

Changing Acute Pain Management Outcomes in Surgical Patients

Clinicians worldwide long have pondered the problem of pain; however, inadequate pain management continues to be a pervasive clinical problem for hospitalized patients, resulting in physiological, psychological, and financial consequences.¹ Continuing pain is associated with morbidity and delayed discharge. Slowed healing, higher complication rates, anxiety, sleep disturbance, increased suffering, and lowered quality of life are significant sequelae.² Substantial economic impact results from longer lengths of stay in the hospital and unscheduled readmissions related to unrelieved pain.³

Though the principle of optimal pain management is accepted universally, pain management has a low priority in overall postoperative care. Changing the behavior of clinicians has been difficult. Postoperative monitoring of urine output, blood pressure, respiration, and temperature has been required for documentation, but monitoring of pain was not required until recent efforts were initiated to include pain as the fifth vital sign. Evidence-based guidelines to help clinicians monitor and manage pain have been distributed widely by concerned organizations, such as the American Pain Society; the Agency for Healthcare Research and Quality (AHRQ), formerly known as the Agency for Health Care Policy and Research; and the Oncology Nursing Society.⁴ The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) standards say patients have the right to appropriate assessment and management of pain.⁵

ABSTRACT

Patient outcome studies indicate that patients accept pain as part of hospitalization. The majority of hospitalized patients who report experiencing pain are recovering from surgical intervention. To achieve successful outcomes, a comprehensive multidisciplinary effort must begin preoperatively and continue through discharge. The perioperative period is an essential link in effective pain management, and perioperative nurses are key in helping direct the care of surgical patients before, during, and after surgical procedures. Pain relief and the patient's satisfaction with care frequently are used to measure pain management outcomes. This article examines the results of a secondary analysis of a subset of surgical patients drawn from a larger data set that was collected during two studies in urban and rural hospitals. It focuses on two outcomes, namely characteristics of pain and patient satisfaction with pain management after surgery. These outcomes were measured using the American Pain Society patient outcome questionnaire and the pain management index. Correlational, descriptive, and regression analyses indicate that postoperative management of patients' pain in these studies was less than optimal. From this new understanding, strategies for effective pain management of surgical patients are recommended. *AORN J 77 (Feb 2003) 374-395.*

Evidence indicates, however, that distribution of guidelines alone has not altered practice, leading many to question how to produce outcomes consistent with accepted guidelines.⁶ A report from nine acute care hospitals revealed no difference in either short-term outcomes of patient-rated pain or patient satisfaction with pain management one and one-half years after the advent of AHRQ guidelines. A repeat measure two years later still indicated no difference.⁷ Analgesics continue to be ordered for an on-demand or PRN

SHERWOOD, RN; McNEILL, RN; STARCK, RN; DISNARD, RN

regimen, leading to a peak and trough experience that contributes to inadequate pain relief.⁸ The undertreatment of pain is so prevalent that it has been declared a medical error deserving the same attention as other incidents of error.⁹

Postoperative pain is a significant problem for hospitals, and the majority of patients who report pain are recovering from surgical intervention. What happens in the perioperative period has a significant effect on pain management outcomes, thus efforts to achieve successful outcomes must begin preoperatively and continue through discharge. This article presents the results of a secondary analysis of two studies that describe the pain experience and measure satisfaction with pain management outcomes of patients undergoing surgical intervention. By selecting postoperative patients from a larger sample, investigators were able to specifically examine the characteristics of the pain experience and patient satisfaction with pain management after surgery to develop more effective pain management for surgical patients.

INFLUENCES ON PAIN MANAGEMENT OUTCOMES

Evidence indicates that in spite of readily available pain management guidelines, the care of postoperative patients lags in effective pain management, surgical patients lack information, clinicians often misjudge pain intensity, and vulnerable populations remain at higher risk. Nonpharmacological interventions that enhance analgesics are underused. Patients continue to report that they expect pain after surgery and experience moderate to high pain levels, yet they report relatively high satisfaction overall.

