Development of Strategic and Clinical Quality Indicators in Postoperative Pain Management

Ewa Idvall

Department of Medicine and Care, Division of Nursing Science, Faculty of Health Sciences, Linköpings universitet SE-581 85 Linköping, Sweden

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To Jan and Patrik
ABSTRACT
The aim of this thesis was to identify important aspects of surgical nursing care, designing strategic and clinical quality indicators in postoperative pain management, investigate content validity, develop and evaluate psychometric properties of an instrument to measure the indicators, test the applicability of the instrument and investigate patient and nurse assessment.

To identify the important aspects of nursing care which might impact on quality of care in surgical wards, it was conducted 4 focus group interviews with clinical nurses (n=20). A tentative model with 15 categories in 2 dimensions, elements of performance and prerequisites, emerged from the data analysis. The categories were, e.g. detecting and acting on signs and symptoms, informing and educating, promoting relationships, responsibility and attitudes. The model was used as a foundation for developing indicators in postoperative pain management, one in each category, each supported by a literature review. To assess the content validity of the indicators, a questionnaire was compiled and sent to registered nurses with a special interest in pain (n=210) and to a random sample of clinical nurses working in surgical wards (n=321). The groups assessed the indicators as essential for achieving high quality, realistic to carry out and possible for nurses to influence management. The first group validated 14 of the 15 indicators and the second group validated 12 as “major” factors in terms of being essential to achieve high quality of care. The remaining factors were classified as “supportive”. No indicator was discarded.

To measure the indicators, an instrument was developed and psychometric properties were evaluated. The indicators were converted to statements suitable for a patient questionnaire and were scored on a 5-point scale with higher values indicating higher quality of care. Patients (n=198) answered the questionnaire on their second postoperative day. The inter-item and item-total correlation coefficients were in a satisfactory range, and Cronbach’s coefficient alpha (0.84) supported internal consistency reliability. Four sub-scales, entitled communication, action, trust and environment emerged from the factor analysis with a total variance of 61.4%. The total scale correlated (r_s=0.53) with the single item pain-relief-satisfaction question. The patients who reported more pain than expected scored lower on the total scale and the patients who received epidural analgesia reported higher scores on the total scale. A nurse questionnaire, similar to the patient questionnaire, was compiled. The responsible nurse at the time (n=63) answered 196 questionnaires paired with the individual patient. The new instrument appeared to be useful in identifying important areas for improvement both from the patients’ and nurses’ perspectives, based on the number of disagreements (1 and 2). Differences were found among departments. The patients’ assessments on the environment sub-scale and the overall satisfaction question were higher than the nurses’ assessments. The findings suggest initial support for the instrument as a means to measure the quality of nursing care in postoperative pain management. Key words: quality indicators; health care, pain; postoperative, focus groups, psychometrics, questionnaires, nursing care.
This thesis is based on the following papers


<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AHCPR</td>
<td>The Agency for Health Care Policy and Research</td>
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<tr>
<td>ANA</td>
<td>American Nurses Association</td>
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<tr>
<td>APS</td>
<td>American Pain Society</td>
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<tr>
<td>DySSSy</td>
<td>Dynamic Standard Setting System</td>
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<td>IASP</td>
<td>International Association for the Study of Pain</td>
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<tr>
<td>JCAHO</td>
<td>Joint Commission on Accreditation of Healthcare Organizations</td>
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<tr>
<td>NIC</td>
<td>Nursing Interventions Classification</td>
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<tr>
<td>NOC</td>
<td>Nursing Outcomes Classification</td>
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<tr>
<td>RN</td>
<td>Registered Nurse</td>
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INTRODUCTION

Defining, measuring, and evaluating the quality of health care has received major attention worldwide. Quality assurance, quality management and continuous quality improvement programmes are being discussed as means to document the outcomes achieved by hospitals, departments or units in a professional, relevant and reliable manner. Professionals, hospital administrators and politicians discuss the significance of measures for health care outcomes in terms of patient satisfaction, quality of life, survival, recovery, etc., and how these variables can be measured, evaluated and improved. According to the regulations from the National Swedish Board of Health and Welfare, health care should have quality systems for planning, performing, evaluating and improving the care given, and all the staff should be involved in this work (SOSFS 1996:24). The organisation also demands that the quality system include, for example, measurable goals.

There are several reasons why the quality of health care should be defined and evaluated. First, patients should be informed about the outcomes which they can expect from the interventions offered by health care providers. Second, the purchasers of health services, whether they be politicians in a tax-based system or executives in an insurance-based system, are interested in knowing the content, quality and price of the care purchased. Third, the mere interest in quality development, its evaluation and the measurement of results will most likely favour and improve the care given. Finally, it will emphasise the importance of the work, practical and scientific. Today, good quality of health care is considered to be the right of all patients, and the responsibility of all staff within the health care system.

Concepts of quality that are bringing about a restructuring of health care are grounded in the work of business experts such as Deming (1986) and his strategy that centred first and foremost on the development of quality and its continual improvement. The idea underlying his system is to do things right the first time. The importance of quality in business first began to be appreciated in the 1940s and 1950s. Initial efforts focused primarily on the manufacturing sector. Subsequently, the need for quality in the service industry was also recognised. In applying business principles of quality to health care, certain problems have evolved. Defining quality according to customer expectations is controversial. While patients are capable of evaluating the quality of the hotel services provided, they are less capable of evaluating whether the correct intravenous fluid is dripping
at the appropriate time and rate. Quality in the context of health care is more than the consequence of consumer satisfaction since the expectations of consumers may be low or their knowledge limited (Redfern & Norman 1990, Katz & Green 1992). The different perspectives are of course, important and it is necessary to consider them in quality development.

The selection of quality indicators is an important part of quality development which requires careful consideration. It is assumed that clinical indicators should be pointers towards quality and if one particular target is successfully reach many others will hopefully follow (Kitson 1986). Different approaches, such as clinical areas, generic aspects of care, specific aspects of care/nursing diagnosis, and medical diagnosis have been used to develop quality indicators (Idvall et al. 1997). However, indicators that were strategic, professional and of particular importance for the quality of nursing care were seldom discussed.

The major purpose of this thesis was to develop strategic and clinical quality indicators in postoperative pain management and to measure these indicators.

**Concepts and definitions**

Generally, *quality* signifies characteristic or merit and is a neutral concept derived from the Latin word *qualitas* (Nationalencyklopedin 1993). According to the National Swedish Board of Health and Welfare (SOSFS 1996:24), quality is described as the sum of all characteristics of a product (service) giving it the capacity to satisfy all expressed and unexpressed needs.

In the United States, the Joint Commission on Accreditation of Health Care Organizations (JCAHO) describes *quality of 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” (JCAHO 1993, p.264). Some important attributes that lead us to a judgement that care is of good or poor quality are effectiveness, efficiency, optimality, acceptability, legitimacy and equity (Donabedian 1992). The quality of care that is expected from a health care facility can be made explicit by written standards, and then the standards define quality (Katz & Green 1992). There are several definitions or variants of quality, and each definition is legitimate in its appropriate context (Donabedian 1980). The pursuit of an all-embracing definition of quality has been elusive, and it does not appear that a universal definition of quality is
forthcoming (Katz & Green 1992). Nevertheless, even in the absence of a formal definition, a patient or a provider can certainly identify its absence, substandard care or less-than-optimal results. There are different opinions on the actual meaning of the concept, and the definitions of quality of care are reflections of the current health care system and of the goals and values of society, which of course change over time (Andersson 1995).

A generally accepted definition of a clinical indicator as “a quantitative measure that can be used as a guide to monitor and evaluate the quality of important patient care and support service activities”, which was adopted in several studies and derived from JCAHO (JCAHO 1989, p. 330), was found in a literature review of quality indicators (Idvall et al. 1997). JCAHO also expressed an indicator as “a valid and reliable quantitative process or outcome measure related to one or more dimensions of performance such as effectiveness and appropriateness and a statistical value that provides an indication of the condition or direction over time of an organisation’s performance of a specified outcome” (JCAHO 1993, p. 255). Indicators are of two general types, sentinel event and rate-based, and can address structure, process of patient care or patient outcome. A sentinel event indicator measures a serious, undesirable and often avoidable process or outcome, and a rate-based indicator measures patient care events for which a certain rate of occurrence is acceptable (JCAHO 1993). The sentinel events are usually of low frequency and so undesirable that each occurrence must always be evaluated. However, the rate-based indicator measures desirable (or undesirable) events that require further review only if the rate of occurrence shows a significant trend over time or differences when compared with other institutions. The type of event measured by an indicator is categorised by Katz and Green (1992) as clinical, professional or administrative. A clinical indicator relates to a key aspect of patient care, a professional indicator relates to an aspect of professional practice and an administrative indicator relates to organisational factors.

This thesis proposes the concept of strategic indicator. Strategy was originally used in the military field and implied the science of military and other forcible means to reach political goals (Nationalencyklopedin 1995). This concept was then transferred to other areas such as sales promotion, negotiation and politics. Direct strategy represents actions which are directly focused on the final goal, while indirect strategy is aimed at a series of restricted but successful actions which will eventually reach the proposed final goal. In psychology and cognition research, strategy is a scientific method of reasoning with a sequence of mental operations. A
problem may be solved by consecutive operations that will gradually reduce the distance to the goal (Nationalencyklopedin 1995). In the present context strategic, clinical and quality indicators are intended to imply specific, clear and well-selected aspects of nursing care a patient receives or the outcome of that care, based on a rationale which includes supportive literature. Strategic indicators should direct care towards quality, perhaps step by step, but always in the direction to reach high quality of patient care.

Donabedian (1980, 1982, 1985) has, in his classical works, described structure, process and outcome in health care. Structure describes physical, organisational and other characteristics of the system. Process describes what is done in caring for the patients. Structure is relevant to quality in that it increases or decreases the probability of good performance. The process indicators generally measure discrete steps in patient care that are important and are often linked to patient outcome. Outcome describes what is achieved in terms of improvement usually in health but also in attitudes and knowledge. Once it has been established that certain procedures used in specified situations are clearly associated with good results, the mere presence or absence of these procedures can be accepted as evidence of good or bad quality. In quality assessment, information is needed about outcome, process and structure in making a proper choice (Donabedian 1992).

The threshold concept is essential in correlation with clinical indicators for assessing the quality of care. A threshold is “a level or point at which the results of data collection in monitoring and evaluation trigger intensive evaluation of a particularly important aspects of care to determine whether an actual problem or opportunity for improvement exists” or “the border between compliance and non-compliance with written standards” (Katz & Green 1992, p. 107). The information and data necessary to establish a threshold for good quality of care is limited in the literature (Idvall et al. 1997) with the exception of sentinel event indicators. For these, there is no tolerance of error and each situation must be investigated. The compliance threshold for rate-based indicators which have been derived from important aspects of care will, of course, be high (or low non-compliance threshold). Determining thresholds requires much information about the range of possible performance, and meaningful thresholds are critical for reports in quality improvement programmes (Rantz et al. 2000).
Assessments of quality of care
Throughout history, nurses have demonstrated their commitment to evaluating clinical practice patterns and identifying opportunities to improve care. Credit for the first documented study in nursing care is usually given to Florence Nightingale who, in the middle of the nineteenth century, reduced the mortality rate of sick and wounded soldiers during the Crimean War in a remarkable way. She introduced standards of infection control and used statistical tests to evaluate the care provided (Nightingale 1863).

During the 1950s, 1960s and 1970s in the United States, process audits were introduced in an attempt to measure the quality of care provided by nurses, for example, the Phaneuf Audit, the Quality Patient Care Scale and the Rush Medicus Nursing Process Quality Monitoring Instrument (Duquette 1991). The quality of care is examined using patient records, patient observation, patient interviews, staff interviews, staff observation, patient environment observation, observer inference and management observation. Audit tools allow for a comprehensive review of the process of providing care.

