hand, patients with chronic pain may assign a higher score on the NRS compared to patients with no history of chronic pain (Wolrich et al., 2015). This implies that patient’ attitudes, fears and preoperative pain experiences can explain their pain-scoring. Consequently, if patients’
experiences remain unknown it could mean that healthcare professionals’ own interpretation of the NRS may become dominant in clinical reasoning instead of finding out the the actual significance of the patients’ NRS pain scores.

There were also healthcare professionals who described passive pain assessment approaches; observations without reflection (II). These healthcare professionals’ habits were dominated by the reliance on long clinical experience and “sensing pain” when giving care to patients (I). Their observational skills of non-verbal pain behaviours become important, when a dialogue was not possible because of various verbal communication barriers. Various observational-behavioural instruments have been developed to assess pain in patients with severe dementia (Hadjistavropoulos et al., 2014). These instruments are in general considered too extensive in the postoperative setting. However, knowledge of the items can be useful to less experienced healthcare professionals when patients, after surgery, have limited cognitive resources to communicate pain also due to other reasons than dementia. However, the experienced healthcare professionals who preferred to observe verbally communicating patients’ pain behaviours instead of asking about their pain experience (I) might be more likely to avoid pain scales despite the implementation of new pain assessment routines. Overall social norms in the clinical setting (Lauzon-Clabo et al., 2007) in combination with established routines and habits are difficult to change because of the comfort of repeating known procedures automatically (Nilsen et al., 2012). Successful breaking of established habits is known to require responsibility from leaders (Rytterström et al. 2011) and actions such as placed reminders and targeted evaluations (Nielsen et al., 2012). Motivation to change also seems to arise when care routines are in harmony with healthcare professionals’ individual perceptions of care (Rytterström et al., 2011). The findings in studies I and II suggest that healthcare professionals with deeper knowledge i.e. understanding of communication put more effort into motivating patients to report pain and trying to understand patients’ pain scoring. Therefore, deeper knowledge about communication and barriers affecting patients’ self-rated pain scores, in addition to new motivational organizational routines have to be considered when implementing the average pain measures (III, IV) to be sure of the quality of these measures.
Theoretical reflection

This thesis demonstrates the healthcare professionals’ perspective on the utilization of pain scales in postoperative care settings after major surgery. Healthcare professionals have so far mainly focused on the use of pain scales in the pain assessment situation. It has historically been difficult to explain why healthcare professionals’ documentation of patients’ self-rated pain scores is mainly dependent on individual habits. Fragmentary documentation means that further collaborative use of patients’ pain scores in the team and in the transfer of pain information risks becoming restricted to one shift as turnover of staff during patients’ hospital stay is high. These consequences can be explained by a high workload in acute settings, patients’ various pain expressions and the difficulty synthesising many pain scores into one reliable measure that is easy to use in the transfer of pain information.

Based on the findings from this thesis it can be argued that the use of pain scales is dependent on multiple perspectives to be fully utilized. The model (Figure 8) represents important key components in healthcare from the organizational, collaborative and individual perspectives without any hierarchical order.
The organizational perspective
- the attentiveness to pain
- the quality of guidelines
- the quality of documentation devices

The collaborative perspective
- the quality of collaborative routines
- the knowledge of available networks
- the quality of information transfer

The individual perspective
- the knowledge of pain/analgesia
- the quality of communication
- habits when assessing pain

Figure 8. A model of key components needed to achieve a structured use of pain scales in postoperative clinical settings, from the organizational, collaborative and individual perspectives without any hierarchical order

**The organizational perspective**

Organizational supportive strategies such as the quality of set goals, local guidelines and documentation devices affect cultural norms regarding attention to patients’ postoperative pain experience. Also, the attention to the patient perspective i.e. current pain experience and history of pain, is affected by the different healthcare professional’s responsibilities in postoperative pain assessments. Healthcare professionals’ opportunities to work evidence based is one component in an organizations attention to quality, in this case postoperative pain. The culture of measuring clinical outcomes by the use of patient-reported outcome measures is embraced in the development of
knowledge-based organizational routines. However, in order to conserve care resources in the acute busy clinical context, postoperative pain assessments should preferably be discontinued when postoperative pain has been resolved.

