



Quality Pain Management in the Hospital Setting

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Gæða verkjameðferð á sjúkrahúsi

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Ágrip

Inngangur og markmið: Verkjameðferð er mikilvægur þáttur í gæða heilbrigðisþjónustu. Hugtakið gæða verkjameðferð virðist illa skilgreint og þrátt fyrir að verkjameðferð hafi batnað á undanförunum árum þá er enn töluverður fjöldi inniliggjandi sjúklinga á sjúkrahúsum sem upplifir mikla verk. Tilgangur rannsóknarinnar var að skoða, skilgreina, og meta gæði verkjameðferðar á sjúkrahúsum. Verkefnið byggir á þremur rannsóknum sem greint er frá í fjórum tímaritsgreinum (I-IV).

Efniviður og aðferðir: Í fyrstu rannsókninni (grein I) var hugtakagreining með aðferð Morse notuð til að meta og skilgreina hugtakið gæða verkjameðferð. Fræðilegt efni var skoðað með það að markmiði að greina helstu byggingarþætti hugtaksins og setja fram skilgreiningu á því. Í annarri rannsókninni (grein II), sem var lýsandi, þversniðsrannsókn, voru próffræðilegir eiginleikar endurskoðaðs spurningalista bandaríska verkjafræðafélagsins (APS-POQ-R) kannaðir. Listinn metur árangur verkjameðferðar hjá sjúklingum. Í þriðju rannsókninni var stuðst við stundaralgengissnið þar sem gögnum var safnað á einum tímapunkti. Annars vegar var árangur verkjameðferðar metinn frá sjónarhóli sjúklings (grein III) og hins vegar innihald verkjameðferðar á háskólasjúkrahúsi (grein IV). Íslenska útgáfa APS-POQ-R var notuð til að safna gögnum frá sjúklingum, en klínísk gögn og upplýsingar um lyf fengust úr sjúkraskrá og vöruhúsi gagna með gátlistum sem unnir voru af rannsakendum. Endurbættur verkjameðferðarstuðull var notaður í grein IV til að meta hvort verkjameðferð væri í samræmi við styrk verkja. Úrtakið í rannsóknum tvö og þrjú samanstóð af einstaklingum sem orðnir voru 18 ára, höfðu legið inni í a.m.k. sólarhring, skildu íslensku, og voru færir um þátttöku. Þátttakendur í rannsókn tvö þurftu að hafa fundið fyrir verkjum (að styrk ≥ 1 á 0-10 skala) síðastliðinn sólarhring, en í rannsókn þrjú var öllum boðin þátttaka sem uppfylltu skilyrði að öðru leyti. Rannsóknirnar fóru fram á 23 legudeildum á skurð- og lyflækningasviðum Landspítala.

Niðurstöður: Í samræmi við líkan Donabedian um gæði í heilbrigðisþjónustu byggir gæða verkjameðferð á sjúkrahúsi á stofnanatengdum þáttum, því ferli sem þar á sér stað og árangri meðferðar hjá sjúklingum. Gæða verkjameðferð er veitt á réttum tíma, er örugg, árangursrík, skilvirk, byggð á jafnræði og tekur mið af þörfum og óskum

sjúklinga. Fýsileiki og próffræðilegir eiginleikar APS-POQ-R-I reyndust ásættanlegir. Listinn samanstandur af fjórum þáttum sem samanlagt skýrðu 64% af dreifingunni og voru með áreiðanleikastuðul \geq ,70. Mat á gæðum verkjameðferðar út frá sjónarhóli sjúklinga (N=308) sýndi að tíðni verkja undanfarinn sólarhring var 83% og 35% sjúklinga hafði upplifað mikla verki (≥ 7 á 0-10 kvarða). Um þriðjungur sjúklinga greindi frá því að verkir hefðu haft fremur eða mjög truflandi áhrif (≥ 5 á 0-10 kvarða) á athafnir þeirra og svefn. Ánægja sjúklinga með árangur verkjameðferðar tengdist minni verkjum, betri verkjastillingu og styttri tíma sem sjúklingur fann fyrir miklum verkjum. Þátttaka í ákvarðanatöku tengdist jafnframt styttri tíma með mikla verki og betri verkjastillingu, $p < ,01$. Mat á innihaldi verkjameðferðar (N=282) sýndi að 85% sjúklinga var með fyrirmæli um verkjalyf. Flestir voru með fyrirmæli um reglulega lyfjagjöf og 60% sjúklinga voru með fyrirmæli um fjölbætta verkjameðferð. Ríflega þriðjungur sjúklinga sagðist hafa notað aðrar aðferðir en lyf við verkjum en sjaldgæft var að hjúkrunarfræðingar eða lækningar ráðlegðu notkun slíkra aðferða. Verkjamat var skráð hjá 57% þátttakenda, og notkun á stöðluðum kvörðum til að meta styrk verkja var að finna í 27% skráðra tilvika. Fyrirmæli um viðeigandi verkjalyf voru til staðar hjá 78% þátttakenda, en 64% fengu verkjalyf í samræmi við styrk verkja. Meiri líkur voru á að fá viðeigandi verkjameðferð ef styrkur verkja var metinn með stöðluðum kvörðum, (OR 3,44; 95% ÖM 1,38-8,60).

Ályktanir: Gæða verkjameðferð er margþætt en mælanlegt hugtak sem þó þarfnast frekari skilgreiningar. Íslensk útgáfa APS-POQ-R reyndist áreiðanleg og réttmæt til að meta árangur verkjameðferðar hjá sjúklingum á íslenskum sjúkrahúsum. Verkjameðferð var að mörgu leyti í samræmi við leiðbeiningar um meðferð verkja en margir sjúklingar fengu þó ekki lyf í samræmi við styrk verkja. Skráningu og mati verkja var ábótavant. Mat á árangri meðferðar sýndi að margir sjúklingar upplifðu verki, oft slæma. Ánægja sjúklinga og þátttaka í ákvarðanatöku voru þættir sem tengdust betri árangri meðferðar. Heilbrigðisstarfsfólk þarf að notast við kvarða til að meta styrk verkja og nýta þau meðferðarúrræði sem eru til staðar til að mæta þörfum sjúklinga. Stuðla þarf að þátttöku sjúklinga í ákvarðanatöku til að bæta gæði verkjameðferðar á sjúkrahúsum. Huga þarf að stofnanatengdum þáttum, s.s. stefnumörkun, verklagsreglum og ráðgefandi þjónustu, sem stutt geta við árangursríka verkjameðferð. Þörf er á rannsóknum til að skoða sambandið á milli stofnanatengdra þátta, ferlis og árangurs verkjameðferðar á sjúkrahúsum.

Lykilorð: Verkir, verkjameðferð, gæði, gæða verkjameðferð, sjúkrahús

Abstract

Background and aims: Pain management is an important factor in quality health care. Reviewing the literature shows that quality pain management (QPM) is vaguely defined and that pain is still prevalent and severe in many hospitalized patients, despite efforts to improve quality in the past decades. The aims of the study were to explore, define, and assess QPM in the hospital setting. This project is based on three studies, reported in four papers (I-IV).

Material and methods: In the first study (Paper I) Morse's method of concept evaluation was used to analyze the literature to identify the structural aspects of QPM, and to put forward a definition of the concept. In the second study (Paper II), a descriptive, cross-sectional design was used to evaluate the psychometric properties of the American Pain Society Questionnaire (APS-POQ-R), purport to measure patient outcomes in relation to pain management. In the third study a descriptive point-prevalence design was used to assess QPM from the patient's perspective (Paper III), and explore the pain management processes in a university hospital (Paper IV). APS-POQ-R, Icelandic version (APS-POQ-R-I), was used to collect data from patients, but clinical and medication data were collected from medical records and the hospital-data warehouse, by checklists made by the researchers. A modified version of the Pain Management Index (PMI) was used to measure the adequacy of the pain treatment in paper IV. For the second and third studies the sample consisted of patients, 18 years and older, who had been hospitalized for at least 24 hours, understood Icelandic, and were able to participate in the study. For the second study the patients had to have experienced pain (defined as ≥ 1 on 0-10 scale) in the past 24 hours. For the third study all patients could participate, regardless of pain. The studies were conducted in 23 inpatient wards on surgical and medical services in Landspítali, The National University Hospital of Iceland.

Results: In line with the Donabedian health care quality model, QPM constitutes the structure, process, and outcomes of care, embedded in safe, equitable, patient-centered efficient, effective, and timely services. The APS-POQ-R-I was found to be feasible, and to have acceptable psychometric properties. The questionnaire has four components that explained 64% of the variance, each with Cronbach's $\alpha \geq .70$. Assessing patient outcomes

(N=308), showed that the prevalence of pain in the hospital was 83% in the past 24 hours, and 35% of the patients had experienced severe pain (≥ 7 on a scale of 0-10). Pain interference was generally low, but a third of the patients experienced moderate to severe interference (≥ 5 on a scale of 0-10) with activities and sleep. Patient satisfaction was related to less time spent in severe pain, lower pain severity, and better pain relief. Reported participation in decision making was associated with better pain relief, and less time in severe pain, $p < .01$. Assessment of pain management processes (N=282) revealed that 85% of patients were prescribed analgesics, most often around the clock, and for 60% of patients the prescribed treatment was multimodal. A third of the sample reported using non-pharmacological methods to treat their pain, but such methods were rarely recommended by nurses or physicians. Pain assessment was documented for 57% of the sample, and use of pain severity scales was noted in 27% of documented assessments. Analgesic prescriptions were adequate in 78%, but administered treatment was adequate in 64%, measured with a modified pain management index. Documented use of severity scales was associated with higher odds of patients receiving adequate treatment, (OR 3.44; 95% CI 1.38-8.60).

Conclusions: QPM is a multidimensional concept that can be operationalized, but needs further refinements. The APS-POQ-R-I was found to be a valid and reliable instrument to measure QPM outcomes in Icelandic hospitals. The study showed that pain management processes were equitable, and in many ways in line with recommendations in guidelines and pain management standards. However, many patients did not receive adequate analgesics to match their pain severity, and documented pain assessment was relatively unstructured. Patient outcomes in relation to pain showed that pain was both prevalent and severe. Patient satisfaction and participation in decision making were related to better outcomes. Clinicians need to use standardized scales to measure the severity of pain and use available treatment options to meet patients' needs. Providing patient centered care, such as including patients in decision making regarding their pain treatment, should be promoted to improve QPM in the hospital setting. Structural aspects, like policies, procedures, and consulting services, might support pain management practices. Future studies need to explore the relationship between structure, process, and outcomes of care.

Keywords: Pain, pain management, quality, quality pain management, hospital

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And so this journey ends. After a long travel, it is time to unpack the bags and start to build on the knowledge learned on this journey. Although the road was sometimes bumpy, I was never alone. I guess my greatest luck in life is how many helpful and generous people I know! So I owe my gratitude to many.

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This thesis is written in loving memory of my grandmother, Ólafía Einarsdóttir, who needlessly suffered severe pain in relation to her advanced breast cancer. She died in 1986. Relieving pain and suffering should be the ultimate goal of all health care professionals. I hope this work will help in advancing pain management for those who need it.

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List of abbreviations

APS	American Pain Society
APS-POQ	American Pain Society Patient Outcome Questionnaire
APS-POQ-R	Revised American Pain Society Patient Outcome Questionnaire
APS-POQ-R-I	Icelandic version of the Revised American Pain Society Patient Outcome Questionnaire
BPI	Brief Pain Inventory
CI	Confidence Interval
ICD	International Classification of Diseases
IOM	Institute of Medicine
IRB	Institutional Review Board
LSH	Landspítali – The National University Hospital of Iceland
NA	No Association
NRS	Numeric Rating Scale
NSAID	Non Steroidal Anti Inflammatory Drug
NS	Not Significant
OR	Odds Ratio
PMI	Pain Management Index
PMI-Cn	Modified version of the Pain Management Index, Cleeland version. The index includes prescribed medications for neuropathic pain and local anesthetics
PMI-Wn	Modified version of the Pain Management Index, Ward version. The index includes administered medications for neuropathic pain and local anesthetics
PRN	Pro Re Nata, abbreviation for drugs given on as needed basis
QPM	Quality Pain Management
SD	Standard Deviation
VAS	Visual Analogue Scale

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List of original papers

This thesis is based on the following original publications, which are referred to in the text by their Roman numerals (I-IV):

- I. Zoëga, S., Gunnarsdottir, S., Wilson, M.E., and Gordon, D.B. (2014). Quality pain management in adult hospitalized patients: A concept evaluation. *Nursing Forum*. Advance online publication. doi: 10.1111/nuf.12085.
- II. Zoëga, S., Ward, S.E., and Gunnarsdottir, S. (2012). Evaluating the quality of pain management in a hospital setting: Testing the psychometric properties of the Icelandic version of the revised American Pain Society Patient Outcome Questionnaire. *Pain Management Nursing* 15(1), 143-155. doi:10.1016/j.pmn.2012.08.001
- III. Zoëga, S., Sveinsdottir, H., Sigurdsson, G.H., Aspelund, T., Ward, S.E. and Gunnarsdottir, S. (2014). Quality pain management in the hospital setting from the patient's perspective. *Pain Practice*. Advance online publication. doi: 10.1111/papr.12166.
- IV. Zoëga, S., Ward, S.E., Sigurdsson, G.H., Aspelund, T., Sveinsdottir, H. and Gunnarsdottir, S. Quality Pain Management Practices in a University Hospital. Accepted for publication in *Pain Management Nursing*.