The Agenda for Change started by JCAHO in the late 1980s aimed, among other things, to refine and test clinical indicators (Nadzam 1991). In 1997, the JCAHO presented the National Library of Healthcare Indicators: Health Plan and Network Edition (JCAHO 1997), which provides a classification system and individual profiles for 225 performance measures. A performance measure is described as “a quantitative tool (for example, rate, ratio, index, percentage) that provides an indication of an organisation’s performance in relation to a specified process or outcome” (JCAHO 2001). An indicator is explained as a performance measure. The National Swedish Board of Health and Welfare has recently presented a proposal consisting of about 60 general quality indicators in health care (2001).

The American Nurses Association (ANA) (1996) initiated a project on nursing quality indicators and has presented 10 key indicators of nursing quality for example, patient injury rate, maintenance of skin integrity and patient satisfaction with pain management. The National Database of Nursing Quality Indicators (ANA 2001) advances this initiative by developing an information resource that will be used to quantify the specific role of nursing intervention in patient outcomes. Today, data are being collected from hospitals across the United States.
To help health professionals on their way to quality development, the Ten-Step Monitoring and Evaluation Process has been developed by the JCAHO (1989, 1993) and described by Katz and Green (1992) in a guide to monitoring and evaluating nursing services. The 10 steps are: (1) assign responsibility, (2) delineate scope of care, (3) identify important aspects of care, (4) identify indicators, (5) establish a threshold, (6) collect data, (7) evaluate care when indicated by threshold, (8) take action, (9) assess the outcome of action and (10) communicate with those responsible for the quality assurance program. Important aspects of care must be identified before developing indicators, and they can be discussed under the 4 categories: (a) high volume (aspects of care which occur frequently or affect a large number of patients), (b) high risk (aspects of care which involve risks), (c) high problem areas (aspects of care which tend to produce problems for patients and staff) and (d) high cost (aspects of care which generate costs). Added to these 4 categories are: (e) high priority and (f) of significant potential to lead to improvement in health care (JCAHO 2001). The structure of the 10-step model and the different categories seem practical to use in quality development and will be considered in the present thesis.

The Dynamic Standard Setting System (DySSSy) is a dynamic method for formulating standards or goals for quality improvement. Kitson (1989) developed this method in Great Britain at the Royal College of Nursing. DySSSy is based in part on Lang’s quality cycle (1975) and Donabedian’s (1988) concept of structure, process and outcome, and on the principle that staff participation and involvement are necessary to improve the quality of patient care. The method involves three phases viz. the describing phase, the monitoring phase, and the phase of taken action. In 1990, the Swedish Nurses Association started a project on health care quality improvement and one of its purposes was to disseminate knowledge about the DySSSy-method. Educational material was developed which supported the educational programs (Hellung Strohl 1996). In Quality Indicators in Nursing (Idvall 1997), the DySSSy-method is suggested as a starting point for developing indicators. By using the triad structure, process and outcome to describe how quality goals can be achieved, one or more of these characteristics can be selected for use as quality indicators.

Pike et al. (1993) has called nurse-physician collaboration a new architecture for quality assurance. They concluded that this approach provides an effective means of evaluating patient outcomes and improving the quality of care because the outcome of patient care is often the result of
integrated professional knowledge. The term nursing outcome should rarely be used (Hegyvary 1991) as outcomes cannot be evaluated independently for just one profession (Mize et al. 1991). However, several authors indicate the importance for the nursing discipline of finding their own impact on patient outcomes (Marek 1989, McCloskey & Bulechek 1992, Johnson & Maas 1997), and this is probably a prediction of an equal collaboration with other professionals. If the goal is to measure the influence of just one discipline, it might be easier to evaluate the process.

**Research on quality of care**
Research on quality of care is an important field and has its own agenda and must take place alongside health services and clinical research (Grol 1996). Grol (1996) provides a reflection on the role of research and development in quality of care and suggest that this area is characterised by its own subjects and research questions. The topics which need to be considered in research are described from three different angles: the actors in quality improvement, the methods and procedures used in quality improvement and the management of quality improvement: systems and conditions. These perspectives are not independent of each other. Research methods and procedures should focus on the most relevant aspects of care with the greatest impact on patients, for example, crucial indicators to evaluate the quality of care which best predict differences in quality, particularly finding indicators for the outcome of care. This is in agreement with the earlier mentioned 10-step process model that suggest identifying the important aspects of care for indicator development. Ibrahim (2000) discussed that information from quality projects is undervalued because quality projects are seen as unscientific and suggest a more rigorous approach conducting and presenting quality activities in the standard scientific format.

In quality development, it is common to request information on clinical outcomes. In some cases, on the other hand, information on the process of patient care can be more helpful in identifying specific shortcomings and pointing the way towards change. Measuring well-supported processes may be more enlightening than monitoring outcomes when the processes in question are supported by research evidence because of difficulties with the interpretation of the outcome (Davies & Crombie 1995). According to the National Swedish Board of Health and Welfare (2001) outcome indicators are generally difficult to define and interpret while the process indicators are practical and easier to interpret but are often an indirect measure. It is a high priority to find valid and reliable indicators to assess the quality of
care in a clinical setting and that can be compared with others and followed over time.

**Pain**

Pain is a universal human experience, and relief from pain has probably been a concern of mankind since the beginning of time. Indeed it is even older, for there is reason to believe that pain is inherent in any life linked with consciousness. In a historical perspective there have been several concepts of pain, for example, Plato (427-347 B.C.) who observed that pleasure is often derived from pain relief, and he deduced that pain and pleasure, although opposite sensations, are linked together as originating from the heart as passions of the soul. The use of analgesics derived from plants and herbs was widespread in ancient Greece. Among earlier references to the use of pain-relieving drugs are those found in the writings of Homer (800 B.C.), and the first authentic reference to the use of opium for pain relief is found in the writing of Theophrastus in the third century B.C. (Bonica 1990). Today, pain theories have been developed from the simple one-to-one relationship between injury and pain to the gate control theory (Melzack & Wall 1965) and the body-self neuromatrix (Melzack 1999), which emphasises the concept of pain as a multidimensional experience produced by multiple influences.

The study of pain, i.e. algology, is in its infancy. Until the early 1970s, the scientific community failed to take advantage of great advances in medical research, medical science and technology and apply them to pain research, according to Bonica (1990). A study by Marks and Sachar (1973) revealed that, in about 73% of the patients with acute and chronic pain, the pain remained unrelieved following administration of narcotic analgesics. In recent decades several studies have reported that patients still suffer from pain after a surgical procedure (Donovan 1983, Warfield & Kahn 1995, Svensson et al. 2000) although the tools necessary to manage postoperative pain are often available, including new drugs and advances in technology (Rawal & Berggren 1994). The reasons for insufficient pain control are complex and multifactorial and include knowledge deficits, inadequate assessments in rest and moving, lack of communication between staff and patients, divergent attitudes, absence of systematic recordings and lack of public awareness (Paice et al. 1995, Sjöström et al. 1997, Klopfenstein et al. 2000).

According to the International Association for the Study of Pain (IASP 1979, p. 250), pain is defined as “an unpleasant sensory and emotional
experience associated with actual or potential tissue damage, or described in terms of such damage”. Pain is a personal, subjective experience influenced by cultural learning, the meaning of the situation, attention and other psychological variables (Melzack & Katz 1994). “The person with pain is the only authority about the existence and nature of that pain since the sensation of pain can be felt only by the person who has it” (McCaffery & Beebe 1994, p. 14), and it stands to reason that management of such phenomena should be evaluated by patients themselves. Both clinicians and researchers are presented with the challenge of capturing patient opinions about pain management as a criterion of quality of care. Satisfaction ratings are subjective, and an aspect of care that cannot be evaluated in an objective fashion. Satisfaction ratings do not reflect what really happened, but rather patients’ evaluations of their satisfaction with what happened (Ward & Gordon 1994).

There are some significant goals for postoperative pain management, for example, minimising or eliminating discomfort, facilitating the recovery process and avoiding complications (IASP 1992). It is also presumed that these objectives are reached with a positive cost-effectiveness. Moreover, it must be regarded as unethical to let patients suffer from pain without adequate efforts to provide treatment. However, pain relief itself is not enough to improve postoperative outcome because of several confounding risk factors (Breivik 1998), but it is a prerequisite for all other measures to improve the outcome. Postoperative pain impairs organ functions and delays mobilisation and overall recovery (Kehlet 1997, Breivik 1998).

Many different team members care for the patient with pain, but it is a close and highly significant problem for nurses who probably spend more time with patients in pain than any other team member. Potential positive effects may be achieved on postoperative outcome by collaboration among the patient, surgical nurse, surgeon and anaesthetist (Kehlet 1994). There seems to be considerable overlap in the functioning of team members, as well there should be if a multidisciplinary approach is being used. The nurses’ role most often includes carrying out pain-relief methods with and for the patients, identifying the need for change and additional methods, implementing them and assessing the impact on the patient (McCaffery & Beebe 1994). Thus, in most cases, nursing care is the cornerstone, and pain management should be the very core of nursing practice (Soafer 1983, McCaffery & Beebe 1994). McCaffery and Beebe (1994) stated that they believe that pain control: (1) is a legitimate therapeutic goal, (2) contributes significantly to the patient’s physical and emotional well-being, (3) must
rank high in the list of priorities in patient care and (4) is patient-controlled, i.e. the patient is the final authority about assessment of pain and all methods of pain control to the extent that is safe and that communication, including the non-verbal kind, is possible.

Several studies have reported quality development in postoperative pain management by using the Quality Improvement Guidelines for the Treatment of Acute Pain and Cancer Pain published by the American Pain Society (APS) and the Acute Pain Management Guideline Panel (1992). The APS Patient Outcome Questionnaire (1995) has been compiled from items developed by the APS and items adapted from various instruments, e.g. the Brief Pain Inventory (Daut et al. 1983). Items may be selected, modified or added to suit the needs of the particular clinical setting, patient population and the intention of the survey. Several studies have been based on the APS Patient Outcome Questionnaire and modified, and the results have been reported on each individual item (Miaskowski et al. 1994, Ward & Gordon 1996, Lin 2000). Psychometric properties, such as internal consistency reliability and validity have been reported in some studies (Boström et al. 1997, Calvin et al. 1999). The APS (1995), which has compiled this questionnaire addressed some important questions worth considering for future research, such as what are the essential items for a brief patient outcome questionnaire and what determines patient satisfaction with pain treatment.

It has been found that many patients who experience severe pain also report satisfaction with the overall pain management and pain relief (Donovan 1983, Miaskowski et al. 1994, Pellino & Ward 1998, Svensson et al. 2001). One possibility for this paradox is that pain is well tolerated. An alternative explanation is that while pain troubled the patients, they were satisfied with the caring attitude of the staff (APS 1995). A study by Gaston-Johansson et al. (1998) reported that patient satisfaction with nurses’ treatment of pain was the most important factor influencing patient satisfaction with pain relief and pain management.

Postoperative pain management is important for the quality of care in surgical wards and an activity that is characterised as high-volume, high-risk, problem-prone, high-cost, high priority and of potential to lead to improvement. These different categories have been suggested to consider when identifying the important aspects of care (Katz & Green 1992, JCAHO 2001). Quality improvement efforts must be discussed continuously. Therefore, it is valuable to develop measures that assess
quality in a reproducible and valid fashion, and to measure the key aspects or the essential items. A uniform instrument to evaluate the quality of care in postoperative pain management should be valuable, and could give baseline data to identify possible areas for quality improvement efforts to be followed over time by patients and staff on different levels in the organisation.

An instrument can be described as the device or technique that a researcher uses to collect data (e.g., questionnaires, tests, observation schedules, etc) (Polit & Hungler 1991). Many instruments used in health care are composites made up of the sum of scores from a series of items. A general goal is to develop an instrument of minimal length while achieving support for its reliability and validity (Ferketich 1991).