The collaborative perspective

The quality of collaboration between healthcare professionals depends on both structural and relational factors. Collaborative structures such as integrated documentation and joint enrolled nurse/nurse/physician meetings enable understanding and trusting relationships between different healthcare professions. A good relationship in the team around the patient is shown to have a strong influence on quality of care. Also, the knowledge of and openness to competences outside the team contribute to care. By providing a common pain discourse i.e. patients’ pain scores, potential hierarchical complexities between different healthcare professions can be bridged. Additionally, the daily summarized average measures at rest and during activity could provide a simple approach for the monitoring of patients’ pain scores in medical records until pain resolves, and could thereby constitute a basis for clinical reasoning, decisions and transfer of pain information between healthcare professionals.

The individual perspective

The quality of healthcare professionals’ routines in the actual setting is, in addition to past history of organizational routines related to social norms, individual knowledge and clinical experience. Knowledge of how to administer balanced analgesia safely without masking potential post-surgical complications is related to perceived quality of care from the perspective of healthcare professionals’. The NRS facilitates rapid evaluation of postoperative pain and constitutes the basis of treatment algorithms; however, the selection of treatment alternatives should also include consideration of pain quality, location, duration, and impact on recovery when needed. Patients’ age, sex, psychosocial, cultural, and religious features and comorbid health conditions are also important to consider. Furthermore, healthcare professionals’ use of pain scales in assessment of patients’ pain demands communication about patients’ individual interpretations of the NRS scores, including the definition of worst
possible pain. Communication skills are needed to be able to instruct and motivate patients to rate their pain and describe their history of pain experiences and expectations. With a dialogue, much knowledge can be transferred between healthcare professionals and patients. However, healthcare professionals with established pain assessment habits that exclude patients’ self-rated pain and written information transfer of pain could have an impeding impact on further use of patients’ self-rated pain. Instead of repeatable habit formations when assessing pain, a multi-dimensional communication approach was found necessary to understand each patient’s pain expressions, desires and needs.

The organization, collaboration and individual perspectives have an overall impact on healthcare professionals’ utilization of patients’ self-rated pain scores. The collaborative working climate is related to the structure of organization, accurate documentation devices, and overall attention to pain management. Furthermore, the use of pain scales includes awareness of the different dimensions of pain and patients’ various interpretations of the conversion of pain intensity into a numerical scale.
Conclusions and clinical implications

This thesis adds new insights into how healthcare professionals utilize pain scales in their assessments of patients’ postoperative pain. Additionally, a new approach to improve the utilization of patients’ self-reported pain scores in clinical decisions was determined. The conclusions and clinical implications are described in relation to the organizational perspective, followed by the collaborative and individual perspectives.

The organizational perspective

Conclusions

- Healthcare professionals’ use of pain scales was related to the attention to pain by the management, in local guidelines, EMR and monitoring records.
- The NRS average pain measures (mode/median at rest and during activity) from patients’ self-reported pain on postoperative day 1 gave a reliable picture of patients’ postoperative pain at rest and during activity.
- The significantly higher pain levels on activity confirmed the relevance of structured clinical measuring of pain both at rest and during activity.

Clinical implications

- The findings indicate that healthcare professionals’ attention to patients’ pain should be clearly stated by ward management and in written local guidelines.
- Patients’ self-reported daily average pain measures may also encourage clinical work on identifying resolution of pain in different surgical procedures, which consequently may contribute to further improvements of surgery-specific pain management routines.
- In the future, persistent high average pain scores may also be used as an important tool for the clinical prediction of post-surgical chronic pain conditions.
The collaborative perspective

Conclusions

- The use of pain scales increased the quality of information transfer of pain by providing a common language. However, the use of pain scales at times demanded collaborative reflections on the differences between healthcare professionals and patients’ interpretation of pain scores.
- The handovers, ward-rounds and collaboration with pain specialists offered important occasions for the exchange of clinical experiences.