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Declaration of contribution

The author, Sigríður Zoëga, was responsible for writing this thesis. The work was done in close cooperation with her advisor, supervisor, the PhD committee, and other co-authors. Contribution for each paper is listed below:

Paper I. Sigríður planned the study, collected and analyzed data, drew conclusions, and drafted the manuscript.

Paper II. Sigríður was involved in planning the study and participated in translating the instrument being tested. She took part in applying for grants and ethical approval, took part in organizing the data collection, was responsible for gaining approval for the study being conducted, trained data collectors, collected and analyzed data, drew conclusions, and drafted the manuscript.

Papers III and IV. Sigríður was involved in planning the study, and applying for grants and ethical approval. She took part in organizing the data collection, trained data collectors, collected, entered, and analyzed data, drew conclusions, and drafted the manuscripts.

1 Introduction

Quality in health care is important for patients, professionals, and health care institutions alike. Patients want care that meets their health care needs, and professionals and institutions aim to provide services that meet patients' expectations (Brook, McGlynn, & Cleary, 1996; Centers for Medicare and Medicaid Services, 2012; Picker Institute, 2012) as well as their own standards of care and those of accrediting bodies (Blumenthal, 1996; The Joint Commission, 2013). Pain management is an important aspect of quality care in the hospital setting (Carr et al., 2014; Idvall, Hamrin, Rooke, & Sjöström, 1999; Salomon, Gasquet, Mesbah, & Ravaud, 1999), since undermanaged pain has negative consequences for patients (Joshi & Ogunnaike, 2005) and institutions alike (Husted et al., 2011; Pavlin, Chen, Penaloza, Polissar, & Buckley, 2002). Managing pain requires interprofessional efforts, but nurses play an important and multifaceted role in pain management in hospitals. They assess pain, administer analgesics and non-pharmacological treatments, they educate patients and their families about pain and its treatment, and they assess the effectiveness and side effects of treatment provided (Registered Nurses Association of Ontario, 2013; Vallerand, Musto, & Polomano, 2011).

Evaluating quality pain management (QPM) is challenging (Gordon et al., 2002) and a lack of a clear definition of QPM has been identified as a hindrance to improvements in pain management practices (Gordon & Dahl, 2004). Reviewing the literature shows that pain is still prevalent and severe in many hospitalized patients (Apfelbaum, Chen, Mehta, & Gan, 2003; Maier et al., 2010; Vallano, Malouf, Payrulet, Baños, & Catalan Research Group for Studying Pain in Hospital, 2006), despite efforts to improve quality in the past years (Benhamou et al., 2008; Fletcher, Fermanian, Mardaye, & Aegerter, 2008; Gordon et al., 2002; Usichenko et al., 2013). Hence, further studies evaluating and promoting improvements in QPM are needed. The aim of this thesis is to define, explore, and assess QPM in the hospital setting.

1.1 Quality in health care

Health care quality is a complex concept (Donabedian, 2005), referring to diverse issues such as cleanliness and comfort of the hospital (Sofaer, Crofton, Goldstein, Hoy, & Crabb, 2005), communication between health professionals and patients (Donabedian, 1988; Sofaer et al., 2005), professional knowledge, access to health care, cost of care (Donabedian, 1988), and outcomes such as mortality and morbidity (Cooperberg, Birkmeyer, & Litwin, 2009) to name but a few. The Institute of Medicine (IOM) has defined quality in health care as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge” (Lohr, 1990, p. 21). In their report, *Crossing the quality chasm*, the IOM (2001) set forth six aims to improve quality in health care. These aims are that health care should be safe, equitable, effective, efficient, timely, and patient-centered. Safety refers to avoiding causing harm or injury to patients; equitable means that everybody should receive the same quality of care regardless of ethnicity, sex, age, or other factors; effective care is evidence based where the focus is on providing care that matches the patient’s needs, while avoiding both over- or underuse of services; efficient care refers to reducing waste of all sorts, such as manpower, products etc.; timely services are provided when the patient needs care, avoiding unnecessary delays in services for both patients and institutions; and finally, patient-centered care means emphatic care where individual preferences and values are respected and the patient has as much input into his/her care as he/she wishes. The same definition and aims are the foundation for the recommendations of the Icelandic Directorate of Health to improve quality and safety in health care (Fagráð Embættis landlæknis um sjúklingaöryggi, 2012).

Quality is a subjective, multidimensional concept that is difficult to measure (Larrabee, 1996). Therefore, it is necessary to define what aspects of quality one intends to assess to accurately operationalize it (Donabedian, 2005). Who and what is being assessed? How should the activities being measured be performed? What are the desired outcomes (Donabedian, 1988)? To address this complexity Donabedian (1988) suggested evaluating quality by looking at the structure, process, and outcomes of care. Today, this model still remains one of the most prominent models for assessing health care quality (Hoenig, Lee, & Stineman, 2010; Mitchell, Ferketich, & Jennings, 1998; Rodkey & Itani, 2009). In the model, structure refers to the

characteristics of the setting such as qualifications of the staff, staff-patient ratio, policies, amenities, equipment, and organizational structure of the institution. Process is the care provided, including communication between health professionals, patients and relatives, and the accuracy and content of care. Finally, outcomes denote how the care affects the patient (Donabedian, 1988).

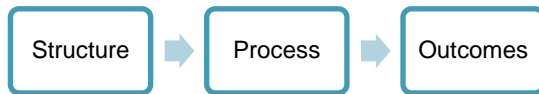


Figure 1. The Donabedian Model

According to Donabedian (1988), the model (Figure 1) is linear with the structure affecting the process, and the process affecting the outcome. This linearity has, however, been questioned and a more reciprocal

relationship between factors suggested (Mitchell et al., 1998). According to the model by Mitchell and colleagues (1998) the structure (system) and client factors are reciprocally related to outcomes on the one hand, and processes (interventions) on the other hand, meaning that the effects of the interventions on patient outcomes are not direct but mediated through client or system factors. When measuring quality it must be noted that some outcomes are not related to any intervention provided by health professionals (Cleary, 2011). This makes it complex to assess the process of care and to establish a link between process and outcome variables. In addition, the evaluation of both process and outcome variables is based on the perceived importance of the outcomes to either the individual or society (Larrabee, 1996), further complicating the evaluation of quality of care.

1.2 Pain

Pain is one of the main reasons why people seek health care (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006; Cordell et al., 2002; Mantyselka et al., 2001) and patients are exposed to various painful procedures and tests while hospitalized. Pain has an important protective role and is a prerequisite for humans to survive (Marchand, 2012). The International Association for the Study of Pain (1994) has defined pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”. This definition highlights the fact that pain is not merely a physical experience, but also a psychological

experience, and subjective in nature (Merskey, Bogduk, & the International Association for the Study of Pain Task Force on Taxonomy, 1994). Further signifying the subjectivity of the pain experience, in 1968 McCaffery defined pain as “whatever the experiencing person says it is, existing whenever he/she says it does” (in Herr, Coyne, McCaffery, Manworren, & Merkel, 2011). The Loeser model of pain, Figure 2, depicts the bio-psychosocial aspects of pain. At the core of the model is nociception, where the individual is exposed to a noxious stimulus. Following a response from the nociceptors the individual recognizes the stimulus as pain, and as the signals reach the brain both emotional and cognitive factors affect how the pain is perceived. The individual then responds to the pain by eliciting pain behavior such as facial or verbal expressions, seeking care, or otherwise acting on the situation (Loeser, 2000).

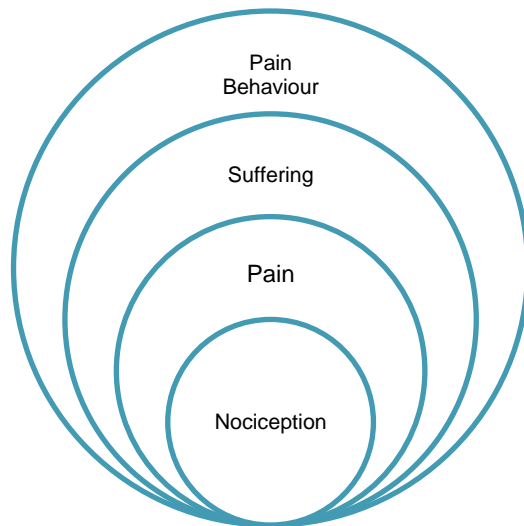


Figure 2. The Loeser Model of Pain

Pain is commonly divided into acute and chronic pain. Acute pain is pain of short duration (maximum of 30 days) that usually resolves as the body heals, such as surgical pain or pain resulting from a fractured bone. Chronic or persistent pain, on the other hand, has been defined as pain that lasts more than six months that may persist with or without obvious tissue damage. Arthritis and low back pain are examples (Marchand, 2012). Pain may also be categorized according to its pathophysiology. Nociceptive pain is “pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors.” In contrast, neuropathic pain is “pain caused by a lesion or disease of the somatosensory nervous system” (International Association for the Study of Pain, 2012).

1.2.1 Epidemiology of pain in the hospital setting

Studies show that pain is common in the hospital setting with pain prevalence ranging from 48-88% (Asmundsdottir, Gunnlaugsdottir, & Sveinsdottir, 2010;

Chung & Lui, 2003; Costantini, Viterbori, & Flego, 2002; Hansson, Fridlund, & Hallström, 2005; Lorentzen, Hermansen, & Botti, 2012; Maier et al., 2010; Melotti et al., 2005; Salomon et al., 2002; Strohbuecker, Mayer, Evers, & Sabatowski, 2005; Vallano et al., 2006) and that 25-47% of patients report severe pain while in the hospital (Apfelbaum et al., 2003; Costantini et al., 2002; Lorentzen et al., 2012; Maier et al., 2010; Melotti et al., 2005; Salomon et al., 2002; Sawyer, Haslam, Daines, & Stilos, 2010; Strohbuecker et al., 2005; Visentin, Zanolin, Trentin, Sartori, & de Marco, 2005; Wadensten, Fröjd, Swenne, Gordh, & Gunningberg, 2011).

Research indicates that pain tends to be more prevalent and severe in women compared to men (Apfelbaum et al., 2003; Asmundsdottir et al., 2010; Costantini et al., 2002; Gerbershagen et al., 2014; Melotti et al., 2005; Salomon et al., 2002; Vallano et al., 2006; Whelan, Jin, & Meltzer, 2004; Yates et al., 1998), although no differences (Strohbuecker et al., 2005) or contradictory (Visentin et al., 2005) results have also been reported. In a review by Berkley (1997) women were more likely to have pain at multiple sites, lower pain threshold, and decreased tolerance of pain compared to men in the experimental setting. Furthermore, a higher number of painful conditions are more prevalent in women compared to men. Other reviews have shown similar results (Fillingim, King, Ribeiro-Dasilva, Rahim-Williams, & Riley, 2009; Racine et al., 2012). Whether experimental pain compares to pain in the clinical setting, however, remains a question (Racine et al., 2012).

As with sex, age has been associated with pain related differences. In a review by Gibson and Helme (2001) on age-related differences in pain perception and report, higher age was usually associated with lower incidence rates, higher pain threshold, and less pain severity. A recent study showed that younger patients were more likely to suffer severe pain postoperatively than older patients (Gerbershagen et al., 2014). Conversely, several studies on pain in hospitalized patients have not shown any age-related difference in pain (Chung & Lui, 2003; Holtan et al., 2007; Strohbuecker et al., 2005; Visentin et al., 2005; Yates et al., 1998). In a mixed method study of 15 younger (39-55 years old) and 17 older (60-90 years old) cancer patients no difference was found in pain severity, but the younger group struggled more with adapting to the pain (Gagliese et al., 2009). There may be several reasons for age-related difference in pain, such as physiological changes in the skin, the sensory system, and the central nervous system that occur with increasing age (Gibson & Farrell, 2004). Furthermore, these factors are rarely acknowledged or corrected for in studies reporting on age and pain which may complicate interpretation of the

results. Methodological factors, like study design, recruitment bias, pain measurements, and diversity in grouping according to age, may also influence age-related difference in pain (Gagliese, 2009). It should also be kept in mind that negative results regarding age-related difference in pain may not be reported (Gagliese, 2009).

Although not universal (Maier et al., 2010; Trentin, Visentin, de Marco, & Zandolin, 2001; Visentin et al., 2005) pain tends to be more prevalent and severe in surgical patients compared to medical (Abbott et al., 1992; Costantini et al., 2002; Sawyer, Haslam, Robinson, Daines, & Stilos, 2008; Strohbuecker et al., 2005; Vallano et al., 2006). This is not surprising since surgery is inherently a painful procedure. Comparing medical and surgical patients is, however, not straightforward because of the great variety in how hospitals are organized and how samples in studies are comprised. Medical patients may be on surgical wards and vice versa (Apfelbaum et al., 2003; Costantini et al., 2002; Maier et al., 2010; Wadensten et al., 2011).

Several other variables, associated with pain, have been identified in the pain literature. Those include demographic variables such as level of education (Costantini et al., 2002; Whelan et al., 2004), and race (Whelan et al., 2004), and disease variables such as advanced disease (Holtan et al., 2007; Sigurdardottir & Haugen, 2008). Furthermore, preoperative anxiety (Ip, Abrishami, Peng, Wong, & Chung, 2009; Katz et al., 2005) and chronic pain (Gerbershagen et al., 2014) have been associated with increased postoperative pain. In the work presented here, the discussion of demographic variables will be limited to sex, age, and type of service.