The first step in constructing a questionnaire is devising the items by looking at what has been done in the past. Another source of items can be the research subjects themselves by, for example, using focus group interviews (Streiner & Norman 1995). Their task would not be to generate the specific items, but rather to suggest themes which can be used. There has also been increasing appreciation for the role that theory can play in instrument development, because if a model has any validity, then it would make sense for the instrument to include items from each of these areas (Streiner & Norman 1995, p. 18). Validity and reliability are central in instrument development. No measure is useful without evidence for its validity, which deals with how well it measures what it purports to measure in the context in which it is to be applied (Nunnally & Bernstein 1994). Essentially, the reliability of an instrument is the degree of consistency or dependability with which it measures the attribute it is designed to measure (Polit & Hungler 1991, p.653). Both validity and reliability have many different aspects and assessment approaches.

In summary, it seems reasonable and of high priority to provide strategic measures or quality indicators in daily clinical nursing practice. The quality indicators should be valid and reliable to be useful in comparing different units and identifying quality improvement efforts, which should be open to continuously evaluation. Indicators that are potentially useful in collaborating with other health professionals should be an advantage. Postoperative pain management is appropriate for quality assessments in surgical nursing care, and is an area where nursing makes a difference and where there is a need for research on essential items for quality development.
SPECIFIC AIMS OF THE THESIS

The specific aims were

♦ to identify clinical nurses’ perceptions of important aspects of nursing care that might impact on quality of care in surgical wards

♦ to evaluate the usefulness of a tentative model, based on important aspects of surgical nursing care, for designing strategic and clinical quality indicators

♦ to investigate content validity of strategic and clinical quality indicators in postoperative pain management

♦ to develop and evaluate psychometric properties of an instrument to measure strategic and clinical quality indicators in postoperative pain management

♦ to investigate patient and nurse assessment on the quality of care in postoperative pain management and to test the applicability of a new instrument

An overview of the papers appears in Table 1.

METHODS AND RESULTS

The different specific aims of the studies were dependent on each other in the sense that the result from the first study provided the foundation for the second study and so on. Four different steps in the process of developing strategic and clinical quality indicators in postoperative pain management could be distinguished. The methods and the results from each of these steps are presented together, followed by a short conclusion to help guide the readers through the development of this thesis.

Statistics
Data were analysed using the computer program “Statistica”, version 5.5 1999 (StatSoft, Tulsa, Oklahoma, USA). Descriptive statistics are
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<th>Paper</th>
<th>Aim</th>
<th>Data collection</th>
<th>Subjects</th>
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<tr>
<td>I</td>
<td>To identify clinical nurses’ perception of important aspects of nursing care that might impact on quality of care in surgical wards.</td>
<td>Focus group interviews</td>
<td>4 groups (20 nurses)</td>
<td>A tentative model based on important aspects of surgical nursing care with 15 categories in 2 dimensions, elements of performance and prerequisites.</td>
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<td>II</td>
<td>To evaluate the usefulness of a tentative model based on important aspects of surgical nursing care, for designing strategic and clinical quality indicators.</td>
<td>Literature review Questionnaire</td>
<td>210 nurses</td>
<td>The tentative model was found to be effective for designing items useful as strategic and clinical quality indicators in postoperative pain management.</td>
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<td>II, III</td>
<td>To investigate content validity of strategic and clinical quality indicators in postoperative pain management.</td>
<td>Questionnaire</td>
<td>2 groups of nurses n=210 and n=321</td>
<td>Content validity was established, i.e. the indicators were judged to be essential for the quality of care in postoperative pain management, realistic to carry out, and possible for nurses to influence management.</td>
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<tr>
<td>IV</td>
<td>To develop and evaluate psychometric properties of an instrument to measure strategic and clinical quality indicators in postoperative pain management.</td>
<td>Questionnaire</td>
<td>198 patients</td>
<td>Internal consistency reliability, factor analysis, different groups approach and convergent validity suggested initial support for the instrument.</td>
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<td>V</td>
<td>To investigate patient and nurse assessment on the quality of care in postoperative pain management and to test the applicability of a new instrument</td>
<td>Patient and nurse questionnaires</td>
<td>198 patients and 63 nurses (paired)</td>
<td>The instrument appeared to be useful in identifying important areas for improvement and differences among groups of patients and departments. Differences were found between the patient and nurse assessments.</td>
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presented as arithmetic means and standard deviation for the sake of clarity, although the different questionnaires are referred to as ordinal scales. Non-parametric unpaired data were tested with Kruskall-Wallis ANOVA, Chi2–test with Yates correction, and Mann-Whitney U-test adjusted for ties and Bonferroni correction. For non-parametric paired data, the Friedman two-way ANOVA, Wilcoxon’s rank test and Bonferroni correction were used. For correlation between non-parametric data, Spearman rank order correlation was used. The backward stepwise multiple regression analysis was used.

Fehring’s methodology (1987) was used for content validation. The Pearson Product-Moment Correlation was used for inter-item and item-total correlations and Cronbach’s coefficient alpha was used to test internal consistency reliability (Cronbach 1951, Streiner & Norman 1995). An explorative factor analysis was performed on patients' scores through a principal component analysis followed by varimax orthogonal rotation (Gorsuch 1983).

**Qualitative analysis**
The qualitative data were analysed by unitising and categorising which were inspired by the constant comparative method described by Lincoln and Guba (1985).

**Ethics**
This thesis was designed and implemented in compliance with common principles in human research, i.e. the principle of respect for autonomy, the principle of nonmaleficience, the principal of beneficience and the principle of justice (Beauchamp 1994). Written information was given to all participants, and it was emphasised that participation was voluntary. The studies which included study groups four and five, were examined and approved by the Research Ethics Committee, Faculty of Health Sciences, Linköping University.

**STEP ONE: To identify clinical nurses’ perceptions of important aspects of surgical nursing care**

*Subjects*
Study group one included 4 focus group interviews with 4 to 6 registered nurses (RN) in each group, 20 in a total and all at the same hierarchical level. The interviews were conducted at 2 university hospitals and at 2 central county hospitals in Sweden. The age of the participants ranged between 24 and 53 years (mean age 35 years), and they had been working
in surgical wards between 1 and 29 years. Each focus group included nurses from different surgical wards, and they had been asked by their respective head nurses to participate in a group interview concerning the quality of nursing care. The nurses did not know the interviewers.

Method
Focus group interview
A qualitative approach, using focus group interviews, was chosen to elicit nurses’ opinions of important aspects of surgical nursing care. The interview is a carefully planned and guided interactional discussion. The focus underpinning the discussions is anything that engages the group in a collective activity, such as debating a particular set of questions (Kingry et al. 1990, Krueger 1994, Powell & Single 1996). In the present focus group interviews, preselected and open-ended questions were used based on an analysis of the subject quality, important aspects, and surgical nursing care (Appendix I). The author (EI) was the moderator of all focus group interviews (n=4) while assistant moderators differed. They were, however, all familiar with the technique of group processes. The moderator was primarily concerned with directing the discussions and keeping the conversation flowing, while the assistants, for example, took comprehensive notes and handled the environmental conditions. Each interview lasted about 90 minutes, and was tape-recorded by permission and transcribed verbatim. The interviews took place at the hospital and were characterised by natural speech and interaction between the participants. Naturally, some individuals talked more than others, but this was handled by the moderator and did not appear to pose a problem. Before and after the interviews there was some discussion to establish a more relaxed atmosphere.

Analysis of the focus group interview
The tape-recorded interviews were transcribed verbatim by the author (EI). The first step in the data analysis was unitising, which implies that the data were examined line by line to identify units of information. According to Lincoln & Guba (1985) a unit should have two characteristics viz. (1) it should be heuristic, that is, aimed at some understanding or some action that the inquirer needs to have, and (2) it must be the smallest piece of information about something that can stand by itself. The units derived were formulated in words used by the nurses themselves. This unitising served, as a second step, as a basis for defining categories. The essential task of categorising was to bring together units of information that related to the same content. This was done by continuous comparisons between
possible categories and the units obtained. Finally, the categories were further condensed into 2 dimensions.

The author (EI) and another researcher familiar with qualitative analysis separately performed the initial unitising. The units of information were compared and discussed. Categories and dimensions were identified and then reasoned with the other researcher, and the findings were evaluated until final agreement was reached. Then, a theoretical interpretation was performed using Carper’s (1978) 4 fundamental patterns of knowing as a framework to assess whether the findings relate to each other. The patterns are (1) empirics, the science of nursing which is descriptive and based on facts, (2) esthetics, the art of nursing which can involve empathy, (3) the component of personal knowledge, for example, to understand the meaning of the sick person, and (4) ethics, the component of moral knowledge. These 4 patterns together constitute the essence of nursing care according to Carper.

**Result**

From the data analysis of the focus group interviews 15 different categories emerged, which the nurses considered as important aspects for the quality and effects of surgical nursing care. These categories become perceptible as 2 dimensions; firstly, the conditions to make good quality of nursing care possible; and secondly a set of activities between the nurses and the patients. Here they are called “prerequisites” and “elements of performance”. The 15 categories in the 2 dimensions frame a tentative model of important aspects of surgical nursing care. The 8 categories in elements of performance are "detecting and acting on signs and symptoms", "performing prescriptions", "performing pre- and postoperative care", "performing general care", "informing and educating", "promoting relationships", "acting on behalf of patients" and "protecting the privacy of patients". The 7 categories in prerequisites are "staffing", "environment/equipment", competence/knowledge", "routines", "responsibility", "attitudes" and "team work".

The 8 categories in the dimension "elements of performance" were interpreted by means of Carper’s 4 patterns of knowing (1978). Three of the patterns could be found viz. empirics in the categories "detecting and acting on signs and symptoms”, ”performing prescriptions”, ”performing pre- and postoperative care”, ”performing general care” and ”informing and educating”, personal knowledge in the categories ”informing and educating” and ” promoting relationships”, and ethics in the categories ”acting on
behalf of patients” and ”protecting the privacy of patients”. However, the fourth pattern, esthetics, could not be identified in the analysis of the data.

Conclusion
Important aspects of surgical nursing care were distinguished and summarised in a tentative model.

STEP TWO: To evaluate the usefulness of the tentative model for designing strategic and clinical quality indicators and to investigate content validity

Subjects
Study group two included all RNs who were registered to participate in two-days intensive courses in acute pain management between 1995 and 1997 (n=233) arranged by the Swedish Nurses Association for Pain Management and Abbott Scandinavia, Inc. This population was selected to answer a questionnaire because of their obvious special interest and clinical experience in pain management. The response rate was 90% (n=210). Study group three included a random sample of clinical RNs working in surgical wards, i.e. general surgery, orthopaedics, gynaecology, and urology (n=404). The participants were recruited from the Swedish Association of Health Officers, which represents more than 90% of the RNs in Sweden. The response rate of the questionnaire was 80% (n=321). The non-respondents came from different parts of the country. Background variables for study groups two and three are reported in Table 2. The questionnaire was mailed to the nurses along with a stamped, self-addressed return envelope. Two reminders were sent to non-respondents.