Clinical implications

- The findings confirm that patients self-reported pain scores could provide a common language in written and verbal transfer of patients’ pain information between healthcare professionals during daily care duties and between units.
- The use of daily average pain intensity measures, in line with person-centred care, ensure the patient’s perspective is considered in clinical reasoning, decisions and transfer of pain information.

The individual perspective

Conclusions

- The use of pain scales when assessing pain varied greatly due to individual established habits, and perceptions of patients’ needs and barriers.
- The use of pain scales facilitated the understanding of pain; however, skilful communication was required to discover the significance of patients’ pain scores.
- Healthcare professionals’ goal in pain management was to balance patients’ needs with safe analgesia administration.
Clinical implications

- The findings support the view that patients’ self-rated pain, when individually tailored can support clinical reasoning and decisions on pain management. However, the potential risk of healthcare professionals’ and patient’s divergent interpretations of pain scores can cause misunderstandings.
- Healthcare professionals need to be aware of barriers concerning patients’ ability and willingness to report pain.
- Healthcare professionals’ motivation to include patients’ self-rated pain in assessments of pain could be enhanced by the transition from the asking of questions to the introducing of “two-way dialogue” communication with patients. By listening to the patient’s own perspective of pain, knowledge useful for clinical reasoning and decisions can emerge.
Future research

Based on the results of this thesis the following future research is suggested:

- The link between the NRS average measures at rest and during and recovery, based on patients’ self-rated pain scores, needs to be clarified and the clinical utility of these average pain intensity measures in decisions on pain management needs to be explored.

- Further exploration of motivational factors and adequate work conditions association with performance of pain assessments is needed to understand their effects.

- An exploration of how patients’ conversion of pain into numerical scales varies depending on their obtained knowledge and experiences during the postoperative period is needed to understand potential variations over time.
Summary in Swedish

Introduktion


Tidigare forskning beskriver bedömning av smärta som komplex. Smärtupplevelsen betraktas som en personlig upplevelse kopplad till kön, värderingar samt till upplevd hälsa. Internationella riktlinjer anger att systematisk mätning av patienters självskattade smärtintensitet hittills är det mest kliniskt relevanta sättet att följa patienters postoperativa smärta. Den numeriska skalan, Numeric Rating Scale (NRS 0-10), är en rekommenderad smärtskala i de flesta kliniska sammanhang. I svensk vård är det undersköterskor, läkare och sjuksköterskor som huvudsakligen vårdar patienter efter genomgången kirurgi. För att uppnå vårdkvalitet är sjukvårdspersonalens individuella roller lika viktiga som samordningen mellan rollerna. Forskning visar att smärtskalor används i begränsad omfattning av sjukvårdspersonal vilket har väckt frågor om smärtskalors bidrag till att identifiera och förstå patienternas smärta.

Vidare är det visat att dokumentation av smärta är ostrukturerad, vilket kan påverka behandlingseffekter och patientsäkerhet. Tidigare forskning beskriver att kliniska beslut baserade på patienters självrapportering av smärta gynnar patienters delaktighet och därmed säkerhet. Dock behövs motiverande strategier för att förbättra klinisk användning av patienters självskattade smärta. Det övergripande syftet med denna avhandling var därför att beskriva den kliniska nytan av patienternas självskattade postoperativ smärta efter större kirurgi utifrån sjukvårdspersonalens perspektiv.
**Design och metod**