Pain relief and patient satisfaction. Pain relief and patient satisfaction frequently are used to determine the effectiveness of pain management. Pain relief is evaluated by patient self-report of pain intensity, worst pain, interference with activities, and overall pain. Patient satisfaction measures how well patients' expectations were met and their overall perceptions of pain management. Patient satisfaction is an important but elusive outcome indicator, and informed patients may choose other providers if their expectations are not met. Neither measure alone can give an accurate picture. Patients who are in pain and who feel clinicians are paying attention may indicate they are satisfied with the care received if they do not know that better pain management is possible. Conversely, patients may report pain relief but not feel satisfied with the care received.¹⁰

Pain relief has been studied since ancient times,

but patient satisfaction as an outcome measure is a recent focus in health care.¹¹ Both are subjective assessments but fairly good indicators of quality of care. Both are dependent on myriad factors and measured with similar scales (eg, 0% to 100%, zero to 10). Patient satisfaction rating is an intentionally subjective, personal evaluation of health care services and providers that cannot be determined by direct observation. Satisfaction scores are related more to psychosocial aspects of care (eg, communication) than to technical aspects, which are better reflected in pain relief measurements.

Why patients are reluctant to alleviate postoperative pain in spite of advances in treatment is not understood.¹² Patients continue to wait until pain is severe before asking for analgesic intervention, or they do not report pain at all.¹³ Pain is both variable and more severe in the first 48 hours after surgery, and, too often, it is ignored by clinicians after this period.¹⁴ Patients who undergo the same surgical procedure report widely varying degrees of pain, which are affected by age, culture, anxiety, expectations, and participation in care. Differences in expected pain and actual postoperative pain were confirmed in a 1995 study of cardiac surgical patients.¹⁵ Interestingly, no relationship was found between doses of analgesia and pain scores. Patients reported that pain was worse in the early morning and late evening. Inadequate information contributed to anxiety that increased patients' pain.

The problem of undermanaged surgical pain is universal. The British Center for Reviews and Dissemination conducted a systematic review of postoperative pain relief using meta-analysis and discovered 191 studies published between 1963 and 1989.¹⁶ The 173 studies that met study criteria include outcome measures of recovery time, postoperative pain, and psychological distress. Results from interventions show a 79% to 84% beneficial effect on pain recovery for 239 measures of pain and psychological distress, leading to a recommendation that patients receive one hour of preoperative instruction reinforced with a booklet or audiovisual material to achieve positive outcomes. An Australian study found that nurses' estimates of pain severity were lower than patients' pain ratings.¹⁷ The McGill pain questionnaire was used to identify factors that correlate with and perhaps predict patients at high risk for postoperative pain and dissatisfaction with pain management, allowing clinicians to address special needs and improve outcomes.

No straightforward relationship between satisfaction and pain severity has been found. Three different studies evaluated hospitalized patients' satisfaction with various aspects of their pain management.¹⁸ Satisfaction with pain management did not necessarily imply that patients experienced pain relief. Understanding the difference is essential for improving pain management. Both patient satisfaction and pain relief ratings are multidimensional and influenced by age, personal preferences, expectations, cultural background, communication between health care providers and the patient, and the measure of care.¹⁹ For example, personal expectation can influence patient satisfaction in that patients may have low expectations about pain relief. Patients often report high satisfaction with pain management even if they experience moderate to severe levels of pain, perhaps because they feel their health care providers are attempting to manage their pain. Even less is known about the interplay of pain relief and patient satisfaction in ethnic groups. For some populations (eg, Hispanics), cultural variables may influence both pain relief and patient satisfaction.²⁰

Patients anticipate and accept the peak and trough pain pattern that results from PRN analgesia compared to the more stable pain experience provided by around-the-clock administration of analgesics.²¹ Perhaps patients' concern about being the "good patient" influences accurate self-reporting. Patients appear to expect some pain after surgery and do not alleviate their pain completely, even with patient controlled analgesia (PCA).²² Seventy-five percent of 200 patients who were asked why they reported they were satisfied if they had pain indicated they expected pain after surgery.²³ Findings were unchanged in a large (n = 241) qualitative study conducted at a later date.²⁴ In one study, 80% (n = 172) of general surgical adult patients reported satisfaction, yet 25% (n = 41) reported moderate, severe, or unbearable unalleviated pain.²⁵ In addition, another 14% (n = 28) were dissatisfied, indicating one-third of the patients in the sample had problems with postoperative pain management.