Method
Construction of strategic and clinical quality indicators
The tentative model of important aspects of surgical nursing care was used as a basis for designing items to be effective as strategic and clinical nursing quality indicators in postoperative pain management. Postoperative pain management was chosen as an area characterised by high volume, high risk, high problem, high cost, high priority and of significant potential to lead to improvement in health care, and where nursing makes a difference. Supportive literature gave a rationale for the indicators (VanDalfsen & Syrjala 1990, AHCPR 1992, Closs 1992, Rawal & Berggren 1994, Meehan et al. 1995, Sjöström 1995, Francke et al. 1996, Segesten 1997). One item was formulated in each of the 15 categories. The tentative model covered different well-selected important aspects of surgical nursing care, rendering these strategic aspects.
Table 2. Background variables for the respondents of the questionnaire for content validity

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Study group 2</th>
<th></th>
<th>Study group 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=210</td>
<td>%</td>
<td>n=321</td>
<td>%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>96</td>
<td>95</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td></td>
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<tr>
<td><strong>Age, years</strong></td>
<td></td>
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<tr>
<td>&lt; 30</td>
<td>9</td>
<td>15</td>
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<tr>
<td>30-50</td>
<td>81</td>
<td>69</td>
<td></td>
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<tr>
<td>&gt; 50</td>
<td>10</td>
<td>16</td>
<td></td>
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<tr>
<td><strong>Years as RN</strong></td>
<td></td>
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<tr>
<td>&lt;1</td>
<td></td>
<td></td>
<td>5</td>
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<tr>
<td>1-5</td>
<td>12</td>
<td>23</td>
<td></td>
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<tr>
<td>5-10</td>
<td>21</td>
<td>24</td>
<td></td>
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<tr>
<td>&gt;10</td>
<td>67</td>
<td>48</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Personal experience of pain intensity; 0-10</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0-5</td>
<td>9</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10</td>
<td>62</td>
<td>76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td>29</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Working unit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgical ward</td>
<td>59</td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (e.g. intensive care, anaesthesia)</td>
<td>41</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hospital</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>University</td>
<td>43</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central county</td>
<td>25</td>
<td>37</td>
<td></td>
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</tr>
<tr>
<td>District county</td>
<td>23</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Years in surgical unit</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>&lt;1</td>
<td>3</td>
<td>10</td>
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<tr>
<td>1-5</td>
<td>19</td>
<td>23</td>
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<tr>
<td>5-10</td>
<td>28</td>
<td>23</td>
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<tr>
<td>&gt;10</td>
<td>50</td>
<td>44</td>
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</tbody>
</table>
Content validity
To establish content validity, a questionnaire was compiled that included the 15 strategic and clinical quality indicators. These were assessed from 3 points of view: (1) whether it was essential to achieve high quality postoperative pain management in adult patients in a surgical ward, (2) whether it was realistic to carry out and (3) whether it was possible for nurses to influence management. A 5-point scale was used with the response alternatives strongly disagree (1), disagree (2), uncertain (3), agree (4), strongly agree (5). The nurses were also asked to choose 3 indicators in each of the 2 dimensions in the tentative model, which they conceived to be the most crucial factors for achieving high quality in postoperative pain management.

Fehring’s methodology (1987) for content validation was adopted for validation of the quality indicators. Using the responses provided by the study groups two and three, mean weighted ratios were calculated for each indicator as essential, realistic to carry out and possible for nurses to influence management. The weighted scores were \(5=1, 4=0.75, 3=0.5, 2=0.25\) and \(1=0\). These weights are provided to give a maximum score of 1.0. No score is given to a defining characteristic judged to be not at all indicative. Defining indicators with weighted mean ratios greater than or equal to 0.80 were considered as “major”, and indicators with mean ratios less than 0.80 but greater than 0.50 were “supportive”. The indicators with mean ratios less than or equal to 0.50 should be discarded.

Result
Essential
Study group two validated 14 of the 15 indicators and study group three validated 12 as “major” factors in terms of being essential to achieve high quality. The remaining indicators were considered to be “supportive”. The nurses in group two scored 7 indicators higher than group three as essential and just 1 indicator was scored higher by group three, i.e. the indicator in the “environment” category (number 10) (Table 3).

Realistic
Study group two validated 9 of the 15 indicators and study group three validated 8 as “major” factors in terms of being realistic to carry out in a surgical ward. The remaining indicators were considered to be “supportive”. The nurses in group two scored 4 indicators higher than group three as realistic to carry out (Table 3).
Table 3. Mean scores (±SD) and the proportion of the three most crucial indicators in ‘elements of performance’ (1-8) and ‘prerequisites’ (9-15), respectively, Mann-Whitney U-test between the groups (essential, realistic, nurses influence) and Chi2 test with Yate’s correction between the groups (most crucial), study group 2, n=210 (2) and study group 3, n=321 (3)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Essential</th>
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<tbody>
<tr>
<td></td>
<td>2 mean(SD)</td>
<td>3 mean(SD)</td>
<td>2 mean(SD)</td>
<td>3 mean(SD)</td>
<td>2 mean(SD)</td>
<td>3 mean(SD)</td>
<td>2 %</td>
<td>3 %</td>
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</tr>
<tr>
<td>1/ The patient’s perception of pain must be assessed regularly with the help of a pain assessment instrument e.g. the VAS scale</td>
<td>.87(.18)</td>
<td>.80(.19)</td>
<td>.80(.20) a</td>
<td>.75(.20)</td>
<td>.90(.17)</td>
<td>.87(.16)</td>
<td>67 a</td>
<td>51</td>
<td></td>
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<tr>
<td>2/ Pharmacological pain treatment must be administered preventively</td>
<td>.92(.15)</td>
<td>.90(.14)</td>
<td>.89(.16)</td>
<td>.87(.17)</td>
<td>.90(.15)</td>
<td>.87(.17)</td>
<td>51</td>
<td>57</td>
<td></td>
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<tr>
<td>3/ The patient’s pain must be assessed in connection with mobilisation e.g. on breathing deeply or moving legs</td>
<td>.89(.19) a</td>
<td>.85(.19)</td>
<td>.82(.20)</td>
<td>.81(.18)</td>
<td>.88(.18) a</td>
<td>.85(.17)</td>
<td>17</td>
<td>15</td>
<td></td>
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<tr>
<td>4/ The patient must be given help/support to find a comfortable position in bed</td>
<td>.94(.13)</td>
<td>.94(.11)</td>
<td>.86(.17)</td>
<td>.88(.14)</td>
<td>.92(.14)</td>
<td>.90(.14)</td>
<td>7</td>
<td>12</td>
<td></td>
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<tr>
<td>5/ The patient must receive information preoperatively about pain treatment</td>
<td>.97(.10) a</td>
<td>.95(.11)</td>
<td>.90(.15)</td>
<td>.89(.15)</td>
<td>.93(.14)</td>
<td>.91 (.14)</td>
<td>58</td>
<td>48</td>
<td></td>
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<tr>
<td>6/ An individual goal for pain treatment must be set up in collaboration with the patient</td>
<td>.87(.16) a</td>
<td>.78(.19)</td>
<td>.76(.22) a</td>
<td>.68(.20)</td>
<td>.82(.22) a</td>
<td>.77(.19)</td>
<td>21</td>
<td>23</td>
<td></td>
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<tr>
<td>7/ The nurse must act until a level has been reached that is acceptable to the patient</td>
<td>.97(.09)</td>
<td>.95(.10)</td>
<td>.85(.16)</td>
<td>.83(.16)</td>
<td>.90(.15)</td>
<td>.87(.16)</td>
<td>72</td>
<td>72</td>
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</tr>
</tbody>
</table>
8/ The patient must be given the opportunity for peace and quiet so as to be able to sleep/rest at night  
9/ Over half the caring staff on the ward must be registered nurses  
10/ There must be rooms that produce a pleasant environment  
11/ Nurses must possess special knowledge of pain assessment and pain treatment  
12/ There must be special rules for the documentation of pain assessment and pain treatment  
13/ There must be a particular nurse who is responsible for the individual patient’s pain treatment, e.g. a primary nurse  
14/ Nurses must believe what the patients tell them concerning their pain  
15/ There must be multiprofessional co-operation with respect to pain  

<p>| | | | | | | |</p>
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</thead>
<tbody>
<tr>
<td>8/</td>
<td>.94(.13)</td>
<td>.94(.11)</td>
<td>.70(.24)</td>
<td>.66(.24)</td>
<td>.74(.26)</td>
<td>.71(.25)</td>
</tr>
<tr>
<td>9/</td>
<td>.69(.31)</td>
<td>.73(.28)</td>
<td>.64(.30)</td>
<td>.65(.26)</td>
<td>.56(.32)</td>
<td>.58(.27)</td>
</tr>
<tr>
<td>10/</td>
<td>.83(.21)</td>
<td>.88(.16)</td>
<td>.53(.28)</td>
<td>.57(.22)</td>
<td>.51(.29)</td>
<td>.54(.26)</td>
</tr>
<tr>
<td>11/</td>
<td>.98(.09)</td>
<td>.94(.12)</td>
<td>.88(.17)</td>
<td>.83(.18)</td>
<td>.85(.21)</td>
<td>.82(.19)</td>
</tr>
<tr>
<td>12/</td>
<td>.95(.13)</td>
<td>.93(.12)</td>
<td>.88(.16)</td>
<td>.85(.17)</td>
<td>.90(.15)</td>
<td>.88(.15)</td>
</tr>
<tr>
<td>13/</td>
<td>.80(.22)</td>
<td>.79(.21)</td>
<td>.71(.24)</td>
<td>.69(.22)</td>
<td>.74(.25)</td>
<td>.75(.21)</td>
</tr>
<tr>
<td>14/</td>
<td>.96(.10)</td>
<td>.95(.11)</td>
<td>.89(.16)</td>
<td>.86(.16)</td>
<td>.90(.16)</td>
<td>.89(.15)</td>
</tr>
<tr>
<td>15/</td>
<td>.94(.15)</td>
<td>.92(.14)</td>
<td>.79(.21)</td>
<td>.78(.19)</td>
<td>.77(.23)</td>
<td>.76(.21)</td>
</tr>
</tbody>
</table>

\(^a\)Sign of differences between groups 2 and 3, p < 0.01
Nurses influence
Study group two validated 10 of the 15 indicators and study group three validated 9 as “major” factors in terms of the possibilities for nurses to influence management. The remaining indicators were considered to be “supportive”. The nurses in group two scored 3 indicators higher than group three as regards the possibility for nurses to influence management (Table 3).

Differences between matched assessments
Among the nurses in study groups two and three, respectively, the ANOVA showed higher scores (p<0.01) for the assessment “essential” compared to “realistic” for 13 of the 15 indicators in group two (except for indicators numbered 2 and 9) and for all indicators in group three. Higher scores were also given for “essential” than for “nurses influence” (p<0.01) for 11 indicators in group two (except for numbers 1, 2, 3, and 4) and for 11 indicators in group three (except for numbers 2, 3, 6, and 13).

Most crucial
The most crucial indicators ranked in both groups were in the categories detecting and acting on signs and symptoms, performing prescriptions, informing and educating, acting on behalf of the patients, competence/knowledge and attitudes (Table 3)

Conclusion
The tentative model was found to be effective for designing items useful as strategic and clinical quality indicators in postoperative pain management. Content validity was established, i.e. essential for the quality of care, realistic to carry out and possible for nurses to influence management.

STEP THREE: To develop and evaluate psychometric properties of an instrument
Subjects
Study group four consisted of 209 inpatients from 5 orthopaedic, gynaecological and general surgical wards in a central county hospital in Sweden. The patients answered a questionnaire on their second postoperative day and inclusion criteria were patients scheduled for elective surgery, oriented to person and place, able to understand Swedish, at least 18 years of age and spent at least 24 hours in the wards after the surgical procedure before answering the questionnaire. Data were collected 2 or 3 weekdays per week over 4 months, September through December 1999. The response rate was 96% (n=200), but 2 questionnaires were omitted
because they were incomplete. The patients (n=198) were undergoing a variety of surgical procedures in orthopaedics (36.4%), gynaecology (19.7%) and general surgery (43.9%). The mean age was 62 years (SD=14.9, range 20-87), and 120 (61%) patients were female. Sixty-one patients (31%) received epidural analgesia for postoperative pain relief. Paracetamol, cetobemidon, and tramadol, intramuscularly, intravenously or orally, were the most commonly ordered analgesics. Three patients received no postoperative analgesia. Demographic variables were collected from the patient records.

The researcher, with no affiliation with the hospital, conducted the study and recruited the patients in study group four. They were all informed both verbally and in writing. The questionnaire was given to the patient and collected after about 20 to 30 minutes. Thirty-six patients (18%) asked the researcher to read the questions and complete their answers.