1.3 Pain and quality

Pain management is an important quality issue for both patients and institutions (Bozimowski, 2012; Salomon et al., 1999). Improving the quality of pain management has been the focus of many studies and projects since the 90's, when the Agency for Health Care Policy and Research (AHCPR) published practice guidelines on managing acute and cancer pain (Carr et al., 1992; Jacox, Carr, Payne, & et al., 1994), followed by the American Pain Society (APS) guidelines on recommendation on improving the quality of acute and cancer pain management (Max et al., 1995; Ward & Gordon, 1994), and when the Joint Commission set pain management standards (Berry & Dahl, 2000). Similar developments have been evident around the world (Binhas et al., 2011; Idvall, Hamrin, Sjöström, & Unosson, 2001; Maier

et al., 2010; Pulver, Oliver, & Tett, 2012; The Canadian Pain Society, 2005; The Royal College of Anesthetists, n.d.) and steps have also been taken to improve the quality of care of patients with chronic pain (Institute of Medicine, 2011).

According to Gordon and colleagues quality pain management includes “appropriate assessment (e.g., screening for the presence of pain, completion of a comprehensive initial assessment when pain is present, frequent reassessments of patient’s responses to treatment); interdisciplinary, collaborative care planning that includes patient input; appropriate treatment that is efficacious, cost conscious, culturally and developmentally appropriate, and safe; and access to specialty care as needed” (Gordon et al., 2002, p. 118). The APS quality of care task force updated their recommendations on improving acute and cancer pain in 2005 (Gordon et al., 2005). According to the recommendations pain should be identified and treated promptly, patients and their families should be active participants in the pain care, treatment patterns should be improved, treatment plans should be reevaluated and adjusted to patients’ needs, and finally, process and outcome data should be monitored to assure and improve the quality of care. Efforts to improve care should be structured, continuous, and interprofessional, with the aim of improving the structure, process, and outcomes of care.

1.3.1 Recognition and prompt treatment of pain

Pain assessment is the first step in pain management and lays the foundation for adequate treatment (Breivik et al., 2008). The APS recommendations (Gordon et al., 2005) suggest routine screening for pain, followed by thorough assessment if pain is present. Similar recommendations can be found in various clinical guidelines on pain management (American Geriatrics Society Panel on the Pharmacological Management of Persistent Pain in Older Persons, 2009; Macintyre et al., 2010; Registered Nurses Association of Ontario, 2013; Scottish Intercollegiate Guidelines Network (SIGN), 2008; The American Society of Anesthesiologists Task Force on Acute Pain Management, 2012). The guidelines also stress the importance of using appropriate scales to measure pain severity, and standardized documentation of pain assessment. Furthermore, each health care setting should have a standard in place, defining when and how to assess and document pain to ensure appropriate practice (Gordon et al., 2005).

Pain severity is commonly used as an outcome measure of pain treatment, as is the impact of pain on both physical and emotional function (Dworkin et al., 2005). There are various scales and questionnaires available that assess pain. Some are multidimensional, like the McGill questionnaire, which describes the quality and severity of pain (Melzack, 1975), and the Brief Pain Inventory (BPI), which measures pain severity and the impact of pain on physical and emotional function (Cleeland, 1991). Other scales or instruments measure a single aspect of pain like the visual analogue scale (VAS) and the numeric rating scale (NRS) which measure pain severity (Breivik et al., 2008).

The NRS is one of the most commonly used scales to measure pain severity and has been found to be both valid and reliable in different patient and age groups (Brunelli et al., 2010; Gagliese, Weizblit, Ellis, & Chan, 2005; Wood, Nicholas, Blyth, Asghari, & Gibson, 2010). In a systematic review, on studies comparing scales for pain severity measures, the NRS was found to have good compliance and to be the tool of choice for patients compared to a verbal rating scale and VAS (Hjermstad et al., 2011). In a study of post operative patients (Gagliese et al., 2005) the NRS was superior to VAS (both vertical and horizontal), and a verbal descriptor scale, in relation to face, construct and criterion validity, as well as convergent and divergent abilities of the scale, irrespective of age. Furthermore, it had the lowest measurement error rate of the four scales. Another study found NRS to be the most responsive scale compared to VAS, verbal rating scale, and the Faces Pain Scale-Revised, in addition to being able to detect sex differences in pain intensity (Ferreira-Valente, Pais-Ribeiro, & Jensen, 2011). The NRS has also been found to be superior to a verbal rating scale (Brunelli et al., 2010), but Breivik and colleagues found VAS and NRS to be equally sensitive when measuring postoperative pain (Breivik, Björnsson, & Skovlund, 2000).

Pain severity is commonly graded as mild, moderate, and severe, but studies vary in which cut points are considered to represent mild, moderate, and severe pain. In their study on pain interference on function in cancer patients, Serlin and colleagues (1995) found a NRS score of 1-4 to represent mild pain, 5-6 moderate, and 7-10 as severe pain. Some studies have confirmed this finding (Li, Harris, Hadi, & Chow, 2007; Mendoza et al., 2004) while others have proposed slightly different cut points for pain severity (Dihle, Helseth, Paul, & Miaskowski, 2006; Jensen, Smith, Ehde, & Robinsin, 2001; Kapstad, Hanestad, Langeland, Rustoen, & Stavem, 2008). According to Jensen et al. (2001) however, the Serlin grading seems to hold in general although individual differences should be considered.

When assessing pain in research, patients are generally asked to recall their pain in a certain time frame like the past 24 hours. The validity of this method has been questioned. Broderik et al. (2006) interviewed 106 rheumatology patients with chronic pain and found that although 49% of the participants did not find it difficult to rate their pain in the past week, 31% had trouble doing so. In postoperative patients pain ratings in the past 24 hours seem to be valid, although memories of the worst pain and last pain experienced may have some effect on how the pain is remembered (Jensen, Mardekian, Lakshminarayanan, & Boye, 2008).

Prompt treatment of pain is important since unrelieved pain has many negative consequences, not only for the individual experiencing the pain, but also for health care institutions and the society as a whole. According to reviews pain affects the immune, cardiovascular, digestive, endocrine, nervous, respiratory, urinary, and muscular systems of the body resulting in decreased immune function, increased pulse and blood pressure, respiratory dysfunction, muscle weakness, and decreased intestinal motility to name but a few (Ballantyne et al., 1998; Dunwoody, Krenzischek, Pasero, Rathmell, & Polomano, 2008; Joshi & Ogunnaike, 2005; Volk et al., 2004). The effects can also be secondary such as atelectasis and venous thromboses resulting from inability to breathe deeply or ambulate because of pain (Dunwoody et al., 2008). Pain also negatively affects quality of life (Simsek et al., 2010; Skevington, 1998; Zoëga, Fridriksdottir, Sigurdardottir, & Gunnarsdottir, 2013), and can cause anxiety, depression (Joshi & Ogunnaike, 2005), sleep problems (Chouchou, Khoury, Chauny, Denis, & Lavigne, 2014; Smith & Haythornthwaite, 2004), and even chronic pain following surgery (Joshi & Ogunnaike, 2005; Kehlet, Jensen, & Woolf, 2006).

The effects of pain on health care institutions are mainly through increase in cost because of longer hospital stays (Husted et al., 2011; Pavlin et al., 2002) and number of pain-related readmissions (Cooley, Short, & Moriarty, 2003). Finally, the societal cost due to lost work hours and disability is enormous (Dagenais, Caro, & Haldeman, 2008; Moskovitz et al., 2011).

1.3.2 Patient satisfaction and participation in care

Patient satisfaction is commonly used to evaluate the quality of care, including quality of pain management (Gordon et al., 2002). Patient satisfaction has been defined as “the subjective, personal, evaluation of treatment effectiveness, health service and health care providers (Evans et

al., 2004, p. 255). Studies have shown a negative, albeit weak, relationship between pain severity and satisfaction (Bozimowski, 2012; McNeill, Sherwood, Starck, & Nieto, 2001; McNeill, Sherwood, Starck, & Thompson, 1998). Nonetheless, the use of patient satisfaction as an outcome measure to evaluate the effectiveness of pain management has been questioned since patients generally report being satisfied despite having experienced severe pain (Dawson et al., 2002; Gordon et al., 2002). Looking into these paradoxical findings has revealed that patients base their satisfaction ratings more on the relationship, trust, and communication with health-care professionals than the effectiveness of the pain treatment itself (Beck, Towsley, Berry, & et al., 2010; Carlson, Youngblood, Dalton, Blau, & Lindley, 2003; Dawson et al., 2002). Hansson and colleagues (2005) opted for leaving patient satisfaction out in their quality pain management questionnaire because of these issues. According to the APS guidelines patient satisfaction should not be evaluated as an outcome measure on its own (Gordon et al., 2005).

Since patient satisfaction may not necessarily reflect the efficacy of pain management, Gordon and colleagues (2002) suggested that assessing information given to patients about pain treatment options as well as patients' involvement in their pain care, might better portray QPM. Patient participation is based on an established, mutual relationship between the patient and the clinician where information is shared and the patient is empowered to participate in his care (Sahlsten, Larsson, Sjöström, & Plos, 2008). Sainio, Lauri, and Eriksson (2001) explored the experience and attitudes of cancer patients (N=34) towards decision making and participation in care. Their results showed that patients held different views. For some, participation included shared decision making while others did not express a desire to participate at all. Some patients were also willing to participate in nursing decisions, but not medical ones. For most, participation included asking questions and getting information. Among factors influencing active participation was mutual relationship with health-care professionals, having the necessary information, being assertive, good health, and encouragement from health-care professionals to participate. Arora and McHorney (2000) obtained similar results in their study on 2197 patients with various chronic health conditions. The majority of the patients preferred to leave medical decision making to their physician, although younger, and better educated patients preferred a more active role.

Studies show that patient participation in pain management, and perceived control, are associated with improved patient outcomes whether it

is acute or chronic pain (Borders, Xu, Heavner, & Kruse, 2005; Hanucharurnkui & Vinya-nguag, 1991; Hudcova, McNicol, Quah, Lau, & Carr, 2006; Pellino & Ward, 1998). Patient participation is, therefore, encouraged as a mean to achieve adequate treatment (Gordon et al., 2005; Macintyre et al., 2010). Jansen (2001) identified three major reasons for why patient participation is particularly important in pain management. Firstly, pain is inherently a subjective phenomena and only the person experiencing pain can truly describe how he or she is feeling, and how severe the pain is. Secondly, patients may harbor various beliefs and views that may act as barriers to pain management. Thirdly, no single intervention for pain is available that will fit most and, therefore, treatment must be individualized. These factors require open communication and active participation from both the health-care professional and the patient, termed deliberative decision making (Jansen, 2001). In their testing of an instrument purported to measure the quality of pain care, Hansson et al. (2005) found that patients were willing to participate in pain care given that they had received the necessary information. However, patients were not interested in either getting help searching for information or having access to analgesics they could administer when needed. The authors noted that assessing participation was complex because of the variability in patients' preferences for participation.

1.3.3 Managing pain

The APS recommendations promote the use of individualized, multimodal pain treatment, while avoiding ineffective and outdated practices like intra muscular injections and giving medications on as needed bases only (Gordon et al., 2005). According to clinical guidelines (American Geriatrics Society Panel on the Pharmacological Management of Persistent Pain in Older Persons, 2009; Macintyre et al., 2010; Registered Nurses Association of Ontario, 2013; Scottish Intercollegiate Guidelines Network (SIGN), 2008; The American Society of Anesthesiologists Task Force on Acute Pain Management, 2012) pain should be treated according to the type, severity, and duration of pain. For patients with constant pain it is recommended that patients are prescribed treatment around the clock with access to further analgesics on as needed basis. Multimodal treatment, defined as use of two or more different methods, both pharmacological and non-pharmacological, to treat pain (Hartrick, 2004), is a recommended practice (Joshi et al., 2014; The American Society of Anesthesiologists Task Force on Acute Pain Management, 2012). The advantages of multimodal treatment are primarily

the opioid sparing effects, reduction in side effects, and improved analgesia (Andersen, Nikolajsen, Haraldsted, Odgaard, & Søballe, 2013; Hartrick, 2004; Kang et al., 2013). Multimodal treatment, incorporating non-pharmacologic methods may also provide opportunity to address other aspects of the pain perception, namely the cognitive and emotional aspects of pain (Loeser, 2000; Pasero & McCaffery, 2010).

Patients do not respond in the same way to pain or pain treatment and hence the recommendations of the APS highlight the importance of reassessing pain and adjusting the treatment plan as necessary (Gordon et al., 2005). In addition to pain relief, it is necessary to assess the effect of the treatment on function, side effects, and possible adverse effects. Research shows that approximately 30-50% pain relief is considered important by patients (Cepeda, Africano, Polo, Alcala, & Carr, 2003; Farrar, Berlin, & Strom, 2003; Farrar, Portenoy, Berlin, Kinman, & Strom, 2000), the APS recommendations (Gordon et al., 2005) however warn against aiming for complete pain relief as this may be unrealistic.

1.3.4 Quality improvement

The final recommendation of the APS (Gordon et al., 2005) relates to the importance of continuous quality improvement. According to the recommendations a baseline data should be collected before starting a quality improvement project to identify the need for intervention and for comparison. Subsequent data collections should follow to monitor the effects of the interventions. Comparing the results to established criteria or quality indicators is important (Donabedian, 2005) and using validated tools for measurement is desirable (The Joint Commission, 2003).