Similarly, a 1985 study found that analgesia was not administered often enough, larger doses should have been administered, and nurses sometimes administered less than the amount ordered so that some patients received only 25% of the pain medication required for effective pain management.²⁶ High preoperative pain severity, high anxiety about postoperative risks and problems, high willingness to report

pain, younger age, and female gender were correlated multivariately with both worse than expected pain severity and low satisfaction, possibly predicting unsatisfactory postoperative pain experiences. Results of other studies are similar.²⁷ Clearly the problem of pain remains unsolved in spite of numerous guidelines and advances in treatment.

A promising new theory applies chronobiology based on a time-dependent or chronotherapeutic approach to pain assessment and intervention.²⁸ Evidence suggests that there is a rhythm in patients' postoperative perception of pain. By examining the pattern of patient attempts at self-administration of analgesia with a PCA pump, nurses can discern the pattern of pain perception. The PCA pump may provide a method of identifying individual pain rhythm and assessing individual analgesic needs. The pump then can be programmed to continue the pattern established by the patient to avoid interruption of analgesia while the patient sleeps. The theory postulates that analgesic therapy delivered in synchrony with the patient's pain rhythm will enhance postoperative outcomes and hasten recovery.

Use of nonpharmacological approaches to enhance pain management. Postoperative pain evokes both physiological changes and psychological responses, suggesting that a combination of pharmacological and nonpharmacological approaches can enhance the effect of pain-relieving medication, particularly in the perioperative area. The adjunctive approach can help patients feel a sense of control over pain, a factor that influences satisfaction.²⁹

Direct nonpharmacological approaches based on sensory effect include repositioning, cutaneous stimulation, and massage. Intrapyschic approaches involve cognitive, behavioral, or affective approaches, such as distraction or relaxation. These approaches help divert attention from the pain to alternate sensory experiences, thus changing the affective component of the pain experience. Cognitive and behavioral nonpharmacological interventions have been associated with postoperative pain recovery and can be important approaches, particularly with short hospital stays. Patients report high use of alternative approaches to pain relief, most commonly prayer,³⁰ massage, deep breathing, distraction, and repositioning.³¹

In one study, a combination of massage, distraction, and repositioning was most helpful.³² Seventy-eight percent of patients reported that adjunctive use of alternative methods helped decrease both the perception and sensation of pain more than medication

alone. Likewise, another study reported positive outcomes from the use of music as an adjunctive pain therapy when patients were allowed to choose the music and the intervention was timed appropriately.³³

Well-designed educational interventions also are an economical approach to changing behavior. One group of researchers reported surgical patients' increased knowledge of pain control, expectations of pain relief, and assertiveness in demanding relief.³⁴ Changing patients' expectations about postoperative pain can increase their willingness to ask for relief before pain becomes severe. In two studies, patient education, frequent assessment and reassessment after intervention, nursing comfort measures, and improved nurse-patient communication decreased average and worst-pain scores.³⁵ Nurse-patient interaction was a significant factor in preoperative instruction. Patients were more likely to allow nurses to help clarify, correct, and inform perceptions about pain interventions when they were allowed to express perceptions about the impending surgery.

Clinicians' influence on pain management.

According to one study, clinicians have an impact on patients' pain experience, particularly through their interactions with patients.³⁶ Nurses who affirmed a patient's pain experience, integrated their knowledge of pain management with their knowledge of the patient, interacted with caring and presence, responded promptly to requests, and offered explanations had a positive effect. Many think nurse-patient interaction is the major determinant in patients' satisfaction with pain management.

Nurses guide care. They control access to pharmacological interventions and may implement non-pharmacological interventions independently. Nurses' attitudes about pain influence pain management outcomes.³⁷ They may fear contributing to patient addiction, overdose, and side effects and may be unaware of or insensitive to the special needs of vulnerable populations, such as older adults and ethnic populations.³⁸

One group of researchers developed a report card for institutions to use as a self-monitoring tool and an assessment of how attitudes influence pain.³⁹ Clinicians set targets for patient pain relief and appropriate interventions and then compare these targets with actual data for a picture of current practice.