Method
Developing an instrument
An instrument was compiled to measure the strategic and clinical quality indicators for achieving high quality in postoperative pain management which were found to have content validity. The indicators were converted by the researcher to statements suitable for a patient questionnaire (Table 4). The statements were scored on a 5-point scale with the endpoints: 1=strongly disagree and 5=strongly agree. The total score could vary between 15 and 75 with higher values indicating a higher quality of care. Complementary questions were “Worst pain you have had in the last 24 hours”, “Lowest level of pain in the last 24 hours”, and “Pain you have right now” from the Brief Pain Inventory (Daut et al. 1983). An 11-point scale was used with the end points 0=no pain and 10=worst possible pain. “Did you have more pain after the operation than expected” as a Yes/No question and the overall satisfaction question “How dissatisfied or satisfied are you with the pain relief after the surgical procedure” (11-point scale with 0=very dissatisfied and 10=very satisfied) were also asked.

Result
Internal consistency reliability
The proportion of times each individual item correlated with other items in the range 0.20 to 0.70 (p<0.05) varied between 3/14 and 14/14. No inter-item correlation coefficients were >0.70. The average inter-item correlation coefficients were >0.20 for all items, except item number 11. The item-total correlation coefficients (without respective item) were between 0.24
and 0.67. Item number 11 was the only item with a correlation coefficient <0.30. For the total scale the Cronbach’s coefficient alpha was 0.83 and the average inter-item correlation coefficient was 0.30. If item number 11 was deleted the coefficient alpha and average correlation coefficient would be 0.84 and 0.32, respectively.

Item number 11 was deleted due to the results from the reliability analysis, viz. several inter-item correlation coefficients <0.20, item-total correlation coefficient <0.30 and increasing Cronbach’s coefficient alpha (0.01) when deleted.

Factor analysis
A principal component factor analysis was performed with the remaining 14 items from the scale to explore underlying structures. The scree-test plot and eigenvalues ≥1.0 in the unrotated explanatory factor analysis supported the 4-factor solution with a cumulative variance of 61.44%. A rotation to orthogonal transformation was performed, and the loading of the items on the 4 factors are reported in Table 5. The salient loading for each item exceeded 0.40. Cross-loading was found between factors, but the highest loading was considered salient. Items with loading which were close to equal in 2 factors were placed in the factor where the content seemed most logical.

The 4 factors were named according to the essential content of the items Communication”, “Action”, “Trust” and “Environment that all are important parts of postoperative pain management. Correlation coefficients between 0.34 and 0.58 (p<0.05) were found among the 4 factors. The Cronbach’s coefficient alpha for the total scale was 0.84 and for the 4 factors 0.65, 0.65, 0.75, and 0.56, respectively.

Different groups approach
The criteria “Epidural-analgesia (EDA)” and “More pain than expected” were used to divide patients into groups to determine whether the scale could distinguish between (1) patients who received EDA or not, and between (2) patients who experienced more pain than expected or not. The patients who received EDA had higher scores on the total scale and the action sub-scale but lower scores on the environment sub-scale. Those who experienced more pain than expected had lower scores for both the total scale and the 4 sub-scales (Table 6). The differences between groups suggest some degree of support for construct validity.
Table 4. The categories, the indicators for content validation and items in the patient questionnaire

<table>
<thead>
<tr>
<th>Categories in the tentative model (I)</th>
<th>Indicators for content validity (II, III)</th>
<th>Items in the patient questionnaire (IV, V)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elements of performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detecting and acting on signs and symptoms</td>
<td>1/ The patient’s perception of pain must be assessed regularly with the help of a pain assessment instrument e.g. the VAS* scale.</td>
<td>7/ To determine my level of pain, a member of the staff asked me to pick a number between 0 and 10 (or make a mark on a straight line) at least once every morning, afternoon, and evening.</td>
</tr>
<tr>
<td>Performing prescriptions</td>
<td>2/ Pharmacological pain treatment must be administered preventively.</td>
<td>5/ Even if I did not always asked for it, I was given pain medication.</td>
</tr>
<tr>
<td>Performing pre- and postoperative care</td>
<td>3/ The patient’s pain must be assessed in connection with mobilization e.g. on breathing deeply or moving legs.</td>
<td>6/ The staff asked me about the pain I had when I breathed deeply, sat up, or moved around.</td>
</tr>
<tr>
<td>Performing general care</td>
<td>4/ The patient must be given help/support to find a comfortable position in bed.</td>
<td>3/ I received support or help in finding a comfortable position in bed to help avoid pain.</td>
</tr>
<tr>
<td>Informing and educating</td>
<td>5/ The patient must receive information preoperatively about pain treatment.</td>
<td>1/ Before my operation I was told about the type of pain treatment I would be offered after surgery.</td>
</tr>
<tr>
<td>Promoting relationships</td>
<td>6/ An individual goal for pain treatment must be set up in collaboration with the patient.</td>
<td>2/ After my operation I talked with a nurse about how I wanted my pain to be treated.</td>
</tr>
<tr>
<td>Acting on behalf of patients</td>
<td>7/ The nurse must act until a level has been reached that is acceptable to the patient.</td>
<td>8/ The nurses helped me with pain treatment until I was satisfied with the effects of pain relief.</td>
</tr>
<tr>
<td>Protecting the privacy of patients</td>
<td>8/ The patient must be given the opportunity for peace and quiet so as to be able to sleep/rest at night.</td>
<td>4/ I was given the opportunity for peace and quiet so I could sleep at night.</td>
</tr>
</tbody>
</table>

**Prerequisites**

| Staffing | 9/ Over half the caring staff on the ward must be registered nurses. | 10/ There have been enough nurses on duty for someone to respond quickly to my request for pain relief. |
| Environment/equipment | 10/ There must be rooms that produce a pleasant environment. | 9/ I have a pleasant room. |
| Competence/knowledge | 11/ Nurses must possess special knowledge of pain assessment and pain treatment. | 13/ The nurses are knowledgeable about how to relieve my pain. |
| Routines | 12/ There must be special rules for the documentation of pain assessment and pain treatment. | 12/ When nurses come on duty, they know “everything” about how much pain I have had and the pain treatment I have received. |
| Responsibility | 13/ There must be a particular nurse who is responsible for the individual patient’s pain treatment, e.g. a primary nurse. | 11/ A specific nurse is responsible for my care during the entire time I am hospitalised. |
| Attitudes | 14/ Nurses must believe what the patients tell them concerning their pain. | 14/ The nurses believe me when I tell them about my pain. |
| Team-work | 15/ There must be multiprofessional cooperation with respect to pain. | 15/ The nurses and doctors have cooperated in treating my pain. |

* VAS visual analogue scale
Convergent validity
The correlation coefficient between the overall score and the single-item pain relief satisfaction assessment was 0.53 (p<0.001), which provides support for some degree of convergent validity.

Conclusion
The findings suggest initial support for the new instrument to measure the strategic and clinical quality indicators in postoperative pain management.

STEP FOUR: To investigate patient and nurse assessment and to test the applicability of the instrument
Subjects
The answers from study group four (n=198 patients) in the “third step” were also used in this fourth step. Study group five consisted of 63 registered nurses. The nurses answered 196 of 198 possible questionnaires (99%), which were all paired with a patient questionnaire. Each nurse answered, on average, three questionnaires (SD 2.3, range 1-11). Mean age for the nurses was 38 years (SD=8.9, range 23-57) and 59 (94%) nurses were female. On average, the nurses had been a registered nurse for 13 years (SD 9.4, range 0.5-33) and in surgical nursing care for 12 years (SD 8.7, range 0.5-33). Twenty nurses (32%) had a special education and training in pain management. In 97% of the 196 possible times a questionnaire was completed, the nurse had been responsible for the patient during the last 4 hours and 86% also at least one shift (about 8 hours) during the last 24 hours.

The researcher, with no affiliation with the hospital, conducted the study and recruited the nurses in study group five. They were all informed both verbally and in writing. At the time the patient agreed to answer the questionnaire, the nurse responsible for this individual patient was asked to complete the nurse questionnaire. It took about 10 minutes to complete the questionnaire.

Method
The patient and nurse questionnaire
The patient questionnaire was the same as that used in step three when developing the instrument to measure strategic and clinical quality indicators. Twelve of the 14 items in the instrument were used and converted to be answered by the nurses, e.g. “I received support or help to find a comfortable position in bed to help avoid pain” (patient questionnaire) to “The patient received support or help to find a
Table 5. Loading of Items on Factors from Factor Analysis, Principal Components with Varimax Rotation, for the 14 Items (n = 198)

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Communality h²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1 Communication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Before my operation I was told about the type of pain treatment I would be offered after surgery.</td>
<td>.56</td>
<td>.52</td>
<td>.04</td>
<td>.04</td>
<td>.59</td>
</tr>
<tr>
<td>12 When nurses come on duty, they know 'everything' about how much pain I have had and the pain treatment I have received.</td>
<td>.66</td>
<td>.12</td>
<td>.26</td>
<td>.13</td>
<td>.54</td>
</tr>
<tr>
<td>15 The nurses and doctors have cooperated in treating my pain.</td>
<td>.76</td>
<td>.22</td>
<td>.22</td>
<td>.05</td>
<td>.68</td>
</tr>
<tr>
<td><strong>Factor 2 Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 After my operation I talked with a nurse about how I wanted my pain to be treated.</td>
<td>.39</td>
<td>.63</td>
<td>.02</td>
<td>-.03</td>
<td>.55</td>
</tr>
<tr>
<td>3 I received support or help in finding a comfortable position in bed to help avoid pain.</td>
<td>.23</td>
<td>.57</td>
<td>.20</td>
<td>.44</td>
<td>.61</td>
</tr>
<tr>
<td>6 The staff asked me about the pain I had when I breathed deeply, sat up, or moved around.</td>
<td>.09</td>
<td>.77</td>
<td>-.00</td>
<td>.21</td>
<td>.65</td>
</tr>
<tr>
<td>7 To determine my level of pain, a member of the staff asked me to pick a number between 0 and 10 (or make a mark on a straight line) at least once every morning, afternoon, and evening.</td>
<td>-.02</td>
<td>.55</td>
<td>.46</td>
<td>-.21</td>
<td>.57</td>
</tr>
</tbody>
</table>
**Factor 3 Trust**

5  Even if I did not always ask for it, I was given pain medication.  
   \[ \begin{array}{ccccc} 
   & .19 & - .10 & .73 & .10 & .59 
   \end{array} \]

8  The nurses helped me with pain treatment until I was satisfied with the effects of pain relief.  
   \[ \begin{array}{ccccc} 
   & .16 & .44 & .58 & .33 & .66 
   \end{array} \]

13 The nurses are knowledgeable about how to relieve my pain.  
   \[ \begin{array}{ccccc} 
   & .52 & .21 & .53 & .25 & .65 
   \end{array} \]

14 The nurses believe me when I tell them about my pain.  
   \[ \begin{array}{ccccc} 
   & .48 & .26 & .56 & .24 & .68 
   \end{array} \]

**Factor 4 Environment**

4  I was given the opportunity for peace and quiet so I could sleep at night.  
   \[ \begin{array}{ccccc} 
   & -.05 & .11 & .27 & .75 & .65 
   \end{array} \]

9  I have a pleasant room.  
   \[ \begin{array}{ccccc} 
   & .50 & .04 & -.14 & .61 & .64 
   \end{array} \]

10 There have been enough nurses on duty for someone to respond quickly to my request for pain relief.  
   \[ \begin{array}{ccccc} 
   & .43 & .05 & .35 & .46 & .52 
   \end{array} \]

<table>
<thead>
<tr>
<th></th>
<th>Eigenvalue</th>
<th>2.55</th>
<th>2.29</th>
<th>2.06</th>
<th>1.70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total variance %</td>
<td></td>
<td>18.23</td>
<td>16.35</td>
<td>14.70</td>
<td>12.16</td>
</tr>
<tr>
<td>Cumulative %</td>
<td></td>
<td>18.23</td>
<td>34.58</td>
<td>49.28</td>
<td>61.44</td>
</tr>
</tbody>
</table>