Avhandlingen bygger på kvalitativa och kvantitativa studier. De kvalitativa studierna beskriver (I) hur vårdpersonal uppfattar användningen av smärtskalor i postoperativ vård och (II) genom kritiska incidenter vilka vårderfarenheter sjukvårdspersonal har och vilka åtgärder de vidtar vid bedömning av postoperativ smärta. Deltagare i studie I och II var kliniska verksamma undersköterskor, sjuksköterskor och läkare med erfarenhet av smärtskalor i postoperativ vård. Syftet med de kvantitativa studierna var att fastställa tillförlitligheten av dagliga genomsnittsvärden (typ- median och max) baserade på patienters självskattade NRS värden vid vila och under aktivitet vid beskrivning av patienternas postoperativa smärta första dagen efter stor kirurgi (III, IV). Syftet var också att bestämma antalet NRS skattningar som behövs för beräkning av dessa värden (IV).

**Resultat**

De kvalitativa resultaten bekräftade tidigare fynd av patienters självskattade smärta bidrag till förståelse av postoperativa smärta och därpå följande kliniska beslut. Organisatoriska rutiner, dokumentationsmöjligheter, kunskap, klinisk kompetens, kontinuitet i vården, samarbete, tid och individuella vanor var vårdrelaterade faktorer som påverkade sjukvårdpersonalens användning av NRS (I, II). Patientrelaterade bidragande faktorer till smärtskattning med NRS var patienters förmåga och villighet att kommunicera, medan oförmåga eller ovilja att kommunicera, inkonsekvens mellan verbal kommunikation och observerat beteende, beskrevs vara barriärer (II). Kunskap om olika kommunikationsstrategier i samband med smärtskattning kunde överbrygga dessa patientrelaterade barriärer (I, II).

Resultat från de kvantitativa studierna (III, IV) visade hög tillförlitlighet för de dagliga genomsnittsvärdena: typ och median vid vila och aktivitet. Rankkorrelationer för individuella medianvärden, baserat på fyra skattningar var i jämförelse med patienters i efterhand självskattade genomsnittliga smärta hög och förstärktes med ökat antal, upp till nio, skattningar. Svensson analyser påvisade en individuell variation inom det förväntade. Vidare gav resultaten en signifikant systematisk gruppförändring som visade att de beräknade typ- och
medianvärdena, särskilt när det gäller smärta i vila, generellt var lägre än de genomsnittliga värden som patienterna angav i efterhand.

**Kliniska implikationer**

- Ur ett organisatoriskt perspektiv tyder resultaten på att klinikledning samt lokala riktlinjers uppmärksamhet på smärta har betydelse för användning av smärtsskalor. Uppföljning av patienters dagliga genomsnittliga postoperativa smärtvärden kan uppmuntra till kliniskt arbete med att identifiera normal återgång av smärta vid olika kirurgiska ingrepp, vilket därmed kan bidra till ytterligare förbättringar av ingreppsspecifika smärtshanteringsrutiner. I framtiden kan kvarstående höga genomsnittliga smärtvärden förslagsvis även användas som en viktig del i bedömning av för postoperativa kroniska smärtstillstånd.

- Ur ett kliniskt samarbetsperspektiv bekräftar resultaten att patienters självrapporterade smärta skulle kunna innebära ett gemensamt skriftligt och muntligt språk i rapportering mellan vårdpersonal och enheter. Användning av dagliga genomsnittliga NRS värden är i linje med personcentrerad vård, vilken innebär att säkra patientens perspektiv i kliniska resonemang och beslut.

**Slutsatser**

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Everything began with an idea on how to follow patient’s postoperative pain trajectory before hospital discharge. Thanks to our dear colleague Marianne Lindbladh-Fridh, Kerstin Eriksson and I started research. Marianne gave continuous and invaluable support and encouraged future studies. Kerstin has been my supporting companion and the best friend one can have.

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Jönköping 2017


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Appendix 1

Enkät

Kodnummer________

Man □  Kvinna □  Ålder _____

Ingrepp_____________________  Operationsdag __________  Klinik_______

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, vilket/vilka smärtstillande läkemedel har du använt dagligen?