Members of ethnic minority populations are at high risk for poor pain management.⁴⁰ In one study, ethnic minority patients were treated with less analgesia and assigned lower pain ratings than Caucasian

patients. The beliefs and attitudes of both providers and patients affect their interaction and behaviors. Both older adults and minorities may assume that the nurse knows they have undergone surgery and, therefore, already is doing all that is possible for their pain, or they may believe that pain means something has gone wrong and not report it.⁴¹ Nurses may assume incorrectly that patients who do not complain have achieved comfort. Many older adult and Hispanic patients are accustomed to being passive recipients of health care and need to be educated to be comfortable with today's active role and patient partnership for effective health care.⁴²

Communication and expert assessment skills allow nurses to ask patients about their pain in ways that elicit honest and accurate answers. For example, a general question will not elicit an accurate assessment if a patient does not feel pain when lying still in a certain position yet experiences pain upon movement. If clinicians have inadequate knowledge of pain management assessment and documentation of pain, pain relief can be inadequate, particularly for complex and sick patients.

In one study, patients described poor communication between provider and patient as a barrier to effective pain management.⁴³ The number of people involved in pain management can be a hindrance, resulting in frequent delays in patients receiving analgesics. There may be lack of agreement about treatment goals and worries about patients who abuse drugs.⁴⁴ Based on the pain management index, one study found that analgesic regimens sometimes did not match pain levels for as many as 25% of patients.⁴⁵ Failure to understand individual variances in response to pain and the amount of analgesia required, lack of assessment, and poor quality management compounded the problem.

Multiple interventions result in better outcomes than any single approach.⁴⁶ Effective plans depend on circumstances, interaction, environment, and a multidisciplinary approach. Experts, however, agree on one thing—the nurse is the leader for effective assessment and management of postoperative pain and for building a rapport that includes the patient as a partner.

METHOD

From a database of two studies conducted during a three-year period, data on surgical patients were selected for a secondary analysis. The purpose of the analysis was to determine the pain experience as reported by surgical patients and what factors

influenced patient satisfaction with pain management in this group of patients.

Setting and sample. The first study (ie, study A) was conducted in two hospitals in the southwestern United States, and the second study (ie, study B) was conducted three years later. In study A, a large urban tertiary care teaching hospital (ie, 800 beds) in a medical center and a smaller hospital (ie, 400 beds) in a more rural setting along the United States-Mexico border provided the setting for data collection, which occurred during a 12-month period. In study B, using the same protocol, data were collected three years later in the urban medical center only. In both studies, participants were recruited from medical and surgical units, excluding specialty areas (eg, intensive care units, labor and delivery, recovery). The unit nurse manager identified potential participants according to the study criteria. These criteria required that participants be 18 years of age or older, have been hospitalized at least 24 hours, have undergone surgery or experienced another painful condition, be English speaking, and be cognitively aware. Using convenience sampling, eligible patients were invited to participate.

In study A, 277 hospitalized adult inpatients were studied using self-report data from the American Pain Society patient outcome questionnaire and information from their medical record. The sample was 35% male and 65% female, and 24% of participants were older than 65 years of age. One hundred sixty-seven participants (60%) in study A were surgical patients. Mean ratings for current and average pain were moderate, and mean ratings for worst pain were severe. High interference due to pain was found for walking, activity, and sleep. Negative correlations with age indicated less effective pain management for older adults.

Participants were satisfied with pain management; however, a significant negative correlation between satisfaction and current pain intensity was discovered. Pain management index scores were measured in one setting. Scores ranged from +2 to -3, indicating that 36% of participants were treated inadequately for pain. Reliability estimates for tool subscales were $> .70$ except for the beliefs subscale, which was $.63$. The study is reported by setting by two groups of researchers.⁴⁷

In study B, 263 inpatients' reports described pain and patient satisfaction variables using the same protocol as in study A; however, in this study, computerized medical records were used to gather demographic information and data about the analgesic regimen.

The mean age of participants was 54 years, a higher proportion (59%) was male, 30% were older than age 65, and a lower proportion (35%) had undergone surgery. Self-report ratings of mild current pain, severe worst pain, and moderate average pain and interference pain ratings were obtained on a scale of zero to 10, with 10 indicating the greatest pain or interference. The highest level of satisfaction with pain management reported was 8.1, and the highest level of satisfaction with instruction regarding pain management was 8. Pain management index scores indicated adequate (57%) to good management (23%) for most participants, but 20% were managed poorly. Lower satisfaction with pain management was associated with negative pain management index scores, moderate to severe pain intensity and interference, and lower satisfaction with instruction. Regression analysis revealed that satisfaction with instruction (odds ratio [OR] = 1.4) and nursing care (OR = 1.4) were predictive of overall satisfaction.