^a The salient loading used for each item is printed in bold type.
Table 6. Mean scores (SD) for the total scale, sub-scales and complementary questions in different groups of patients

<table>
<thead>
<tr>
<th></th>
<th>Epidural analgesia</th>
<th>More pain than expected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scale range</td>
<td></td>
</tr>
<tr>
<td></td>
<td>yes: $n=62$ mean</td>
<td>no: $n=136$ mean</td>
</tr>
<tr>
<td></td>
<td>(SD)</td>
<td>(SD)</td>
</tr>
<tr>
<td>Total scale</td>
<td>14 – 70</td>
<td>60.5 (7.8)</td>
</tr>
<tr>
<td>Sub-scales:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>3 – 15</td>
<td>13.3 (1.7)</td>
</tr>
<tr>
<td>Action</td>
<td>4 – 20</td>
<td>15.6(3.9)</td>
</tr>
<tr>
<td>Trust</td>
<td>4 – 20</td>
<td>18.7(2.2)</td>
</tr>
<tr>
<td>Environment</td>
<td>3 – 15</td>
<td>13.0(2.1)</td>
</tr>
<tr>
<td>Complementary questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain: now</td>
<td>0 – 10</td>
<td>2.3 (2.0)</td>
</tr>
<tr>
<td>Pain: worst</td>
<td>0 – 10</td>
<td>5.8 (2.5)</td>
</tr>
<tr>
<td>Pain: lowest</td>
<td>0 – 10</td>
<td>1.5 (1.3)</td>
</tr>
<tr>
<td>Dissatisfied/ satisfied</td>
<td>0 - 10</td>
<td>8.9 (1.6)</td>
</tr>
</tbody>
</table>

*a* Mann-Whitney U-tes
position in bed to help avoid pain” (nurse questionnaire). Items numbered 12 and 15 (Table 4) were excluded because it was difficult to find acceptable similar items. Furthermore, 2 questions were asked: “Worst pain the patients have experienced in the last 24 hours and “How dissatisfied or satisfied are the patients with their pain relief after the surgical procedure”. The same 5- and 11- point scales, respectively, as in the patient questionnaire, were used. Data on demographic variables were also asked in the nurse questionnaire. An individual nurse was paired with an individual patient.

Result
Patient assessment
The mean scores (SD) for the total instrument (scale range 14-70, higher values indicating a higher quality of care) was 58.6 (SD 8.9). The mean scores for the individual items were between 2.8 and 4.7 (scale range 1-5) and the number of patients who scored an item 1 or 2 (disagreement) varied between 0.5% and 52% (Table 7). The mean scores for the sub-scales and complementary questions are reported in Table 8.

The patients ≥70 years had higher (p<0.001) mean scores (14.0 SD 1.5) on the environment sub-scale compared to the patients <70 years (12.9 SD 2.3). Females had lower (p<0.01) mean scores (13.6 SD 4.0) than males (15.1 SD 4.2) on the action sub-scale, and females had higher (p<0.05) mean pain intensity scores (2.0 SD 1.9) on the question about lowest pain level compared to males (1.4 SD 1.5). Patients with epidural analgesia had higher mean scores than those without epidural analgesia on the total scale and the action sub-scale, but lower scores on the environment sub-scale (Table 6). Forty-two patients (24%) reported more pain than they expected. These patients had lower scores than those who reported no more pain than they expected on the total scale and on the 4 sub-scales. Moreover, they had experienced higher pain-levels on worst, lowest and “right now pain”, and were less satisfied with overall pain relief (Table 6).

In a multiple regression model using the backward stepwise method, the total scale and the 4 sub-scales were used as outcome variables (dependent). The explanatory variables (independent) were “sex”, “age”, “epidural analgesia” and “more pain than expected”. The outcome variable “total scale” was associated with the explanatory variable “more pain than expected” (p<0.001), viz. if you reported more pain than expected you had lower scores. The communication, trust and environment sub-scales were all associated with “more pain than expected” (p<0.01, p<0.01 and
Table 7. Patients’ and nurses’ mean scores (SD) for the individual items (5-point-scale, 1–5) and number of patients and nurses (of total) scoring 1 or 2 on each item

<table>
<thead>
<tr>
<th>Item</th>
<th>Patients’ mean (SD) n=198</th>
<th>Number of patients scoring 1 or 2 (of total) %</th>
<th>Nurses’ mean (SD) n=196</th>
<th>Number of nurses scoring 1 or 2 (of total) %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sub-scale: Communication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Before my operation I was told about the type of pain treatment I would be offered after surgery</td>
<td>4.0(1.4)</td>
<td>16.2</td>
<td>3.9(1.1)</td>
<td>11.1</td>
</tr>
<tr>
<td>12. When nurses come on duty, they know 'everything' about how much pain I have had and the pain treatment I have received</td>
<td>4.3(0.9)</td>
<td>5.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>15. The nurses and doctors have co-operated in treating my pain</td>
<td>4.5(0.8)</td>
<td>3.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Sub-scale: Action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. After my operation I talked with a nurse about how I wanted my pain to be treated</td>
<td>3.4(1.5)</td>
<td>29.3</td>
<td>3.3(1.2)</td>
<td>21.2</td>
</tr>
<tr>
<td>3. I received support or help in finding a comfortable position in bed to help avoid pain</td>
<td>4.3(1.1)</td>
<td>9.1</td>
<td>4.2(0.9)</td>
<td>4.5</td>
</tr>
<tr>
<td>6. The staff asked me about the pain I had when I breathed deeply, sat up, or moved around</td>
<td>3.7(1.5)</td>
<td>22.7</td>
<td>3.3(1.2)</td>
<td>18.7</td>
</tr>
<tr>
<td>7. To determine my level of pain, a member of the staff asked me to pick a number between 0 and 10 (or make a mark on a straight line) at least once every morning, afternoon, and evening</td>
<td>2.8(1.8)</td>
<td>52.0</td>
<td>3.3(1.7)</td>
<td>34.8</td>
</tr>
<tr>
<td><strong>Sub-scale: Trust</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Even if I did not always ask for it, I was given pain medication</td>
<td>4.5(1.0)</td>
<td>6.6</td>
<td>4.4(1.0)</td>
<td>6.6</td>
</tr>
<tr>
<td>8. The nurses helped me with pain treatment until I was satisfied with the effects of pain relief</td>
<td>4.5(0.9)</td>
<td>7.1</td>
<td>4.5(0.7)</td>
<td>0.5</td>
</tr>
<tr>
<td>13. The nurses are knowledgeable about how to relieve my pain</td>
<td>4.6(0.7)</td>
<td>2.5</td>
<td>4.5(0.6)</td>
<td>0.5</td>
</tr>
<tr>
<td>14. The nurses believe me when I tell them about my pain</td>
<td>4.7(0.6)</td>
<td>0.5</td>
<td>4.8(0.4)</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Sub-scale: Environment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I was given the opportunity for peace and quiet so I could sleep at night</td>
<td>4.3(1.1)</td>
<td>8.1</td>
<td>4.0(0.9)</td>
<td>5.1</td>
</tr>
<tr>
<td>9. I have a pleasant room</td>
<td>4.3(1.1)</td>
<td>8.6</td>
<td>3.6(1.1)</td>
<td>14.6</td>
</tr>
<tr>
<td>10. There have been enough nurses on duty for someone to respond quickly to my request for pain relief</td>
<td>4.7(0.7)</td>
<td>3.0</td>
<td>4.1(0.9)</td>
<td>4.1</td>
</tr>
</tbody>
</table>
Table 8. Mean scores (SD) for the total scale, sub-scales and complementary questions, and differences between patients and nurses

<table>
<thead>
<tr>
<th>Scale range</th>
<th>Patients mean (SD)</th>
<th>Scale range</th>
<th>Nurses Mean (SD)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=198</td>
<td></td>
<td>n=196</td>
<td></td>
</tr>
<tr>
<td>Total scale</td>
<td>14 – 70</td>
<td>12 - 60</td>
<td>48.1 (6.2)</td>
<td>-</td>
</tr>
<tr>
<td>(14 and 12 items, respectively)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-scales:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>3 - 15</td>
<td>1 - 5</td>
<td>3.9 (1.1)</td>
<td>-</td>
</tr>
<tr>
<td>(3 items and 1 item, respectively)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action</td>
<td>4 - 20</td>
<td>4 - 20</td>
<td>14.2 (3.2)</td>
<td>0.979</td>
</tr>
<tr>
<td>(4 items)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust</td>
<td>4 - 20</td>
<td>4 - 20</td>
<td>18.2 (1.8)</td>
<td>0.098</td>
</tr>
<tr>
<td>(4 items)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>3 - 15</td>
<td>3 - 15</td>
<td>11.8 (2.1)</td>
<td>0.000</td>
</tr>
<tr>
<td>(3 items)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complementary questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain: now</td>
<td>0 – 10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pain: worst</td>
<td>0 – 10</td>
<td>0 - 10</td>
<td>4.5 (2.4)</td>
<td>0.000</td>
</tr>
<tr>
<td>Pain: lowest</td>
<td>0 – 10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Dissatisfied/satisfied</td>
<td>0 - 10</td>
<td>0 - 10</td>
<td>7.4 (1.9)</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* Wilcoxon matched pairs test
Table 9. Mean scores (SD) for the total scale, sub-scales and complementary questions, and differences (Kruskall-Wallis ANOVA by ranks followed by Mann-Whitney U-test with Bonferroni correction) between different groups of patients

<table>
<thead>
<tr>
<th>Scale range</th>
<th>General surgery (GS) mean (SD)</th>
<th>Orthopaedics (O) mean (SD)</th>
<th>Gynaecology (G) mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=87</td>
<td>n=72</td>
<td>n=39</td>
</tr>
</tbody>
</table>

**Total scale**  
(14 items)

<table>
<thead>
<tr>
<th>Sub-scales:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication (3 items)</td>
<td>3 – 15</td>
<td>11.9 (2.6) ^a</td>
<td>13.5 (1.8)</td>
</tr>
<tr>
<td>Action (4 items)</td>
<td>4 – 20</td>
<td>13.3 (4.3) ^c</td>
<td>15.6 (3.6) ^d</td>
</tr>
<tr>
<td>Trust (4 items)</td>
<td>4 – 20</td>
<td>17.8 (2.7) ^e</td>
<td>18.8 (2.2)</td>
</tr>
<tr>
<td>Environment (3 items)</td>
<td>3 – 15</td>
<td>12.6 (2.4) ^c</td>
<td>14.0 (1.6)</td>
</tr>
</tbody>
</table>

**Complementary questions**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain: now 0 – 10</td>
<td>2.3 (1.9)</td>
<td>3.1 (2.4)</td>
<td>2.1 (2.0)</td>
</tr>
<tr>
<td>Pain: worst 0 – 10</td>
<td>5.2 (2.5)</td>
<td>6.0 (2.7) ^g</td>
<td>3.9 (2.7)</td>
</tr>
<tr>
<td>Pain: lowest 0 – 10</td>
<td>1.7 (1.6)</td>
<td>2.2 (2.1)</td>
<td>1.3 (1.3)</td>
</tr>
<tr>
<td>Dissatisfied/satisfied 0 - 10</td>
<td>8.4 (1.9)</td>
<td>8.8 (2.0)</td>
<td>9.4 (1.0) ^f</td>
</tr>
</tbody>
</table>

^a Differences between GS and O, p < 0.001  
^b Differences between G and GS, p < 0.001  
^c Differences between GS and O, p < 0.01  
^d Differences between O and G, p < 0.05  
^e Differences between GS and O, p < 0.05  
^f Differences between GS and O, p < 0.05  
^g Differences between O and G, p < 0.01
p<0.001, respectively). The environment sub-scale was also related to “sex” (p<0.05) and “age” (p<0.01), viz. females and increased age had higher scores, respectively. The action sub-scale was related to “epidural analgesia” (p<0.01) and “sex” (p<0.05), viz. those receiving epidural analgesia and males had higher scores, respectively.