Läkemedel:

_________________________________________________________________

Vilken smärtnivå har du i genomsnitt upplevt de senaste 4 veckorna? Ringa in det alternativ som stämmer bäst för dig. 0 = ingen smärta, 10 = värsta 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

Hade du SMÄRTA DAGEN EFTER OPERATION (Kl. 06-06) Kryssa i det alternativ som bäst stämmer överens med din upplevelse.

1.  Hade du smärta?
   Ja □  Nej □  om nej, fortsätt till fråga 12

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 smärta påverkat din förmåga att äta eller dricka?  
    Inte alls □  Delvis □  Till stor del □  Helt och hållet □

11. Har smärta påverkat din sömn?  
    Inte alls □  Delvis □  Till stor del □  Helt och hållet □
1. Vilket är ditt födelseland?

☐ Sverige  ☐ Övriga Norden  ☐ Övriga Europa  ☐ Övriga Världen


☐ Ingen  ☐ Föräldrar/syskon  ☐ Make/maka/sambo/partner  ☐ Andra vuxna  ☐ Barn

3. Vilken är din högsta avslutade utbildung?

☐ Har inte avslutat grundskola  ☐ Grundskola eller likvärdigt
☐ Gymnasium eller likvärdigt  ☐ Universitet eller högskola

---

Följande frågor gäller SMÄRTA och ILLAMÅENDE före operation

4. Vilken smärta har du i genomsnitt upplevt de senaste 7 dygnen?

I vila: 

Ingen smärta  0  1  2  3  4  5  6  7  8  9  10  Värsta tänkbara

I rörelse: 

Ingen smärta  0  1  2  3  4  5  6  7  8  9  10  Värsta tänkbara

---

5. Har du använt smärtstillande läkemedel de senaste 6 månaderna?

☐ Nej
☐ Ja  Om ja, hur ofta har du varit i behov av smärtstillande läkemedel?

☐ Dagligen  ☐ Några gånger i veckan  ☐ Några gånger i månaden

---

6. Vilka läkemedel har du använt mot smärta?

---

7. Vilket illamående har du i genomsnitt upplevt de senaste 7 dygnen?

Inget illamående  0  1  2  3  4  5  6  7  8  9  10  Värsta tänkbara

---

8. Har du använt läkemedel mot illamående de senaste 6 månaderna?

☐ Nej
☐ Ja  Om ja, hur ofta har du varit i behov av läkemedel mot illamående?

☐ Dagligen  ☐ Några gånger i veckan  ☐ Några gånger i månaden
9. Vilka läkemedel har du använt mot illamående?
Följande frågor gäller SMÄRTA från operationsområdet första dygnet efter operation kl. 07-07

1. Vilken var den lägsta smärtan du upplevde under första dygnet efter operation?

   Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

2. Vilken var den högsta smärtan du upplevde under första dygnet efter operation?

   Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

3. Hur bedömer du i genomsnitt din smärta under det första dygnet när du vilade?

   Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

4. Hur bedömer du i genomsnitt din smärta under det första dygnet när du var i rörelse?

   Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

Vilken smärta har:
Om du inte haft dessa besvär till följd av smärta anger du alternativet 0.

5. gett dig problem med att vila

   Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

6. påverkat din sömn

   Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

7. gett dig problem med att vara i rörelse

   Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

8. påverkat din aptit
9. gett dig svårighet att sköta din personliga hygien

Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara

Demografi     studie 4     KOD ____

Ingrepp____________________ Operationsdag (år, mån, dag) ________

Man ☐  Kvinna ☐  Födelseår 19______  Ålder ______

Andra sjukdomar _____________________________________________________________
___________________________________________________________________________
Ja ☐  Nej ☐
Rökare ☐  Nej ☐
Åksjuka ☐  Nej ☐
För rökare ange ”Ja” om patient röker dagligen.