Several instruments that measure some aspects of pain care quality are available. Evans and colleagues (2004) developed the Pain Treatment Satisfaction Scale (PTSS) that measures satisfaction with pain treatment in patients with both acute and chronic pain. Another instrument is the Strategic and Clinical Quality Indicators in Postoperative Pain management (SQIPP) (Idvall, Hamrin, & Unosson, 2002), aimed to measure pain management quality indicators in post operative patients. Yet another questionnaire is the Pain Care Quality survey (PainCQ). The instrument measures the quality of both nursing and interdisciplinary pain management in the hospital setting (Beck, Towsley, Pett, & et al., 2010). The Patient Pain Questionnaire (Hansson et al., 2005) is an instrument that measures pain severity, pain

interference with function, participation, and communication. One of the most commonly used instruments to assess QPM is the recently revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) (Gordon et al., 2010) that measures six aspects of pain care quality: The effects of pain on activities, sleep, and emotions; pain severity, use of non-pharmacological methods to treat pain; information regarding pain treatment options; participation in decision making; and side effects of treatment.

Various quality improvement projects have been undertaken to improve pain management (Binhas et al., 2011; Haller et al., 2011; Meissner et al., 2008; Pulver et al., 2012; Ward, Donovan, & Max, 1998). Still, treatment remains suboptimal as evidenced by frequent and often severe pain in hospitalized patients as previously mentioned (Benhamou et al., 2008; Maier et al., 2010; Sawyer et al., 2010). Factors identified as hindering improvements in pain management are, although not limited to, lack of administrative support, fear of legal consequences, failure to assess pain, lack of resources, and attitudinal barriers and insufficient knowledge in health care professional, patients, and relatives (Brockopp et al., 1998; Letizia, Creech, Norton, Shanahan, & Hedges, 2004; Oldenmenger, Silleviss Smitt, van Dooren, Stoter, & van der Rijt, 2009; Ward, Carlson-Dakes, Hughes, Kwekkeboom, & Donovan, 1998).

Health care is complex and multifaceted so system wide efforts that address care at all levels are needed for quality improvement (Gordon et al., 2005; Powell, Rushmere, & Davies, 2009; The Joint Commission, 2012). Several comprehensive quality improvement projects have been found to improve pain care, combining diverse modalities such as audit and feedback, clinical champions/opinion leaders, implementation of policies, staff education, treatment protocols, patient education, computerized decision support systems, and standards of care (Binhas et al., 2011; Haller et al., 2011; Meissner et al., 2008; Morrison, Meier, Fischberg, & et al., 2006; Usichenko et al., 2013). Single strategies such as staff education (Dalton et al., 2001), implementation of treatment protocols (Cleeland et al., 2005; Du Pen et al., 1999; Yang et al., 2013), and computerized reminders that alert staff to reassess patients with severe pain (Okon, Lutz, & Liang, 2009) may also enhance practices. Various quality improvement models are available, such as Lean, Six Sigma, Total Quality Management, and the Plan-Do-Study-Act quality cycle, that have been successfully used to improve the quality of health care (Powell et al., 2009). Identifying effective strategies for improvement is however difficult since studies in the field tend to be small (Goldberg & Morrison, 2007; Oldenmenger et al., 2009), because of great

variability in interventions (Gunnarsdottir & Gretarsdottir, 2011; Ista, van Dijk, & van Achterberg, 2013), because patient outcomes are not always measured (Gunnarsdottir & Gretarsdottir, 2011; Oldenmenger et al., 2009), and because interventions have failed to diminish pain severity (Goldberg & Morrison, 2007). Furthermore, there is also a gap in knowledge whether improvements in structure and process result in improved patient outcomes in relation to pain (Gordon et al., 2010). In a large project, aimed at improving the quality of postoperative pain management, Dahl and colleagues (2003) found, that despite significant improvements in both structural and process factors, no improvements were noted in patient outcomes. Stevenson et al. (2006) also found significant improvements in structural aspects, following their intervention aimed at improving the quality of pain management in small health care institutions, but the effects on patients' outcomes were minute, although statistically significant. A systematic review on pain management in hospitalized patients also failed to show a relationship between various process and outcome variables (Helfand & Freeman, 2009).

1.4 Summary

Quality in health care is a complex issue that is related to the patient's perception of care. Health care institutions should aim to provide timely, safe, effective, efficient, equitable, and patient centered services. The Donabedian framework is suitable to assess the quality of care. Pain management is an important factor in quality health care, especially in the hospital setting. Despite efforts in the past decades to improve the quality of pain management, pain remains prevalent in hospitals and a significant number of patients experience severe pain with consequent negative effects on their well-being. Recommendations for improvement by the APS include recognition and prompt treatment of pain, participation of patients and families in care, improving pain management practices, evaluating patient outcomes and adjusting the treatment plan accordingly, and finally continuous monitoring of both process and outcomes of care.

Measuring both pain and quality is complex, since both concepts are inherently subjective and therefore, related to individual and contextual differences. Efforts to improve the quality of pain management should aim for the structure, process, and outcomes of care, but little is known about the relationship between these factors in relation to pain management. Further studies are needed to explore these issues. The aim of this thesis is to define, explore, and assess QPM in the hospital setting.

2 Aims

The overall aim of this thesis is to define, explore, and assess quality pain management in the hospital setting.

2.1 Specific aims

The first aim was to gain an understanding of the QPM concept in the hospital setting, and to put forward a definition of it based on a concept evaluation (Study 1, Paper I). The following research questions were asked:

1. How can QPM in the hospital setting be defined?
2. Can QPM be operationalized?

The second aim of this study was to translate and test the psychometric properties of the APS-POQ-R-I, a questionnaire that measures QPM patient outcomes (Study 2, Paper II). For this aim the following research questions were asked:

1. How feasible is the APS-POQ-R-I instrument to measure QPM in hospitalized patients?
2. How valid is the APS-POQ-R-I instrument to measure QPM in hospitalized patients?
3. How reliable is the APS-POQ-R-I instrument to measure QPM in hospitalized patients?

The third aim was to assess QPM process and outcomes (Study 3, Papers III and IV). For this aim the following research questions were asked:

Outcomes (Paper III):

1. How prevalent is pain in medical and surgical patients hospitalized for at least 24 hours in LSH?
2. How severe is pain in medical and surgical patients hospitalized for at least 24 hours in LSH?
3. How much time do medical and surgical patients hospitalized for at least 24 hours in LSH spend in severe pain?
4. How much does pain interfere with activities, sleep, and emotions in medical and surgical patients hospitalized for at least 24 hours in LSH?

5. Do medical and surgical patients hospitalized for at least 24 hours in LSH experience side effects from pain treatment?
6. How satisfied are medical and surgical patients hospitalized for at least 24 hours in LSH with the results of their pain treatment?
7. For questions 1-6: Is there a difference in outcomes according to age, sex, and type of service (surgical/medical).
8. Is patient satisfaction and participation in decision making in medical and surgical patients hospitalized for at least 24 hours in LSH related to pain severity, time spent in severe pain, or pain relief?

Process (Paper IV):

1. Is documented pain assessment in medical and surgical patients hospitalized for at least 24 hours in LSH in accordance with recommendations in pain management guidelines?
2. Are medical and surgical patients hospitalized for at least 24 hours in LSH prescribed analgesics?
3. How are analgesics scheduled in medical and surgical patients hospitalized for at least 24 hours in LSH?
4. Do medical and surgical patients hospitalized for at least 24 hours in LSH use non-pharmacological methods to treat their pain?
5. Is the pain treatment multimodal in medical and surgical patients hospitalized for at least 24 hours in LSH?
6. How adequate is the analgesic treatment measured with the PMI in medical and surgical patients hospitalized for at least 24 hours in LSH?
7. Are medical and surgical patients hospitalized for at least 24 hours in LSH prescribed medications to treat common side effects of analgesics?
8. Are medical and surgical patients hospitalized for at least 24 hours in LSH able to participate in decisions regarding their pain treatment?
9. Do medical and surgical patients hospitalized for at least 24 hours in LSH receive information regarding their pain treatment options?
10. For questions 1-9: Is there an association between the measured variable and age, sex, and type of service (surgical/medical)?
11. Is there an association between number of medical and surgical patients hospitalized for at least 24 hours in LSH with an adequate score on the PMI and documented pain assessment?

3 Materials and methods

Both qualitative and quantitative methods were used to address the research questions put forward in the study. In this chapter the materials and methods according to the aims of the study will be discussed. An overview of materials and methods used in the three studies can be found in Table 1.

3.1 Evaluating and defining QPM (Study 1, Paper I)

3.1.1 Design

In this study concept evaluation as described by Morse et al. (1996) was used. A concept evaluation can be used to explore the composition of a concept to assess its maturity, before it is operationalized and consequently studied. The QPM concept was evaluated according to the core structures of a concept: preconditions, defining characteristics, definitions, boundaries, and outcomes (Morse et al., 1996). This method was chosen since QPM is a multidimensional concept that despite being commonly used has not been well defined in the literature.

3.1.2 Data sources

The literature was the source of data for this concept evaluation (Morse, 1995). The SciVerse, PubMed, Cinahl, ProQuest, and Google Scholar databases were searched for articles containing the key words “pain”, “quality pain management”, “quality of pain management”, “quality indicators”, “quality of health care”, and “quality improvement”, between 1995 and 2012. The search was further limited to adults and articles in English, Swedish, Danish, and Norwegian where applicable. Table 1 in Paper I gives an overview of the literature search.

The search revealed a vast (more than 5000) number of published articles for the search terms. In order to refine the search, the matching sentences or paragraphs in SciVerse were used to identify articles that specifically focused on the topic, starting with articles that contained the terms “quality pain management” or “quality of pain management”. Furthermore, the articles had to focus on both pain and quality in the hospital setting, and had to have been published either by an official organization or in peer reviewed journals. Articles describing questionnaires measuring pain and quality were used to

identify defining characteristics of QPM (Morse et al., 1996). Articles of interest were further searched for related articles, and reference lists were checked for material of interest. Data were collected until new material was not providing new information (data saturation) (Munhall, 2007). The final number of analyzed articles was 37.

3.1.3 Data analysis

The matrix method (Garrard, 2007) was used to extract and organize data according to the headings: settings and participants, methods and measurement, definitions of QPM (explicit or implicit, QPM characteristics, and conclusion/outcomes. Data was then synthesized according to the building blocks of a concept: definition, characteristics, boundaries, preconditions, and outcomes.

Selection of articles and review of the literature is inevitably subjected to some bias. To ensure validity, the literature search was broad, and co-authors validated the coding of the first author for five randomly selected articles (Morse, 2000).

Table 1. Overview of the research aims, designs, setting, samples, measures, and analyses in Papers I-IV

	Study 1 (Paper I)	Study 2 (Paper II)	Study 3 (Papers III & IV)	
Aims	To explore and define QPM in the hospital setting	To test the psychometric properties of the APS-POQ-R	To evaluate QPM processes and outcomes in the hospital setting	
Research design	Concept evaluation	Descriptive, cross sectional	Descriptive, correlational, point prevalence	
Setting	Not applicable	LSH, a 650 bed university hospital. The hospital is the largest in Iceland and covers most major surgical and medical specialties		
Data sources/sample	The literature	Patients The hospital's Data Warehouse	Patients Medical records The hospital's Data Warehouse Medication Database	
Measures	Data were extracted according to the five building blocks of a concept: definition, characteristics, preconditions, boundaries and outcomes	Feasibility questionnaire APS-POQ-R-I pro-type	APS-POQ-R-I PMI Pain assessment checklist Demographic and clinical checklist Medication data checklist	
Number of participants	37 articles selected for analyses	210 eligible 143 lists analyzed 68% response rate	Paper III: 420 eligible 308 participated 73% response rate	Paper IV: 395 eligible 282 participated 71% response rate
Analyses	Data were synthesized according to the headings in the data matrix	Descriptive statistics Mann Whitney <i>U</i> Spearmans <i>rho</i> Chi square χ^2	Descriptive statistics Mann Whitney <i>U</i> Chi square χ^2 Odds ratio with 95% confidence interval	
Reliability & validity issues	Coding of five articles verified by co-authors	Structured training of data collectors	<ul style="list-style-type: none"> -Structured training of data collectors -Preventive measures to prevent Hawthorne effect -One researcher oversaw all data entry of documentation data to ensure consistency -Validation of medication data 	

3.2 Testing the psychometric properties of the APS-POQ-R-I (Study 2, Paper II)

3.2.1 Design, setting, and sample

The design was cross-sectional and descriptive, suitable to describe variables and the relationship between them (Polit & Beck, 2012).

The setting was LSH, a 650 bed university hospital. The hospital is the largest in Iceland and covers most major surgical and medical specialties. At the time of study, the hospital had an Acute Pain Service in place, providing care to patients with patient controlled analgesia (PCA) and epidurals, and a palliative care team that provided services to a selected group of patients. No general consulting pain team was available at the time of study, nor were there chronic pain services in place. Policies and procedures on pain assessment and management were scarce in the hospital, except regarding treatment with PCA and epidural.