The group of patients in orthopaedics scored higher on the total scale and also on the 4 sub-scales compared to the group of patients in general surgery, but there were no differences in worst-, now-, and lowest pain levels or how dissatisfied/satisfied the patients were (Table 9). The group of patients in gynaecology scored higher on 2 sub-scales compared to the patients in general surgery and they were more satisfied with the overall pain relief. The patients in gynaecology were younger than the patients in orthopaedics (p<0.001) and naturally there were more females compared to the patients in both general surgery and orthopaedics (p<0.001). There were no differences between the number of patients both with more pain than they expected and receiving epidural analgesia in the different wards. The complementary question “Worst pain you have had the last 24hours” correlated negatively with the 2 sub-scales, trust (r=-0.18, p<0.009) and environment (r=-0.15, p<0.036), and the overall satisfaction question (r=-0.43, p<0.000). The overall satisfaction question correlated with the total scale (r=0.53, p<0.001) and also on the 4 sub-scales.

Nurse assessment
The mean score for the instrument (scale range 12-60, higher values indicating a higher quality of care) was 48.1 (SD 6.2). The mean scores for the individual items were between 3.3 and 4.8 (scale range 1-5) and the number of nurses who scored an item 1 or 2 (disagreement) varied between 0.0% and 34.8% (Table 7). The mean scores for the sub-scales and complementary questions are reported in Table 8.

The total scale and the action, trust and environment sub-scales were used as outcome variables in the multiple linear regression model. The explanatory variables were “number of years working in surgical nursing care” and “special education and training in pain management”. The total scale (p<0.01), the sub-scales action (p<0.01) and trust (p<0.01) were associated with “numbers of years working in surgical nursing care”, viz. the nurses with many years reported higher scores.
Patient versus nurses
There were differences between the patient and nurse assessments on the environment sub-scale with higher scores for the patients. The patients also scored higher on the complementary question concerning dissatisfied/satisfied than did the nurses. According to the question about worst pain intensity level the patients reported higher scores than the nurses thought they had experienced (Table 8).

Conclusion
The instrument to measure strategic and clinical quality indicators appeared to be useful in identifying important areas for improvement and differences among groups of patients and departments. Differences were found between patient and nurse assessments.

DISCUSSION

Methodological considerations
To find the important aspects of surgical nursing care, an exploratory method with focus group interviews was chosen. This interview technique was originally developed in sociology and was found valuable as many of the decisions people make often grow out of discussions with others (Patton 1990). The advantage of this method is the possibility of stimulating a spontaneous exchange of ideas, thoughts, and attitudes that may be more easily expressed in a crowd (Fitzpatrick & Boulton 1994, Krueger 1994, Sim 1998). A collective view was sought rather than individual views, but the purpose was not to reach consensus. Thomas et al. (1995) compared focus groups with individual interviews. They found that certain concepts were more likely to occur in focus group interviews compared with individual ones, but they found no difference in the depth of the data generated. Fern (1982) indicated that focus groups did not produce significantly more or better ideas than individual interviews. However, it may be an effective use of time to use focus group interviews if one is interested in group rather than individual opinions. According to Krueger (1994), focus groups are valid if they are used carefully for a problem suitable for focus group inquiry and if they follow the established procedures, which was the case in this thesis. He has also stated that the greatest amount of information usually comes in the first two groups, and by the third and fourth session a fair amount has already been covered. More groups are advisable when, for example, the group of participants is heterogeneous, but the respondents in the present thesis were homogeneous in that they were all female, belonged to the same professional group in a
similar area and were at the same hierarchical level. A disadvantage of the focus group interviews could be that one person dominates the group or that one person will not speak at all. In the present thesis this was not a problem.

The strategic and clinical quality indicators in postoperative pain management were generated from the tentative model of important aspects of surgical nursing care. The stages, domain identification and judgement/quantification have been described as fundamental and constitute the difference between content validity and face validity (Lynn 1986). Developing and determining quality indicators from theories, models and frameworks are seldom discussed in the literature (Idvall et al. 1997), but, for example, Orem’s concept of self-care has been used to determine whether outcome criteria were congruent with the concept (Gallant & McLane 1979). Wilde et al. (1993, 1994) developed the questionnaire, Quality of Care from the Patient’s Perspective, from a grounded theory model of quality of care. This model was generated from in-depth interviews, and indicators were identified and grouped into categories and dimensions.

When formulating indicators that should be useful in clinical practice, it is important that they are supported by the literature and to decide if they are essential for achieving high quality, are realistic to carry out and if the nurses believed they were empowered to influence how they were carried out. These aspects have been described by Kitson et al. (1994), who emphasised professional experience and research-based knowledge as sources of information and the fact that the items formulated should be both relevant and achievable.

This thesis used the content validation model proposed by Fehring (1987), which was originally developed to validate nursing diagnosis. This model has also been used to validate nursing interventions in the Iowa Intervention Project: NIC (Nursing Interventions Classification) (Closkey & Bulechek 1992) and a revised model (Sparks & Lien-Gieshen 1994) for validating the nursing-sensitive patient outcomes in the Iowa Outcomes Classification: NOC (Nursing Outcomes Classification) (Johnson & Maas 1997). Content validation models are often based on obtaining experts’ opinions, and the experts selected will depend on the concept being validated (Lynn 1986, Fehring 1987, Slocumb & Cole 1991, Sparks & Lien-Gieshen 1994). Two groups of nurses, study groups two and three, were used to judge the indicators in the present study. Study group two was
composed of nurses with special knowledge, interest and clinical experience while study group three was composed of a representative sample of general clinical nurses working in surgical wards. Both groups were deemed important for the purpose – study group three, as a random sample, especially for judging if the indicators were realistic to carry out and if nurses felt empowered to influence management. There is no consensus on the number of experts needed for a content validation process, but some authors suggested 10 to 20 participants (Lynn 1986, Slocumb & Cole 1991). However, the NIC and NOC-projects used about 200 experts. In this thesis, realistic to carry out and nurse influence, are clinical items which have not been previously validated, and it was considered important to validate them with a large sample (n=210, 321).

After content validity was established for the indicators, psychometric tests were performed with data gathered from a sample of respondents for whom the new instrument was designed. The sample size (n=198) was considered sufficient for examining psychometric properties on a 15-item scale. Different ratio rules are recommended in multivariate analyses (Knapp & Campbell-Heider 1989), but Knapp & Cambell-Heider (1989, p. 640) concluded that “for the most multivariate analyses the number of observations should be at least 10 times the number of variables and exceed the number of variables by at least 30”. Another recommended rule is five times as many subjects as items or at least 200 to 300 (Gorsuch 1983, Ferketich 1991).

It was decided to delete one of the 15 items because of average inter-item correlation coefficient <0.20, item-total correlation coefficient <0.30 and increasing coefficient alpha (0.01) when deleted. Inter-item correlation coefficients in the range 0.30 to 0.70 are desired (Ferketich 1991, Knapp & Brown 1995), but Ferketich also suggested that a sufficient coefficient alpha can be reached with an average inter-item correlation coefficient of 0.20 if there are more than 10 items. Item-total correlation coefficient is recommended to be >0.30 (Ferketich 1991, Knapp & Brown 1995), but a “rule of thumb” suggests >0.20 (Streiner & Norman 1995). In this thesis, inter-item correlation coefficients in the 0.20 to 0.70 range were used, and all remaining items had an average inter-item correlation coefficient >0.20 and an item-total correlation coefficient >0.30. There were no inter-item or item-total correlation coefficient >0.70, which could indicate redundant and probably unnecessary items. According to Streiner and Norman (1995, p. 62), the best coefficient to use is the Pearson Product-Moment Correlation,
even for an ordinal scale when data are not normally distributed, if there are more than 2 response alternatives in the scale.

The Cronbach’s coefficient alpha was satisfactory for the 15 items, but increased slightly (0.01) when item number 11 was deleted. In an early stage of scale development, a coefficient alpha of 0.70 is discussed as satisfactory reliability (Nunnally & Bernstein 1994, Knapp & Brown 1995, Streiner & Norman 1995). The coefficient alpha decreased in the sub-scales probably because there are few items (3 or 4) in each sub-scale.

The remaining 14 items loaded in 4 factors. Two criteria were used to decide how many factors to extract: scree test and eigenvalues ≥1.0, which have been suggested by Gorsuch (1983). The magnitude of the factor loadings exceeded 0.40, which can be used as a “cut-off” (Knapp & Brown 1995). There were some cross-loadings between the factors, but all items were retained because they seemed important and suitable in one of the factors (Gorsuch 1983). An item that has been carefully constructed to measure a single construct, but statistically appears to be measuring 2 or more constructs, should not be automatically discarded according to Knapp and Brown (1995). There were inter-correlation coefficients among the 4 factors but they were all <0.70 and hence low enough to indicate that the factors were not redundant (Ferketich 1991).

**Tentative model of important aspects in surgical nursing care**

The tentative model of important aspects in surgical nursing care describes elements of performance and prerequisites for achieving the goal of high quality, and predicts that the goal will be reached if the prescriptions suggested are fulfilled. A model is a symbolic representation of an empiric experience, an attempt to objectify the concept it represents and replicates a reality with various degrees of precision, according to Chinn and Kramer (1991). Conceptual models give direction to search for relevant questions about phenomena, and they point out solutions to practical problems (Fawcett 1984). Walker and Avant (1995) state that a model can be developed pretheoretically.

The tentative model of important aspects in surgical nursing care for designing strategic and clinical quality indicators emerged from the findings of the focus group interviews. The main findings were 15 different categories, and these were divided into 2 dimensions called prerequisites and elements of performance. As early as 1955, Shep assessed hospital quality by examining prerequisites, or desiderata, for adequate care,
indexes of elements of performance, indexes of the effects of care and qualitative clinical evaluations. This influenced Donabedian’s (1980) thinking and the development of the trilogy of structure, process and outcome. In this thesis, both prerequisites and elements of performance were found to be important aspects of nursing care, which is in agreement with the approaches to quality assessment illustrated by Shep and Donabedian. The outcomes, or the effects, of care such as patient satisfaction, safety and well-being were considered as a starting point for the interviews, which is why the interviews were focused on how to reach these goals rather than the goals themselves. In a study aimed to understand nursing home quality of care, by using focus group interviews, the analyses were carried out within the context of structure, process and outcome (Schirm 1999). Some of the categories identified, i.e. team-work, staff, communication and relationships were similar to those in the present thesis.

The tentative model of important aspects of care has been used in a study with a phenomenological approach (Söderhamn & Idvall unpublished data) to analyse text from nurses’ narratives concerning a complex postoperative pain situation where their actions essentially influenced the outcome. Different categories from the model could be identified in the nurses’ narratives, such as detecting and acting on signs and symptoms, performing prescription, competence/knowledge and attitudes.

Carper (1978) has proposed that the fundamental patterns of knowing may be conceived as necessary to achieve mastery in the nursing discipline. If Carper’s model is applied to this thesis, only 3 patterns of knowing could be identified. The esthetics pattern of knowing was not distinguished in the analysis. Nurses working in ordinary surgical care would probably find it difficult to express the esthetics pattern of knowing, e.g. intuition, empathy and the knowing of a unique particular as important aspects for the quality and effects of care, even if they consider it to have an important impact on patient care. The nurses are occupied the entire day with practical activities, which might explain the fact that the empirical pattern is more prominent and easier to illustrate. Hence, it could be argued that an aspect that representing the esthetics pattern of knowing will not be identified in the tentative model.