Only surgical patients from both studies were included in the secondary analysis. For the subset of 258 surgical patients, all but one were recovering from general surgery (eg, orthopedic, abdominal, gynecological) with the exception of 62 participants from study A who were recovering from cesarean section. The surgical sample for study A was primarily female ($n = 120$, 72%), with a mean age of 45 years [standard deviation (SD) = 19]. Education level was predominantly high school graduate or general equivalency diploma ($n = 51$; 31%). Most participants (94%) had experienced pain in the preceding 24 hours. In study B, there were 91 surgical patients with a mean age of 55 (SD = 15.4). A greater proportion was male ($n = 64$; 70%). Half of the participants had an educational level of high school equivalent or less, and the other half had received college or graduate education. Again, most participants (94.5%) reported experiencing pain in the preceding 24 hours. Demographic characteristics of the surgical participants in study A and B are presented in Table 1.

Data collection. Three data collection instruments were used. Data collectors recorded information related to age, gender, ethnicity, diagnosis, occupation, and religion and other pertinent participant information on the demographic data sheet. In the rural setting, data regarding the analgesic regimen also were gathered from the medical record and recorded on the demographic data sheet. These data included names of prescribed analgesics and frequency of administration. A modified American Pain Society

patient outcome questionnaire, which consisted of 16 items, was used to capture information about participants' pain experience at a given point in time.⁴⁸ Data collectors asked participants to rate pain intensity, interference with various activities, and satisfaction with pain management. Other questions related to wait time for analgesia or a change in medication, reasons for desiring or not desiring more analgesia, and whether a health care professional informed participants of the importance of pain management.

In study A, pain intensity and interference items were scored on a zero to 10 scale, with higher scores indicating more pain or interference, and satisfaction

items were scored on a zero to six scale, with higher scores indicating greater satisfaction. In Study B, pain intensity scales remained the same, but the satisfaction scale was changed to zero to 10 for consistency across scales. The timing of interviews in relation to participants' surgery varied, ranging from one to four days postoperatively. In study B, information about the analgesic regimen was obtained from the computerized medical record using a chart audit form to compute the pain management index.⁴⁹ Worst-pain ratings were categorized as one (ie, pain rating of one to three), two (ie, pain rating of four to six), or three (ie, pain rating of seven to 10). The

Table 1

DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE (N = 258)

	STUDY A			STUDY B		
	Mean	Standard deviation	Range	Mean	Standard deviation	Range
Age	44.6	19.0	19 to 83	55.1	15.4	18 to 87
Gender	Frequency	Percentage		Frequency	Percentage	
Female	120	71.9		27	29.7	
Male	47	28.1		64	70.3	
Education level	Frequency	Percentage		Frequency	Percentage	
College/graduate education	23	13.8		43	47.3	
High school/general equivalency diploma	51	30.5		33	36.3	
Less than high school	27	16.2		14	15.4	
Missing	66*	39.5		1	1.1	
Pain in last 24 hours	Frequency	Percentage		Frequency	Percentage	
Yes	157	94.0		86	94.5	
No	10	6.0		3	3.3	
Missing	0	0		2	2.2	
Patient instruction	Frequency	Percentage		Frequency	Percentage	
Received some information on pain from physician or nurse	123	73.7		75	82.4	
Received no information on pain from physician or nurse	26	15.6		13	14.3	
Missing data	18	10.8		3	3.3	

* Missing data due to a change in data collection procedures.

May not equal 100% due to rounding.

World Health Organization analgesic ladder was used to classify the analgesic regimen. It includes the following classifications:

- zero—no analgesic prescribed,
- one—nonopioid,
- two—weak opioid, and
- three—strong opioid.⁵⁰

The pain management index is computed by subtracting the patient's worst-pain level from the rating of the most potent analgesic prescribed for the patient.⁵¹ Scores greater than zero suggest adequate pain management, and scores less than zero suggest ineffective management.