Data were collected in 23 medical and surgical inpatient wards in the summer of 2010. The sample consisted of patients 18 years and older, hospitalized for at least 24 hours, who understood Icelandic and were not too ill to participate according to the evaluation of the head nurse or his/her substitute. Only patients, who had experienced pain ≥ 1 on 0-10 scale in the past 24 hours, were included.

To have an adequate sample size for factor analysis of 18 variables the aim was to collect data from at least 150 patients (Field, 2005; Kline, 1994). Of 210 available subjects, 154 answered the questionnaire. Eleven questionnaires were eliminated because patients did not have pain in the past 24 hours, data were inconsistent, or because of cognitive issues. One questionnaire was empty. The final number of participants was therefore 143 (response rate = 68%).

3.2.2 Translation of the APS-POQ-R and measures of feasibility

The American Pain Society Patient Outcome Questionnaire (APS-POQ) was originally developed by the American Pain Society and is in part based on questions from the Brief Pain Inventory questionnaire (BPI) (Max et al., 1995). The questionnaire has been translated and used in several studies worldwide (Dihle, Helseth, Kongsgaard, Paul, & Miaskowski, 2006; McNeill et al., 1998; Rothaug et al., 2013), including Iceland (Asmundsdottir et al., 2010; Kristjansdottir, Qvindesland, & Kristinsdottir, 2000).

The questionnaire was recently revised to reflect current quality improvement guidelines (Gordon et al., 2010). The revised version contains 12 questions with a total of 23 items, and measures six dimensions of pain care quality: pain severity and relief; use of non-pharmacological methods; the effects of pain on emotions, sleep and activities; side-effects from pain treatment; patient participation in decision making; and information about pain management. Pain severity, interference, helpfulness of information, participation in treatment decisions, and satisfaction are scored on a 0-10 scale, with 0 meaning “does not interfere” and 10 = “completely interferes” as an example. The items time spent in severe pain and pain relief are scored on a 0-100%, with 0 anchored as “never in severe pain” or “no relief”, and 100% as “always in severe pain” or “total relief”. Items querying if patient received information about pain treatment or if he/she used non-pharmacological methods for pain were answered with yes or no. If patients had used non-pharmacological methods they were asked to mark which method from a list, or write it down if not included in the list. A question asking how often physicians or nurses encouraged the use of non-pharmacological methods, was answered with “never”, “sometimes”, or “often”.

A permission to translate and use the instrument was obtained from one of its developers (Debra B. Gordon). The questionnaire was translated according to an adapted version of the method described by Brislin et al. (Jones, Lee, Phillips, Zhang, & Jaceldo, 2001). Two bilingual nurses translated the questionnaire back and forth. An older Icelandic version of the APS-POQ (Kristjansdottir et al., 2000) and the Icelandic version of the BPI (Gunnarsdottir, Ward, & Serlin, 2008) were used to guide the translation of the revised questionnaire. Since these questionnaires, containing the same or similar questions were available for comparison, only one round of translations was performed. The translations were then reviewed by a panel of the researchers and bilingual experts to reach a consensus on the final version of the translations.

The feasibility of the APS-POQ-R-I was measured with a five item questionnaire. One item queried how long it took to fill out the APS-POQ-R-I in minutes. For the other items participants marked on a 1-5 Likert scale whether they felt it was easy to fill out the questionnaire, if the questions were clear and easy to understand, if it was easy to answer the questions, and if they felt the questions were annoying. The options ranged from “totally agree” (1) to “totally disagree” (5).

3.2.3 Analysis

Descriptive statistics (number, percentage, mean, standard deviation) were used to portray demographic variables, feasibility questions, and the scoring of individual items, and subscales of the questionnaire. Since most of the data were skewed, non-parametric tests, Mann Whitney *U* and Spearman's ρ , were used to test the association between variables (Grimm, 1993). Significance level was set at $p \leq .05$.

To match the original testing of the revised questionnaire (Gordon et al., 2010), a confirmatory principal component analysis on 18 continuous items, with varimax rotation, was used to test the construct validity of the APS-POQ. Since the confirmatory analysis did not entirely support the original results, an exploratory principal analysis, with varimax rotation, was run after removing the four items that lowered the reliability. Therefore, a total of 14 items were used in the exploratory analysis. Cases were excluded pair-wise in both the confirmatory and the exploratory analyses. The determinant of the anti image matrix was used to check for multicollinearity (Field, 2005).

The internal consistency of the questionnaire was tested with Cronbach's alpha, inter-item correlation, and item-total correlation. A value of $\geq .70$ for Cronbach's alpha and $\geq .30$ for inter-item and item-total correlations was considered acceptable (Polit & Beck, 2012). Scoring for individual items were converted where needed, so each scale was scored in the same direction (Field, 2005), and in line with Gordon et al. (2010) the 0-100% scales were converted to 0-10. The IBM's SPSS software, version 19.0, was used for analysis.

3.3 Assessing pain management process and outcomes (Study 3, Papers III and IV)

3.3.1 Design, setting, and sample

This was a descriptive, correlational, point prevalence study conducted in January 2011. This design is suitable to describe a population or phenomena of interest, in this case pain and pain management, and the relationship among variables. The design does however, not allow for testing of causal relationships between variables (Brink & Wood, 1998; Polit & Beck, 2012).

The setting was the same as for Paper II, described in chapter 3.2.1. The inclusion criteria for the consecutive sample were also the same as in Study 2, except patients without pain could participate in Study 3. Patients who had

undergone surgery in the past 24 hours were excluded from analysis in Paper IV. This was done since the purpose of the study was to assess pain management on the wards rather than during surgery and in recovery.

3.3.2 Measures

Data were collected from patients, medical records, the hospital's data warehouse, and the medication software used in LSH (Therapy©).

3.3.2.1 Patient questionnaire (APS-POQ-R-I)

Patient data were collected with the APS-POQ-R-I tested in study II. The Icelandic version is composed of 25 items. Two items ask about least and worst pain, two more items concern time spent in severe pain and pain relief, and eight items query about the interference from pain on activities, sleep, and emotions. Four items relate to side effects from the pain treatment. Patients are asked if they received analgesics or used non-pharmacological methods for their pain. Patients stating they used non-pharmacological methods either mark the method they used from a list or write it down if not in the list. Patients also marked if a nurse or a physician encouraged the use of non-pharmacological methods. Other items concern information about available pain treatment and the usefulness of the information, if the patient was able to participate in pain treatment decisions, or did not wish to participate, and patient satisfaction. Scoring of individual items is explained in Papers III and IV.

3.3.2.2 Demographic and clinical data

Demographic data on education, marital and employment status were collected from patients, but information about age, residency, and sex were retrieved from the hospital data warehouse. Age was grouped into 18-74 years old, and 75 years and older (frail elderly), in accordance with the American Geriatrics Society guidelines on pharmacological pain treatment in the elderly (American Geriatrics Society Panel on the Pharmacological Management of Persistent Pain in Older Persons, 2009). Type of service was categorized as surgical (all surgical wards) and medical (oncology, palliative, internal medicine, rehabilitation, geriatrics, and cardiology).

Data on ICD diagnoses, length of stay, readmissions, time from diagnosis, and type of admission (acute, scheduled), were collected from the hospital's data warehouse with a checklist made by the researchers.

Medication data were collected with a checklist made by the researchers. Data were collected on both prescribed and administered drugs according to the Anatomical Therapeutic Chemical classification system. Information about route of administration and dose was also collected. Analgesics were categorized as non-opioids, weak opioids, strong opioids, neuropathic drugs, and local anesthetics, as described in Paper IV. The time frame was from 08:00 AM the day before the data collection, to 08:00 AM on the day of the data collection, to match the time frame the patients were reflecting on their pain.

Data on pain assessment documentation from medical records were also collected with a checklist made by the researchers. Prior to data collection the checklist was tested for applicability by members of the research team. Items in the checklist were based on recommendations in clinical guidelines on pain management as suggested (Banks, 1998) and queried if some form of pain assessment had been documented; if standardized scales to measure pain severity had been utilized; if the location, description, timing of assessment (before or after pain treatment), patient's position while assessed (resting, moving, coughing) were documented; if non-pharmacological methods for pain were used, and other documentation of pain.

3.3.2.3 Multimodal Therapy

Two multimodal variables were calculated. One including medications from two or more classes of analgesics (denoted multimodal-MEDS), and another including both medications and non-pharmacological methods (multimodal-NonPh). Results are reported for both prescribed and administered multimodal therapy.

3.3.2.4 Pain Management Index (PMI)

The PMI was used to assess the adequacy of the pain treatment. The index was modified to meet the criticism that the PMI does not reflect treatment for neuropathic pain or other difficult pain conditions (Apolone et al., 2009; Radbruch et al., 1999; Strohbuecker et al., 2005) as described in Paper IV. Two different versions of the modified index were calculated from a) prescribed analgesics as described by Cleeland (denoted PMI-Cn) (Cleeland et al., 1994), and b) administered analgesics as used by Ward (PMI-Wn) (Ward et al., 1993).

The PMI is based on the World Health Organization analgesic ladder (World Health Organization, 1996). The index is calculated by extracting the

pain severity score from the analgesic score. A negative score indicates inadequate treatment, while a score of 0 and above represents adequate treatment (Cleeland et al., 1994). In our study non-opioids were scored as 1, weak opioids as 2, and strong opioids, neuropathic drugs, and local anesthetics as 3. For pain severity, mild pain was scored as 1, moderate as 2, and severe pain as 3. Hence, a patient experiencing severe pain (=3) and prescribed or administered a NSAID drug (=1) would have a PMI score of -2, and the treatment would be considered inadequate. A patient with severe pain (=3) who was prescribed or administered morphine (=3) would however get a PMI score of 0, and his treatment would be said to be adequate since it matched the severity of the patient's pain.

3.3.3 Procedures

Data were collected simultaneously on the 23 participating wards on two days, a week apart. This was done to ensure that data were not collected on an "atypical" day. Patients could participate on both days, if still hospitalized, but only data from the former day was used for analysis. The head nurse in each ward knew of the data collection a few days in advance, but was instructed not to inform the staff of the dates since it might affect how they treated or documented their care.

The head nurse or her substitute screened patients for eligibility on the morning of data collection. Patients interested in participation were met by a data collector who explained the study in more detail. Those who agreed to participate signed an informed consent form and filled out the questionnaire with or without the assistance of the data collector.

A staff member of the Finance and Information Services extracted the data from the data warehouse, and a system data analyst retrieved data from the medication software. Selected data collectors gathered data on pain assessment documentation from the medical records.

All data collectors took part in a two hour training session where the researchers explained the informed consent form, the APS-POQ-R-I, and the pain assessment checklist. One person was specially trained to gather data from computerized data regarding pain assessment. A more detailed description of the data collection procedure is found in Paper III.

3.3.4 Analysis

Descriptive statistics (frequency, mean, median, range, standard deviation) were used to portray demographics, items in the APS-POQ-R-I, pain

assessment, and medication variables. Unadjusted odds ratios with 95% confidence intervals were calculated for 2x2 crosstabs. Inferential statistics (Chi-square, Spearman's ρ , and Mann-Whitney U) were used to test the association between variables. Non-parametric tests were used since data were usually skewed (Grimm, 1993). Bonferroni correction was used for 2x3 Chi-square tests to control for type I error (Field, 2005). Level of significance was set at $p \leq .05$. The IBM SPSS software, versions 20, was used to analyze data.

3.4 Ethics

The study on the psychometric properties of the APS-POQ-R-I (paper II) was approved by the Institutional Review Board (IRB) of LSH (25/2010), and reported to the Data Protection Authority. Relevant executives of LSH also gave their permission, and head nurses and physicians approved the data collection in the participating wards. Participants received an introductory letter, but returning the questionnaire was viewed as consent for participation. Questionnaires were anonymous.

The study on pain management processes and outcomes was approved by the Data Protection Authority (2010111016VEL), the IRB of LSH (52/2010), and relevant executives of the hospital. Participants received an introductory letter and signed an informed consent form. Participants could consent to a) answering the questionnaire, b) give access to their medical record, or c) both. Each participant received a research number that was used to code their questionnaires and electronic data.

4 Results

The main results of the study are presented. For more detailed results, see the respective publications (Papers I-IV)

4.1 Evaluating and defining QPM (Study 1, Paper I)

Only one explicit definition of QPM was found in the literature. Yet the concept is somewhat mature as evident by its frequent use in research, and similarities in defining characteristics in questionnaires used to evaluate the quality of pain management or satisfaction with care. QPM is often viewed as synonymous with patient satisfaction although the latter should rather be viewed as an outcome of QPM.

In line with the Donabedian model, the QPM concept in the hospital setting can be defined as “a multifaceted concept relating to the structure, process and outcomes of care, consisting of organizationally supported evidence-based policies, competent staff that works efficiently together, interprofessional and specialized care or referral to meet the needs of the patient population being served, staff accountability; screening, assessment, reassessment and communication of pain and its treatment, patient and family education, individualized and evidence-based treatment, embedded in safe, effective, patient-centered, timely, efficient, and equitable services; resulting in reduced pain severity and functional interference, decreased prevalence and severity of adverse consequences from pain or pain

treatment, and increase in patient satisfaction with pain management” (Paper I). Figure 3 shows the conceptual model.