**Strategic and clinical quality indicators in postoperative pain management**

A new instrument to measure strategic and clinical quality indicators in postoperative pain management was developed and used in this thesis. The
result from the clinical study could offer useful baseline data to evaluate the quality of care in surgical wards. The indicators were, not surprisingly, deemed to be essential but also both realistic to carry out and possible for nurses to influence management. However, these scores were generally lower than the scores for essential. Nevertheless, the nurses’ opinion of their high impact on postoperative pain management is convincing. Which score or threshold constitutes high quality of care? A threshold is discussed as a level or point at which the results of data collection in monitoring and evaluation trigger intensive evaluation of a particular important aspect of care to determine whether an actual problem or opportunity for improvement exists (Katz & Green 1992). As the indicators studied have been derived from important aspects of care, the threshold will be high, leaving only a small percentage of non-conformances due to uncontrollable factors. A baseline threshold is defined as a starting point for the process of continual improvement, which should be compared to the ideal threshold that has been established by, e.g. a panel of experts (Katz & Green 1992). An expert panel (n=15) was convened in a study aimed at setting thresholds for quality indicators from data for nursing home quality (Rantz et al. 2000). The thresholds should be realistic, reflect what providers thought nursing homes would be able to achieve and would alert staff to potential problems. Panel members individually determined lower and upper threshold scores and completed a follow-up Delphi of the final results.

In this thesis, a mean score for each item, which exceeds 4.5 (scale range 1-5) could, e.g. be discussed as a desired level for high quality of care. If this mean score is not obtained it would be important to scrutinise the quality of care and suggest quality improvement efforts. The number of patients who scored an item 1 or 2 (disagreement) could be discussed as an area for improvement. Looking at the items with a mean score exceeding 4.5, the number of patients scoring 1 or 2 were between 0.5% and 3% (Table 7). This could be regarded as a reasonably small percentage of non-conformances. On ward level, it is most valuable to evaluate and discuss the individual items in quality development. The total scale and sub-scales scores should be valuable to follow on hospital level or national level.

Thus, the desired mean score for the total scale should exceed 63.0 (14 items x 4.5), for the communication and environment sub-scales 13.5 (3 items x 4.5) and for the action and trust sub-scales 18.0 (4 items x 4.5). These desired mean scores could be compared to the baseline data. The desired mean scores for the total scale and the 3 sub-scales – communication, action and environment- were not reached by the patients
which indicates that an intensive evaluation should be performed of the different sub-scales and/or their items to determine whether an actual problem or opportunity for improvement exists. Looking at the number of patients scoring 1 or 2 on the sub-scales, there obviously exist possibilities for improvement, especially on the action sub-scale. Setting threshold as absolutes is, of course, not recommended although there is variability in everything (Katz & Green 1992). Threshold parameters, which in this thesis should define the lower limit of acceptance for the result could be discussed and set statistically in retrospective analysis when further studies have been performed. When evaluating the different departments according to the desired mean scores, the orthopaedics and gynaecology departments reached that level for high quality of care on the trust and environment sub-scales. This also points out that an absolute score for high quality of care should not be set even though, e.g. there was no significant difference between general surgery and gynaecology in the scores for the trust sub-scale, but the desired mean score was reached only in gynaecology.

The total scale and the communication, trust and environment sub-scales were associated with the patients who reported more pain than expected. It seems reasonable that the patients who reported more pain than expected had lower scores. The action sub-scale was related to the patients receiving epidural analgesia who scored higher on this sub-scale. This could be explained by the special and distinct routines explicit for these patients, such as using a pain assessment instrument. The differences between groups of patients must be considered when further evaluating the quality of care and quality improvement efforts, e.g. pain assessments in rest and moving and discussing the patient’s individual pain treatment.

The overall satisfaction question correlated with the total scale and the sub-scales, which implies that the new instrument indicated the patients’ general satisfaction with the pain relief. However, the instrument also mapped out important areas for improvement. There was no difference between how the patients in general surgery and orthopaedics scored the overall satisfaction question, but there were differences between the scores on the total scale and the 4 sub-scales. From this point of view, the overall satisfaction question is inadequate to indicate necessary quality improvements and differences between departments and groups of patients. The validity of patient satisfaction as an optimal outcome variable in quality assurance was also questioned in a study by Svensson et al. (2001). Bruster et al. (1994) suggested that the results from a national survey in the
UK strengthened the view that specific questions were better than satisfaction questions.

An inverse correlation was found between the worst pain intensity level and the trust and environment sub-scales, and the overall satisfaction question. Another study (Jamison et al. 1997) also reported that patients with low pain ratings were most satisfied, and that patients who experienced less pain than expected were more satisfied than patients who experienced more pain. However, many patients who experience severe pain also report satisfaction with overall pain management (Donovan 1983, Miaskowski et al. 1994, Pellino & Ward 1998). The pattern of pain relief, not pain severity per se, has been discussed as a critical determinant of satisfaction. The patients are satisfied even though they are in pain because they experience a commonly expected peak (Ward & Gordon 1994). A study by Pellino and Ward (1998) found that the perception of having control over pain was highly related to satisfaction even in the presence of severe pain.

The nurses’ scores did not reach the desired threshold suggested earlier for high quality of care on 2 sub-scales, which may indicate their awareness of non-compliance to a general standard for high quality of care in postoperative pain management. The reasons for this may vary, but the individual items concerning enough nurses on duty and whether nurses are knowledgeable exceeded 4.0, and obviously do not appear to represent the major problems for the nurses involved. The total scale and the action and trust sub-scales were associated with the number of years working in surgical wards. This could be attributable to clinical experience giving more knowledge and confidence on how to act, and these nurses scored higher. The scores for the environment sub-scale differed between nurses and patients, with higher scores for the patients. The nurses scored only few percent 1 or 2 (disagreement) on the trust sub-scale, as did the patients. No difference was found between nurses’ and patients’ scores on the action sub-scale, but the number of nurses scoring 1 or 2 (disagreement) was the highest, as it was for the patients. Opportunities for improvement in the quality of care from the nurses’ perspective could be identified, which was in line with the patients’ assessments. It must be an advantage, and facilitate quality improvement efforts, if both patients and nurses have similar opinions about the quality of care delivered. Perhaps a nurse questionnaire also could be useful to evaluate the quality of care.
The patients in the present thesis reported a higher pain intensity level on “worst pain” than the nurse’s thought they had experienced. Several studies have reported a discrepancy between nurse and patient assessments of the patients’ pain intensity level both at rest and on coughing, and the discrepancy increased with the level of pain (Sjöström et al. 1997, Hall-Lord et al. 1998, Rundshagen et al. 1999, Klopfenstein et al. 2000). The nurses in this thesis, however, scored the complementary question dissatisfied/satisfied lower than did the patients, which may indicate that the nurses were aware that pain management could be better from their professional perspective. A study concerning satisfaction with the general quality of care also found that the staff perceived that the patients were less satisfied than they actually were (Lövgren et al. 1998). The authors suggested that the staff probably based their assessments on professional experience, while the patients expressed personal non-professional opinions. The result from another study on the quality of care showed that elderly home care users evaluated most care components more favourable than did their caregivers (Larsson & Wilde-Larsson 1998).

One can reflect on the best occasion for delivering a patient questionnaire to evaluate postoperative pain management. The present thesis used the second postoperative day. The American Pain Society-questionnaire (1995), which includes some similar questions as in the present questionnaire, has been used on different days, e.g. on discharge and on the second postoperative day (Boström et al. 1997, Calvin et al. 1999, Lin 2000). This may influence the responses and make it difficult to compare results. It has been reported that a patient’s pain intensity level is most severe about 37 hours after surgery (Svensson et al. 2000). If a response is given near this occasion a more critical view on pain management might be expected than on discharge when there is probably less pain. It is also important to obtain honest, unbiased responses from the patients, which can be a problem if the patients are concerned that their answers might influence their ongoing care. Miaskowski et al. (1994) recommended using unbiased surveyors, and that caution must be taken to insure that patients understand that their responses will not influence the care they receive. This was considered in the present thesis.

CLINICAL CONSIDERATIONS

The outcomes of this thesis should be valuable to consider in the clinical settings where postoperative pain management is discussed as an important area for quality assessment and quality development. The strategic and
clinical quality indicators being validated could provide a foundation when implementing a strategy to achieve high quality in postoperative pain management and when planning to evaluate the quality of care. A Model for Symptom Management (Larson et al. 1994) suggests 3 major dimensions for a broader perspective on symptoms: symptom experience, symptom management and symptom outcomes. The conceptual model offers ideas for a comprehensive approach to, e.g. pain. Certain indicators in this thesis could potentially fit into the context of the 3 dimensions suggested, e.g. “the patient’s perception of pain must be assessed regularly with the help of a pain assessment instrument” in the dimension of symptom experience, “an individual goal for pain treatment must be set up in collaboration with the patient” in the dimension of symptom management strategies and “the nurses must act until a level has been reached that is acceptable to the patient” in the dimension of symptom outcomes.

The strategic and clinical quality indicators were assessed by clinical nurses as essential, realistic and possible for them to influence management, which could be an advantage for enabling implementation in clinical practice. Implementation of research into practice is a complex and difficult task, and is currently on the agenda (Kitson et al. 1998, McCormack et al. 1999, Retsas 2000). Kitson et al. (1998) have proposed a multidimensional framework for implementing research into practice that emerged from the equation: SI=f(E,C,F) where SI=successful implementation, E=evidence, C=context, F=facilitation, and f=function of. The interplay of these 3 core elements - the level and the nature of evidence, the context or environment into which the research is to be placed and the method or way in which the process is facilitated - are important. Conditions for evidence (E) are research, clinical experience and patient preferences, for context (C) culture, leadership and measurement and for facilitation (F) characteristics, role and style. All of these elements are most important in the implementation process. In the present thesis, fulfilling the conditions for evidence, research, clinical experience and patient preferences could be discussed, but good conditions for context and facilitation must be enabled in the clinical setting to succeed and reach the goal of high quality for patients. Leadership and facilitation were also emphasised as important factors for moving evidence into practice, as reported in a study by Wallin et al. (2000) that evaluated clinical guidelines for neonatal nursing care in Sweden.
CONCLUSIONS

♦ Important aspects of surgical nursing care were identified and summarised in a tentative model with 15 categories in 2 dimensions, elements of performance and prerequisites. The categories were detecting and acting on signs and symptoms, performing prescriptions, performing pre- and postoperative care, performing general care, informing and educating, promoting relationships, acting on behalf of patients, protecting the privacy of patients, staffing, environment/equipment, competence/knowledge, routines, responsibility, attitudes and team-work.

♦ From the tentative model, 15 strategic and clinical quality indicators in postoperative pain management were developed. It was established that the indicators were essential for the quality of care, realistic to carry out and possible for nurses to influence management.

♦ An instrument was developed to measure the strategic and clinical quality indicators in postoperative pain management and consisted of 14 items in 4 sub-scales, communication, action, trust and environment. Internal consistency reliability, factor analysis, different groups approach and convergent validity suggested beginning support for the instrument.

♦ The instrument identified areas for improvement such as pain assessments in rest and moving, discussing the patient’s individual pain treatment and differences between departments and groups of patients, e.g. patients who received epidural analgesia compared to those who did not.

♦ There were differences between patient and nurse assessments concerning the environment sub-scale and the overall satisfaction question, with higher mean scores for the patients. The patients also reported higher worst pain intensity level than the nurses thought they had experienced.

♦ The instrument appeared to be useful in clinical settings to measure the quality of nursing care in postoperative pain management, but must be further refined, tested and evaluated to determine if the instrument is comprised of the best essential items.
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Interview Guide to the Focus Group Interviews

1. Opening question:
   *What is your name and in what kind of surgical ward do you work?*

2. Introductory/ transition question:
   *Have you been engaged in quality development?*

3. Key questions:
   *Tell us what you regard as particularly important in surgical nursing care for the effects and quality of care.*
   
   *Describe what you would monitor and evaluate if you were commissioned to make a quality assessment concerning surgical nursing care in other hospitals.*
   
   *What would your feelings be if nurses from another hospital were commissioned to make a quality assessment with surgical nursing care in your working unit?*

4. Ending question:
   *How would you like to work with quality development in the future?*