Preoperativa läkemedel Ja ☐  Nej ☐
Oro ☐  ☐
Depression ☐  ☐
Sömn ☐  ☐
Ange ”Ja” om patienten använder läkemedel dagligen.

Anestesi Ja ☐  Nej ☐
Lokal ☐  ☐
Regional ☐  ☐
Sedering ☐  ☐
Generell anestesi ☐  ☐
Generell anestesi ☐  ☐
Operationstid ________ tim ________ min

Aktuell ASA classificering:
ASA I ☐
ASA II ☐
ASA III ☐

Behandlingar och åtgärder postoperativ dag 1

<table>
<thead>
<tr>
<th></th>
<th>Ja</th>
<th>Nej</th>
<th>Dygnsdos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paracetamol</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>NSAID</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Tramadol</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Dolcontin/Morfin</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Oxycontin/Oxynorm</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Opioid</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>PCA med opioid</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Perifer blockad</td>
<td>☐</td>
<td>☐</td>
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</tbody>
</table>

För rökare ange ”Ja” om patient röker dagligen.
Ange ”Ja” om patienten använder läkemedel dagligen.
<table>
<thead>
<tr>
<th>Behandlingar och åtgärder postoperativ dag 2</th>
<th>Ja</th>
<th>Nej</th>
<th>Dygnssdos</th>
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</thead>
<tbody>
<tr>
<td>Paracetamol alla beredn.former</td>
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<td>NSAID alla beredn.former</td>
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<tr>
<td>Tramadol alla beredn.former</td>
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<tr>
<td>Dolcontin/Morfin tabletter</td>
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<tr>
<td>Oxycontin/Oxynorm tabletter</td>
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<tr>
<td>Opioid intravenöst</td>
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<tr>
<td>PCA med opioid intravenöst</td>
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<tr>
<td>Perifer blockad</td>
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<tr>
<td>Epidural</td>
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<tr>
<td>Regional blockad</td>
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<td>Musik</td>
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<tr>
<td>Värme</td>
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<td></td>
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<tr>
<td>Kyla</td>
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</tr>
<tr>
<td>Annat</td>
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</tbody>
</table>

| Annat                                      |    |     |           |

| Drän                                       |    |     |           |
| KAD                                        |    |     |           |
| V-sond                                     |    |     |           |
| Fastande                                   |    |     |           |

| Primperan alla beredn.former               |    |     |           |
| Zofran/Kytril alla beredn. former          |    |     |           |
| Postafen tabletter                         |    |     |           |
| Sea-band                                   |    |     |           |

| Annat                                      |    |     |           |

<p>| Drän                                       |    |     |           |
| KAD                                        |    |     |           |
| V-sond                                     |    |     |           |
| Fastande                                   |    |     |           |</p>
<table>
<thead>
<tr>
<th>Komplikation</th>
<th>Ja</th>
<th>Nej</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Om ja, vad</td>
<td>________________________________</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Vårdtid</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>&gt;9 dagar</th>
</tr>
</thead>
</table>
Studieprotokoll av smärta/illamående/kräkning

KOD_____

Dokumentation av smärta, illamående och kräkning var 4:e tim då patienten är vaken.

Dokumentera med S när patienten sover.

Dokumentation görs även vid genombrott av smärta, illamående/kräkning samt vid utvärdering.

Åter från operation: kl. ________
Dokumentera under operationsdagen, postoperativ dag 1, 2 och 3 fram till kl 08.00

---

NRS smärta:
Ingen smärta 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara smärta

NRS illamående:
Inget illamående 0 1 2 3 4 5 6 7 8 9 10 Värsta tänkbara illamående

<table>
<thead>
<tr>
<th>Datum</th>
<th>Klockslag</th>
<th>NRS i vila 0-10</th>
<th>NRS i aktivitet 0-10</th>
<th>Illamående 0-10</th>
<th>Kräkning Ja/Nej</th>
</tr>
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