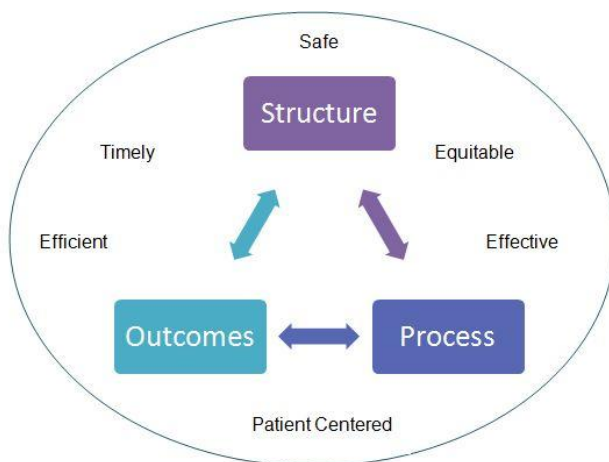


Figure 3. Quality Pain Management in Hospitalized Adults

4.2 Testing the psychometric properties of the APS-POQ-R-I (Study 2, Paper II)

The response rate was 68%. Participants (N=143) had a mean age of 66.2 years (SD=17.9), range 19-100 years, and gender proportions were nearly equal. An overview of the participants is in Table 2.

Table 2. Demographic variables in Study 2 (N=143)

		n (%) ^a	
Sex	Men	67 (47)	
	Women	71 (50)	
	Missing	5 (4)	
Age	18-74	51 (36)	
	75-100	84 (59)	
	Missing	8 (6)	
Services	Type of ward (n)		
	Medical	Total (16)	96 (67)
		Rehabilitation (1)	8 (8)
		Oncology and palliative (4)	19 (20)
		Internal medicine (7)	47 (49)
	Surgical	Geriatric (4)	22 (23)
		Total (7)	47 (33)
		General, urology, gynecological (3)	25 (53)
		Heart, eye & lung (1)	8 (17)
		Orthopedic & brain/ neurosurgery (2)	9 (19)
Ear-nose-throat, vascular, & plastic (1)		5 (10)	

^a Because of rounding percentages may not add to exactly 100%

4.2.1 Feasibility

The questionnaire was found to be feasible. In general, patients had little trouble understanding the instructions or questions, Table 3. Exceptions were two questions where patients were asked to rate their pain relief or time spent in severe pain proportionally.

	Agree n (%*)	Neutral n (%*)	Disagree n (%*)	Missing n (%*)
Instructions were clear and easy to follow	103 (72)	26 (18)	5 (4)	9 (6)
The questions were clear and understandable	118 (83)	15 (10)	6 (4)	4 (3)
It was easy to answer the questions	110 (77)	16 (11)	13 (9)	4 (3)
It was annoying to answer the questions	17 (12)	8 (6)	113 (79)	5 (4)
*Because of rounding percentages may not add to exactly 100%				

4.2.2 Validity and reliability

The confirmatory principal component analysis partially supported the factor structure in the original version of the questionnaire. The five factor structure explained 63% of the variance, Cronbach's alpha was .42. Reliability analyses showed that four items considerably lowered the Cronbach's alpha: time spent in severe pain, pain relief, participation in treatment decisions, and satisfaction with the pain treatment. These four items were therefore removed and an exploratory principal component analysis with the remaining items was run. The result of that analysis showed a four factor structure: "pain severity and activity interference", adverse effects", "affective", and "sleep interference", each with an Eigenvalue >1, and Cronbach's alpha >.7. This four factor structure explained 64% of the variance and had a Cronbach's alpha of .84. Table 4 shows the initial and final component loadings. A question about analgesics use and the option of answering the question about participation in decision making with "I did not want to participate" were added according to patients' recommendations. Therefore, the Icelandic version of the APS-POQ-R contains 25 items in total. For more detailed description of the results, see Paper II.

Table 4. Initial and final component loadings, variance, and internal consistency of the APS-POQ-R-I (Study 2, Paper II)

	Components									
	Pain severity and activity interference		Adverse effects		Affective		Sleep interference		Perceptions of care	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final
Variance explained	29%	34%	11%	12%	9%	11%	8%	8%	7%	Nsp
Cronbach's alpha	.42	.78	.75	.75	.65	.78	.86	.86	.13	Nsp
Number of items	6	5	4	4	4	3	2	2	2	Nsp
	Component loadings									
Least pain	<u>.608</u>	<u>.514</u>	.100	.029	.025	.136	-.126	.042	-.429	Nsp
Worst pain	<u>.739</u>	<u>.735</u>	.134	.119	.106	.125	-.039	.011	.004	Nsp
Percentage of time spent in severe pain	<u>.680</u>	Ex	.021	Ex	.237	Ex	.186	Ex	-.266	Nsp
Pain interference with activities in bed	<u>.679</u>	<u>.773</u>	.073	.094	.117	.078	.249	.170	.190	Nsp
Pain interference with activities out of bed	<u>.735</u>	<u>.772</u>	.154	.152	.057	.042	.276	.269	.189	Nsp
Pain interference with falling asleep	.335	.241	.176	.119	.070	.119	<u>.732</u>	<u>.829</u>	-.198	Nsp
Pain interference with staying asleep	.284	.203	.246	.209	.097	.120	<u>.815</u>	<u>.881</u>	-.064	Nsp
Pain causing anxiety	.179	.148	.151	.124	<u>.810</u>	<u>.852</u>	-.103	-.051	-.222	Nsp
Pain causing depression	.167	.120	.211	.179	<u>.726</u>	<u>.769</u>	.165	.234	-.047	Nsp
Pain causing fear	.256	.194	.036	.027	<u>.793</u>	<u>.798</u>	.077	.131	.068	Nsp
Pain causing helplessness	<u>.582</u>	<u>.591</u>	.110	.101	.270	.264	.369	.373	.062	Nsp
Severity of nausea	.125	.235	<u>.720</u>	<u>.760</u>	.143	.086	-.010	-.107	.087	Nsp
Severity of drowsiness	.172	.154	<u>.686</u>	<u>.681</u>	.150	.140	.268	.304	.152	Nsp
Severity of itching	-.020	-.029	<u>.705</u>	<u>.693</u>	.022	.049	.082	.099	-.277	Nsp
Severity of dizziness	.134	.106	<u>.809</u>	<u>.801</u>	.069	.094	.107	.165	.107	Nsp

Pain relief in %	.335	Ex	.299	Ex	-.129	Ex	-.327	Ex	<u>.571</u>	Nsp
Participation in pain treatment decisions	-.043	Ex	.003	Ex	-.015	Ex	-.038	Ex	<u>.775</u>	Nsp
Satisfaction with pain treatment	-.130	Ex	-.010	Ex	<u>.406</u>	Ex	.337	Ex	.092	Nsp

Kaiser-Meyer-Olkin measure of sampling adequacy: Initial: .746 Final .727

Bartlett's test of sphericity: Initial: $\chi^2 (153) = 781.2, p < .001$ Final: $\chi^2 (153) = 716.0, p < .001$

Underlined bold values are items with component loadings $>.400$

Ex=Excluded in the final analysis because of low reliability

Nsp = Not supported in the final analysis

4.3 Assessing pain management outcomes (Study 3, Paper III)

The response rate in was 73%. Participants (N=308) had a mean age of 67.5 (SD 17.4) years, range 18-100, and 208 (68%) were on medical services, table 5. The median length of stay was 11 days, ranging from 1-234.

Table 5. Demographic variables in Study 3

		Paper III	Paper IV	
Total number of participants (N)		308	282	
		n (%) ^a	n (%) ^a	
Sex	Men	152 (49)	143 (51)	
	Women	155 (50)	138 (49)	
	Missing	1 (<1)	1 (<1)	
Age	18-74	175 (57)	150 (53)	
	75-100	133 (43)	132 (47)	
Employment status	Employed	76 (25)	63 (22)	
	Unemployed/disability/other	64 (21)	58 (21)	
	Retired	166 (54)	161 (57)	
	Missing	2 (1)	0 (0)	
Education	Elementary school	132 (43)	123 (44)	
	High school/ technical /other ^b	124 (40)	113 (40)	
	University	50 (16)	45 (16)	
	Missing	2 (1)	1 (<1)	
Marital status	Married/cohabiting	161 (52)	141 (50)	
	Single/divorced/widowed	145 (47)	140 (50)	
	Missing	2 (1)	1 (<1)	
Services	Type of ward (n)			
	Medical	Total (16)	208 (68)	203 (72)
		Rehabilitation (1)	17 (8)	17 (8)
		Oncology and palliative (4)	32 (15)	29 (14)
		Internal medicine (7)	116 (56)	114 (56)
		Geriatric (4)	43 (21)	43 (21)
	Surgical	Total (7)	100 (33)	79 (28)
		General, urology, gynecological (3)	50 (50)	34 (43)
		Heart, eye & lung (1)	14 (14)	13 (16)
		Orthopedic & brain/ neurosurgery (2)	26 (26)	23 (29)
		Ear-nose-throat, vascular, & plastic (1)	10 (10)	9 (11)

^a Because of rounding percentages may not add to exactly 100%.

^b Generally 1-2 years in addition to elementary school.

Data from the hospital data warehouse for the participating wards in the year 2011 (the population) were compared to the sample for Paper III (not Paper IV since patients having operation within the past 24 hours were excluded) see Table 6. The sample was representative of patients admitted to the participating wards in the year 2011 except for length of stay which was expected since only patients who had been in the hospital for at least 24 hours in our sample were included.

Table 6. Demographics for the population versus sample (Study 3)

		Population	Sample	p
Mean length of stay in days		14.7	24.8	<.001
Mean age		65.4	67.5	NS
		n (%)	n (%)	
Sex	Men	8391 (47)	152 (49)	NS
	Women	9296 (53)	155 (50)	
	Missing	5 (<1)	1 (<1)	
Marital status	Married/cohabiting	5695 (47)	161 (52)	NS
	Single/divorced/widowed	6145 (52)	145 (47)	
	Missing	161 (1)	2 (1)	
NS = not significant				

The pain prevalence in the past 24 hours in both surgical and medical wards was 83% (n=255). The mean worst pain severity was 4.6 (SD 3.1). Pain interference on activities, sleep, and emotions was generally mild, ranging from 2.0-3.4 on a 0-10 scale. Thirty percent of patients (n=75) said they received information about their pain treatment options and 23% (n=56) reported they were not willing to participate in decisions regarding the pain management. Descriptive results of the outcome variables are presented in Table 7.

Patient satisfaction was associated with less severe pain, shorter time spent in severe pain, and increased pain relief. The relationship was weak. Similarly, patient participation in decision making was weakly associated with less time spent in severe pain and increased pain relief. Table 8 shows the correlation between patient satisfaction and participation in treatment decisions with pain relief, pain severity, and time spent in severe pain.

Pain was more prevalent in women and surgical patients compared to men and medical patients, but the effect sizes were low. Similarly, patients aged 18-74, women, and surgical patients, experienced more severe pain than those 75 years and older, men, and medical patients. Again the effect sizes were low, table 9. A more detailed description of the results can be found in Paper III.

Table 7. Descriptive results for outcome variables in hospitalized medical and surgical patients (Study 3, Paper III)			
QPM aspects	Measured with	N	n (%)
Prevalence of pain	Patients reporting pain ≥ 1 on a 0-10 scale	308	255 (83)
Prevalence of adverse effects	Patients reporting side effects	240	130 (54)
Communication of pain and its treatment*	Received information about pain treatment	247	75 (30)
	Did not want to participate in decision making	247	56 (23)
		Scale	Mean (SD)
Pain severity	Least pain severity	0-10	1.4 (1.7)
	Worst pain severity	0-10	4.6 (3.1)
	Time spent in severe pain	0-100%	26 (27)
	Pain relief	0-100%	63 (33)
Patient satisfaction	Patient satisfaction	0-10	6.4 (3.8)
Patient participation	Participation in decision making regarding pain	0-10	5.8 (4.1)
Functional interference	Activity interference	0-10	3.4 (3.0)
	Sleep interference	0-10	2.8 (3.2)
	Affective interference	0-10	2.0 (2.4)
Severity of adverse effects	Severity of side effects	0-10	1.3 (1.7)

*Process variable but reported with outcomes in Paper III

Table 8. Correlation (Spearman's ρ) between patient satisfaction and participation with pain severity, time spent in severe pain, and pain relief in hospitalized medical and surgical patients (Study 3, Paper III)		
	Patient satisfaction	Patient participation
	ρ (n)	ρ (n)
Least pain severity	-.206 (237)*	-.156 (189)
Worst pain severity	-.277 (240)*	-.029 (191)
Time spent in severe pain	-.307 (230)*	-.204 (182)*
Pain relief	.217 (219)*	.274 (176)*

*Significant at the 0.01 level (two-tailed)

Table 9. Outcome variables associated with age, sex, or type of service in hospitalized medical and surgical patients. Descriptive results and effect sizes (Study 3, Paper III)

Variables	18-74	75-100	Men	Women	Medical	Surgical
Prevalence of pain, n (%)	151 (87)	104 (78)	118 (78)	136 (88)	166 (80)	89 (90)
OR (95% CI)	.55 (.3-1.0)		2.0 (1.1-3.7)		2.3 (1.1-4.7)	
Least pain severity, median (range)	1 (0-10)	0 (0-7)	1 (0-10)	1 (0-7)	1 (0-10)	2 (0-7)
<i>R</i>	-.13		-.12		-.20	
Worst pain severity, median (range)	5 (0-10)	4 (0-10)	4 (0-10)	5 (0-10)	4 (0-10)	5 (0-10)
<i>R</i>	-.13		-.12		-.15	
Pain relief, median (range)	70 (0-100)	80 (0-100)	NA		NA	
<i>R</i>	-.17					
Patient satisfaction, median (range)	7 (0-10)	9 (0-10)	NA		NA	
<i>R</i>	-.16					
Sleep interference, median (range)	2.5 (0-10)	0.3 (0-10)	NA		NA	
<i>R</i>	-.28					
Affective interference, median (range)	NA		0.8 (0-9)	1.7 (0-9.3)	NA	
<i>R</i>			-.17			
Severity of side effects, median (range)	1 (0-8.8)	0.3 (0-5.3)	NA		NA	
<i>R</i>	-.17					
Number (%) of patients who received information	60 (42)	15 (14)	NA		NA	
OR (95% CI)	.23 (.12-.43)					
Participation in decision making, median (range)	8 (0-10)	5 (0-10)	NA		NA	
<i>R</i>	-.16					

OR = Odds Ratio CI = Confidence Interval r = Correlation Coefficient NS = No Association

4.4 Assessing pain management process (Study 3, Paper IV)

The response rate was 71%. Total number of participants was 282 and mean age was 68.9 (SD = 17.0), range 18-100, and 203 (72%) were on medical services. The median length of stay was 11 days, ranging from 1-234 days. An overview of the participants is in Table 5.

The majority of patients (85%, n=239) were prescribed analgesics and 78% (n=219) were prescribed adequate treatment that matched the pain severity (PMI-Cn). Administered treatment was adequate in 64% (n=159) of patients (PMI-Wn). Pain assessment was documented for 57% (n=160) of patients, of those validated scales to measure pain severity were used in 27% (n=43) of instances. Descriptive results of the pain management process variables are presented in Table 10.

Patients on surgical wards were more likely to have documented pain assessment, to have multimodal treatment prescribed, and to have adequate PMI (both prescribed and administered) than medical patients. Table 11 shows descriptive results and the effect sizes for the process variables associated with type of service. No association was found between sex and process variables but patients aged 75 and older were less likely to report using non-pharmacological methods than patients aged 18-74 years (OR .40, 95% CI .24-.68). Similarly, the older age group was less likely to be prescribed (OR .43, 95% CI .25-.74) or administered (OR .33, 95% CI .18-.59) multimodal-non-pharmacologic treatment.

Patients with documented pain assessment were more likely to receive adequate treatment than those without (OR 1.90, 95% CI 1.1 – 3.27). This was particularly true for documented use of pain severity scales (OR 3.44, 95% CI 1.38-8.60). No association was however found between the adequacy of prescribed analgesics and documented pain assessment.

Table 10. Descriptive results for process variables in hospitalized medical and surgical patients (Study 3, Paper IV)			
QPM aspects	Measured as	N	n (%)
Screening	Number of pain assessments	282	160 (57)
Assessment	Documented pain severity using a standardized scale	160	43 (27)
	Documented pain location	160	71 (44)
	Documented pain character	160	15 (9)
	Documented position of patient while assessed (at rest/walking/coughing)	160	15 (9)
Reassessment	Documented timing of assessments (before or after treatment)	160	39 (24)
Individualized and evidence based treatment	Number of patients prescribed analgesics	282	239 (85)
	Number of patients with adequate PMI-Cn (prescribed)	281	219 (78)
	Number of patients with adequate PMI-Wn (administered)	247	159 (64)
	Number of patients with prescribed multimodal-MEDS treatment	282	170 (60)
	Number of patients administered multimodal-MEDS treatment	248	120 (48)
	Number of patients with prescribed multimodal-NonPh treatment	280	80 (29)
	Number of patients administered multimodal-NonPh treatment	246	74 (30)
	Number of patients reporting use of non-pharmacological methods	282	95 (34)
	Number of patients on opioids prescribed laxatives ATC	103	42 (41)
	Number of patients on opioids prescribed antiemetic PRN	103	53 (51)

**Table 11. Association between process variables and type of service in hospitalized medical and surgical patients.
Descriptive results and effect sizes (Study 3, Paper IV)**

Variables	Medical	Surgical	Odds Ratio (95% CI)
Number (%) of documented pain assessments	95 (47)	65 (82)	4.94 (2.60-9.38)
Number (%) of patients prescribed analgesics	166 (82)	73 (92)	2.71 (1.10-6.71)
Number (%) of patients with adequate PMI-Cn (prescribed)	151 (74)	68 (87)	2.34 (1.10-4.88)
Number (%) of patients with adequate PMI-Wn (administered)	100 (58)	59 (80)	2.87 (1.51-5.46)
Number (%) of patients with prescribed multimodal-MEDS treatment	104 (51)	66 (84)	4.83 (2.51-9.31)
Number (%) of patients administered multimodal-MEDS treatment	67 (39)	53 (71)	3.81 (2.13-6.83)
Number (%) of patients with prescribed multimodal-NonPh treatment	49 (24)	31 (40)	2.12 (1.21-3.70)
Number (%) of patients administered multimodal-NonPh treatment,	42(24)	32 (44)	2.43 (1.37-4.34)
Number (%) of patients reporting use of non-pharmacological methods	63 (31)	32 (42)	1.58 (.92-2.72)
Number (%) of patients on opioids prescribed laxatives ATC	35 (58)	7 (16)	.14 (.05-.36)
Number (%) of patients on opioids prescribed antiemetic PRN	23 (38)	30 (70)	3.71 (1.61-8.54)
CI = Confidence Interval			

5 Discussion

The aims of the thesis were to explore, define, and assess QPM in the hospital setting. QPM refers to the structure, process, and outcomes of care, provided in safe, equitable, effective, patient centered, timely, and efficient services. The Icelandic version of the APS-POQ-R was found to be both reliable and valid as a tool to measure pain management outcomes in Icelandic patients. Results regarding processes and outcomes were somewhat mixed. Patients were generally prescribed analgesics, yet many patients were not administered adequate treatment. Pain assessment and documentation were relatively unstructured and not in line with recommendations. Assessment and documentation of pain severity was associated with more adequate treatment being provided. Pain was prevalent in the hospital and around third of the patients had experienced severe pain in the past 24 hours. Nearly half became pain free during the same time period. Few patients experienced severe side effects, and pain interference on activities, sleep, and emotions was modest. Better outcomes were associated with increased patient satisfaction and participation in treatment decisions.

5.1 The QPM concept

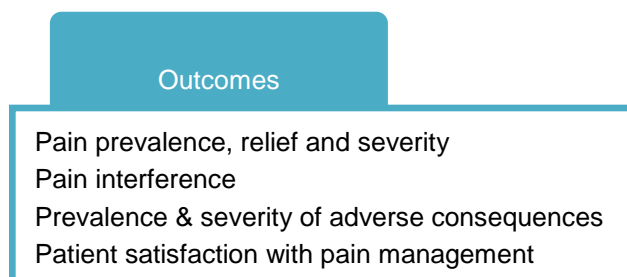
QPM is complex, since both quality and pain are subjective in nature, and defining the concept is not easy. Only one explicit definition of the concept was found in the literature (Gordon et al., 2002) although the term was widely used. Comparing the definition resulting from the concept evaluation and the one by Gordon et al. (2002) shows that both are based on the Donabedian model, and both share similar characteristics. However, the definition proposed here, expands on the issue and defines in more detail the structural, process, and outcome aspects of the concept. Furthermore the six aims of the IOM (2001) on improving the quality of health care have been incorporated into the definition.

As previously mentioned the Donabedian model is linear with the structure affecting the process, which again affects the outcome (Donabedian, 1988). In contrast, although essentially based on the Donabedian framework, the conceptual model proposed in this study is reciprocal rather than linear,

where each component may affect the other. This is because the model includes continuous quality improvement where measures of each component will be used for improvement in others (The Joint Commission, 2003). If for instance pain severity remains unacceptably high, policies on pain management may need to be updated (structure) as well as what and how medications are used to treat the pain (process). Mitchell and colleagues (1998) also proposed a reciprocal relationship between factors, and suggested an indirect relationship between process and outcomes. In their model the effects on outcomes were thought to be mediated through system or client factors. It is plausible that effects on outcomes in the QPM model may be indirect as well, but such relationship needs to be tested. Finally, it bears mentioning that patient outcomes may improve without any interventions by health care professionals at all (Cleary, 2011).

In addition to defining QPM, a specific aim of this study was to assess the maturity of the concept. As discussed in Paper I the concept is quite well-established as evident from its frequent use in the literature and the similarity between items in questionnaires measuring pain and quality (Morse et al., 1996). Hence the concept can be operationalized. However, the conceptual blur between QPM and patient satisfaction, as well as the lack of a clear definition of QPM in the literature, suggests that the concept needs further refinements. Researchers need to be clear on what aspects of QPM they are measuring to advance the science, not least since little is known about the relationship between structure, process, and outcomes in relation to pain management (Gordon et al., 2010).

5.2 QPM in hospitalized adults



Assessing outcomes requires a psychometrically sound instrument that adequately measures what it is purports to do (Gordon et al., 2010). The instrument needs to be easily understood, to have acceptable reliability, and

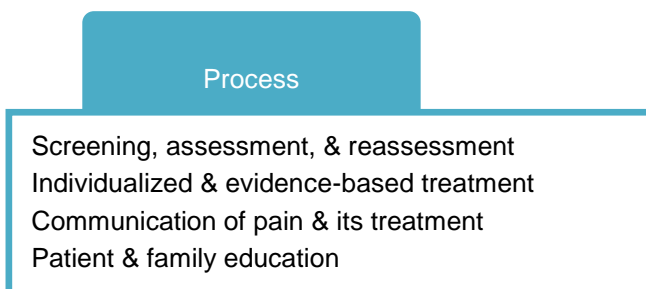
data must support its validity. However, neither validity nor reliability are static, but depend on the context and population under study (Polit & Beck, 2012).

As reported in Paper II the majority of participants found the instrument feasible and did not have significant problems with answering the questions. The results partially supported the psychometric testing of the American version of the APS-POQ-R (Gordon et al., 2010). The main difference is that the Icelandic version contains four subscales instead of five. This was largely due to four items that either had low component loadings or lowered the reliability of the scale: time spent in severe pain, pain relief, participation in decision making, and patient satisfaction. Detailed discussion regarding the troublesome items can be found in Paper II.

Since Paper II was accepted for publication, two articles have been published that report on translations of the APS-POQ-R in surgical patients. The study of Wang and colleagues (Wang, Sherwood, Gong, & Liu, 2013), conducted in the US, showed similar results as the original version by Gordon et al. (2010) with five subscales. However, the perception of care subscale, that contains three of the four items found troublesome in the Icelandic version, had low Cronbach's alpha (.492) in Wang and colleagues' study (2013). Homogenous sample was suggested by the authors as a possible explanation for this. Rothaug et al. (2013) tested the psychometric properties of the APS-POQ-R in eight European countries and Israel. Their results showed a three factor structure of the questionnaire in contrast to the four in the Icelandic version and five in the American versions (Gordon et al., 2010; Wang et al., 2013). Interestingly, Rothaug and colleagues (2013) encountered similar problems in testing of the questionnaire as in the Icelandic version. The four items, with the highest number of missing values in the Rothaug study, were the same as those found to be troublesome in the APS-POQ-R-I. In addition, three of those items (satisfaction, pain relief, participation) loaded on the perception of care subscale that, as in the study of Wang et al. (2013), had unacceptably low Cronbach's alpha (.55). In line with the discussion in Paper II, Rothaug et al. (2013) argued that perhaps these items should rather be used independently than as a part of a scale.

Pain management outcomes in the current study were similar to several other studies conducted in hospitals, with high prevalence of pain (83%) and around a third of the patients with severe pain (Apfelbaum et al., 2003; Costantini et al., 2002; Hansson et al., 2005; Lorentzen et al., 2012; Maier et al., 2010; Yates et al., 1998). As expected (Costantini et al., 2002;

Gerbershagen et al., 2014; Ip et al., 2009; Strohbuecker et al., 2005; Vallano et al., 2006) pain was more prevalent and severe in women, younger patients, and on surgical wards, than in men, patients aged 75 and older, and on medical wards. In all instances the effect sizes were low and marginal for age and prevalence. In contrast to the high prevalence and severity, the mean pain relief was high (63%) and a minority of participants (n=42) reported less than 30% pain relief, which is considered clinically important (Cepeda et al., 2003; Farrar et al., 2003; Farrar et al., 2000). Pain interference was relatively low in comparison with other studies (Apfelbaum et al., 2003; Gordon et al., 2010; Lorentzen et al., 2012; J Sawyer et al., 2010; Wang et al., 2013), possibly related to shorter time spent in severe pain (mean = 26%) compared to other studies (Gordon et al., 2010; Wang et al., 2013). Similarly, although 130 (54%) of patients reported side effects from the pain treatment, the severity was low. Since side effects of opioids are usually most prominent in the beginning of treatment (Collett, 1998) the low severity might be explained by the wide time frame for length of stay in the hospital (1-234 days). In line with other studies (Bozimowski, 2012; Carlson et al., 2003; Dawson et al., 2002; McNeill et al., 1998; Wang et al., 2013) decreased patient satisfaction was weakly associated with negative outcomes, but still participants were generally satisfied with the pain treatment. This supports the notion that patient satisfaction, although pain related, measures more than the effectiveness of the treatment provided (Beck, Towsley, Berry, & et al., 2010; Carlson et al., 2003; Dawson et al., 2002).



As with outcomes, results regarding processes were mixed. In many ways practice was in line with recommendations, but still areas for improvement could be identified. In the study the majority of patients were prescribed analgesics and in 78% prescribed treatment was adequate according to the PMI. However, only 64% were administered adequate treatment. Compared

to other research (Chapman, Stevens, & Lipman, 2013; Salomon et al., 2002; Wadensten et al., 2011), the proportion of patients with documented pain assessments was relatively low, and the content of the assessments was not in line with recommendations in guidelines (Macintyre et al., 2010; Registered Nurses Association of Ontario, 2013; Scottish Intercollegiate Guidelines Network (SIGN), 2008). This may be explained in part by the heterogeneous sample in the study. Although only 57% of the total sample had documented pain assessment, the proportion was 82% in surgical wards, comparable to the European data in the study of Chapman et al. (2013). Importantly, patients who had documented pain assessment were more likely to receive adequate treatment than those whose pain was not documented. This was particularly true when scales measuring pain severity were used. This underscores the importance of assessing pain to provide prompt and adequate care (Bourdillon et al., 2012; Nelson et al., 2004; Purser, Warfield, & Richardson, 2014; Silka, Roth, Moreno, Merrill, & Geiderman, 2004), although it should be kept in mind that pain assessment alone may not necessarily lead to better patient outcomes (Chapman et al., 2013; Nworah, 2012; Wells, McDowell, Hendricks, Dietrich, & Murphy, 2011). It should also be noted that complete pain relief is an unrealistic goal (Gordon et al., 2005) and treating pain according to pain severity solely may result in adverse effects (Vila et al., 2005).

As with PMI, fewer patients (48%) received multimodal medication therapy than were prescribed (60%) such treatment. In addition to providing superior analgesia, multimodal therapy may reduce opioid requirements and even side effects (Andersen et al., 2013; Hartrick, 2004; Kang et al., 2013). Nurses need to be aware of this when choosing appropriate analgesics from available medications. Similarly, utilizing multimodal therapy that incorporates non-pharmacological methods may be of benefit since pain perception is complex and involves physiological, emotional, and cognitive functions (Loeser, 2000).

Although nausea and constipation are common side effects of opioid treatment (Benyamin et al., 2008), patients were generally not prescribed laxatives, and many did not have access to antiemetic medications as recommended (Registered Nurses Association of Ontario, 2013; Scottish Intercollegiate Guidelines Network (SIGN), 2008). Still, reported severity of side effects was low in the study which, as previously discussed, might stem from the variance in length of stay in the sample. It should be noted though that constipation was not assessed as it is not included in the APS-POQ-R.

Patient participation is highly recommended (Gordon et al., 2005; Macintyre et al., 2010; Scottish Intercollegiate Guidelines Network (SIGN), 2008), and involving patients is particularly important in pain management, since pain is subjective and only the patient can truly describe his pain (Jansen, 2001). Patient participation predicts patient satisfaction (Schwenkglens et al., 2014), but few studies report on pain related outcomes in relation to patient participation in pain management (Borders et al., 2005; Hanucharurnkui & Vinya-nguag, 1991). Therefore, the association between participation in decision making, pain relief, and time spent in severe pain, was an important finding. A prerequisite for patient involvement is open communication and access to necessary information (Hansson et al., 2005; Sahlsten et al., 2008). Therefore, it was worrying that only 75 (30%) patients reported having received information about their pain treatment options, especially since those who did rated their participation in treatment decisions higher than those who did not receive information. Perhaps this could be explained by the heterogeneity of the sample, not all hospitalized patients receive information regarding pain, although it could be speculated that they should, given the high prevalence of pain in the hospital setting. Of note is also that not all patients wished to participate in decision making. Since respect and equality are central to patient participation (Thórarinsdóttir & Kristjánsson, 2014) these wishes need to be honored.

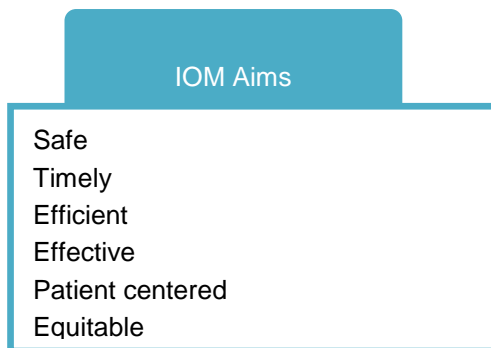
Structure

Organizationally supported evidence-based policies
Competent staff that works efficiently together
Interprofessional and specialized care or referral
Staff accountability

Structural aspects are important to set standards of care and to support clinicians in their practice (Gordon et al., 2005). Indeed one of the key messages of the ANZCA guidelines states that “[m]ore effective acute pain management will result from appropriate education and organizational structures for the delivery of pain relief rather than the analgesic techniques themselves” (Macintyre et al., 2010, p. xxi). Although structural aspects were not systematically evaluated in this study, the informal assessment revealed

that available policies and procedures were scarce at the time of the study, and access to specialized care was limited.

The results showed that nurses did not document pain in a systematic way, and a considerable proportion of patients were not administered sufficient analgesics despite availability. There may be various explanations for this such as lack of time, lack of knowledge, negative attitudes towards analgesics (Oldenmenger et al., 2009), reliance on non-verbal cues for pain (Schafheutle, Cantrill, & Noyce, 2001), and unclear roles and responsibilities (Hartog, Rothaug, Goettermann, Zimmer, & Meissner, 2010), but also lack of resources to support nurses in providing quality care. At the time of the study no standardized pain assessment form was in general use, which might have improved the content of documentation (Stevenson et al., 2006). Similarly, explicit procedures and guidelines on when and how to assess and manage pain might have supported the nurses in choosing and administering adequate analgesia to the patients.



According to the IOM (2001) quality health care services should aim to provide safe, timely, equitable, efficient, effective, and patient centered care. The timeliness, safety, or efficiency of the pain treatment in the study were not assessed, but the effectiveness of the treatment, referring to evidence based treatment aimed at meeting the patient's need (The Institute of Medicine, 2001), are reflected to some extent by the analgesic prescriptions and the adequacy of the treatment (PMI), already discussed. Whether services were being under- or overused was however not evaluated. Patient-centered care was assessed with the question on patient participation in treatment decisions regarding their pain treatment as previously discussed.

Equitable services were assessed by comparing if treatment differed between sex, age, or type of service. Unlike other studies (Donovan, Taliaferro, Brock, & Bazargan, 2008; McNeill, Sherwood, & Starck, 2004;

Moskovitz et al., 2011; Strohbuecker et al., 2005) no association was found between pain management and age or sex. In line with other studies (Maier et al., 2010; Wadensten et al., 2011), however, surgical patients were more likely to have documented pain assessment, and to be both prescribed and administered more adequate treatment and multimodal treatment than medical patients. This was not surprising as pain is an inevitable part of surgery and hence pain management is part of routine care. However, pain was also severe and prevalent on medical wards so adequate treatment needs to be available for these patients as well (Whelan et al., 2004).

5.3 Methodological considerations

The study has both limitations and strengths. Here the major methodological considerations for the study in general will be discussed. A more detailed discussion of limitations and strength for each paper can be found in the respective publications.

The major strengths of the study are the high response rate, that data were collected simultaneously in the 23 participating wards, and how care was taken to prevent that the hospital staff knew of the data collection. It is plausible that if the staff knew of the purpose of the study and the date of the data collection that it might have, unintentionally, influenced how the care was being provided and documented (McCarney et al., 2007). Pilot testing of the data collection methods while collecting data for study 2 was influential in making this possible.

The study also has limitations, but all possible measures were taken to overcome those. Although a thorough search of the literature for the concept evaluation was conducted, reviewing the material comprehensively was impossible because of the number of articles retrieved. Some important literature might hence have been missed. On the other hand data were collected until data saturation was achieved. Another limitation is the sample size for the principal component analysis. The final sample consisted of 143 participants, but a preferred sample size for 18 continuous variables would be somewhere between 180 and 270. The communalities in our study however indicated that a sample of 100 – 200 was suitable (Field, 2005) as explained in Paper II.

The sample in the point prevalence study, reported in Papers III and IV, was quite heterogeneous since data were collected in different type of wards and with different patient groups. This might somewhat dilute the results and

make it more difficult to detect differences between variables. On the other hand this heterogeneity can also be viewed as strength, since by including everyone the results portray the population hospitalized on any given day in the hospital. Although the research design in Papers III and IV was appropriate to describe the process and outcomes of pain management in the hospital, it was not suitable to explore causal relationship between variables. A randomized clinical trial or a quasi experimental study would be more suitable for that purpose.

Data were collected from patients in 23 wards simultaneously. Although collecting data all at once has its advantages, having so many people involved may have caused some bias. For instance, there may have been individual differences in how data collectors read questions aloud to patients who needed assistance with filling out the questionnaire. Similarly, not all data collectors may have extracted data from the medical record in the same way. Since all data collectors received the same training before the study it is probable that this error is a random one rather than systematic (Polit & Beck, 2012). When extracting data from medical records it is important that the data collector is qualified for the task, and preferably, he or she should be blinded to the study purpose (Panacek, 2007). The data extracted from the medical records in our study concerned the documentation of nursing assessment of pain. Therefore, only experienced nurses were chosen for this task. They were however not blinded to the study purpose. Also the inter-rater reliability between data collectors was not assessed, but one researcher inspected all medical record checklists to ensure rigor in data entry. The whole process was carefully documented as recommended (Panacek, 2007).

Electronic databases and medical records are also subject to bias. Not everything that is done gets documented (Briggs & Dean, 1998) and researchers have no control over the accuracy of the data in the chart, or how the information is documented when doing a retrospective chart review (Panacek, 2007). Therefore it is important to prospectively decide what information to collect, and how to deal with missing or incomplete data (Banks, 1998). The checklist for the medical records was tested before collecting data, and security checks were done on 30% of all data entries to ensure rigor. Furthermore, 10% of all medication data were compared to the original software from which the data was extracted.

Unfortunately structural aspects of QPM were not collected in a systematic way. Firstly, this was not a part of the initial study plan, and secondly, although an instrument is available (Wisconsin Cancer Pain

Initiative, 1997) that accesses structural aspects, it was designed for use in the US where health care and hospitals are structured differently from that in Iceland. This will be a part of future research in Iceland, which needs to start with the development of appropriate measures.

6 Conclusions

The overall aims of the thesis were to explore, define, and assess QPM in the hospital setting. QPM is a complex issue that despite being vaguely defined in the literature can nonetheless be operationalized and hence studied. The definition and the conceptual model put forward in this thesis needs to be refined and tested for validity. The lack of conceptual clarity impedes with advancing the science of quality improvement. It is therefore important to define and state what aspects of QPM are being measured in research and quality improvement projects. Reliable and valid instruments are also required to accurately measure the quality of care. The APS-POQ-R-I is a valid and reliable instrument to assess patient outcomes regarding pain in Icelandic hospitals. As to the quality of care the study showed mixed results. In relation to outcomes, pain was both prevalent and severe in the hospital, yet the impact of pain on activities, emotions, and sleep was relatively low, and side effects from pain treatment were not severe. In regard to process, many aspects of the pain management were in line with recommendations in clinical guidelines with the exception of documented pain assessment that were found to be unstructured and lacking in quality. Most patients were prescribed analgesics and the treatment was found to be equitable, since no difference in pain treatment was found according to sex or age. Still, many patients did not receive adequate treatment.

The results identify several areas for improvement. To improve the process of care, clinicians need to assess and document pain in a structured and comprehensive way. The use of standardized pain severity scales is recommended. Furthermore, clinicians need to utilize available treatment options to meet patients' needs. This includes both analgesics and non-pharmacological methods. Importantly, patient centered care should be encouraged as a mean to improve QPM since patient participation and satisfaction were associated with more favorable outcomes. Patients need to have access to information regarding pain treatment options in order to be able to participate in pain management decisions. Structural aspects, such as procedures, policies, and specialized services, need to be available to support the process of care. Continuous, multilevel, comprehensive, multidisciplinary, team based efforts, are needed to advance the quality of care (Gordon et al., 2005; Mechanic, 2002; Powell et al., 2009).

In this study individual aspects of QPM were explored. Further studies are needed in this area as well as studies to explore the relationship between structure, process, and outcomes of care. The results of this study lay the foundation for testing the association between variables. Systematic reviews on structural, process, and outcome factors are needed to further strengthen and refine the QPM model. Interviews or focus groups with patients and health care professionals might also be helpful in exploring the content of the model. A randomized or quasi randomized trial is needed to test causal relationship between variables in the model. To further understand the process of care it is important to explore why nurses are not assessing and managing pain according to recommendations. What are the factors hindering effective care, and how can these be overcome? An exploration into patients' experience and needs is also important. How do patients view participation in care, and what is their preferred role in pain management?

This study is the first of its kind in Iceland and adds important knowledge on how pain is managed and treated in the largest hospital in the country. The study also adds to the growing literature on pain and quality in health care. The results portray a comprehensive picture of the process and outcomes of care on a given day in the hospital. The results also show an important association between participation in decision making and patient outcomes, and between documented pain assessments and the adequacy of treatment. Finally, the aim was to define QPM in the hospital setting and hopefully the conceptual model presented can be used to guide studies and advance the quality of pain care.

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Original publications

Paper I

Paper II

Paper III

Paper IV