The institutional review board for the university employing the researchers and the review boards of both hospitals granted permission to conduct the study. Data collectors, mainly nursing students and faculty members, participated in a two-hour standardized training protocol that included a brief overview of pain management and patient satisfaction research, discussion of the pain outcome questionnaire, role playing the patient interview, and instructions for collecting demographic and medical record information. To ensure interrater reliability regarding medical record data, two raters examined every 10th chart, and excellent correlations were demonstrated. A standardized script was followed to maximize uniformity of the interview process. Oral consent was obtained from each participant, and those who consented to participate received a letter explaining the study, ensuring patient confidentiality and anonymity, and providing a contact telephone number for questions. Data collection took place between 2 and 7 PM to avoid variability associated with time of day. Data collectors read items to each participant, recorded the response, and gathered data from patients' charts.

Data analysis procedures. Coded, computerized data were analyzed using the Statistical Package for the Social Sciences.⁵² Selected study variables (eg, age, level of satisfaction) were recoded into two groups (ie, satisfied or dissatisfied) for the purpose of group comparisons. For items related to satisfaction with pain management, ratings were collapsed in study A, yielding those who were satisfied ($n = 131$) and dissatisfied ($n = 19$). Data were missing on 17 surveys. Satisfaction was indicated by a score of five or six. Dissatisfaction was indicated by a score of one to four. Although four indicates "slightly satisfied," this rating was pooled with the dissatisfied ratings of one, two, and three due to very skewed distribution

related to satisfaction. In study B, the satisfaction rating scale was changed to zero to 10, with 10 being the most satisfied. Again, due to a positively skewed distribution, ratings of zero to six were classified as dissatisfied ($n = 11$), and ratings seven through 10 were classified as satisfied ($n = 78$). Data were missing on two surveys.

Descriptive statistics were used to describe the sample and the characteristics of the pain experience. Correlational analyses were performed on all pain intensity, interference, and satisfaction items; the demographic variable of age; and pain management index scores. Nonparametric tests were used to compare differences between variables of interest. For example, the Mann-Whitney U test was used to compare means between satisfied and dissatisfied participants. Cronbach's α was used to test the evidence for reliability of the pain outcome questionnaire modified subscales.

Logistic regression was used to determine the probability of being satisfied with pain management based on the predictors of age, gender, reported pain intensity, and adequacy of pain management.⁵³ A multivariate logistic regression was used to identify a set of variables most associated with participants' satisfaction with pain management. A stepwise model selection was used to identify these variables. Age and gender variables were used to adjust for each step in the analysis.

RESULTS

The reliability of the pain outcome questionnaire in this sample was estimated using Cronbach's α . In study A, the three satisfaction items demonstrated the lowest reliability (.62). In study B, the satisfaction subscale became four items, with an item added to measure satisfaction with instruction, which demonstrated a Cronbach's α of .84. The new subscale related to satisfaction with instruction regarding pain management showed high reliability (.93). The reliability estimates in this study were similar to those obtained previously.⁵⁴

Outcomes of the pain experience include adequacy of pain management and patient satisfaction with pain management. Table 2 presents these characteristics for the two samples. The mean patient ratings for pain now, worst pain, and general level of pain in the last 24 hours are slightly lower for participants in study B compared to participants in study A, and satisfaction ratings in study B are similar overall. In study A, participation in activities related to recovery

from surgery ($|x| = 7.1$, $SD = 2.5$) was reported as having the most interference due to pain, and the least interference was with interpersonal relationships ($|x| = 2.9$, $SD = 3.2$). In study B, a global interference item was used, indicating moderate interference related to pain. For the new items related to satisfaction with instruction about pain management, mean ratings were uniformly high (> 8.0), with the exception of mean satisfaction with information regarding side effects (7.4).

Satisfaction was correlated inversely and significantly with pain intensity, meaning the lower the pain rating, the greater the patient's satisfaction. Bivariate association between pain now and satisfaction was negative and significant for both samples

(study A, $r = -.3$; $P = .00$; study B, $r = -.32$; $P = .01$). Similarly, satisfaction and general pain in the last 24 hours yielded a correlation of $-.2$ in both data sets. In study A, satisfaction was not correlated significantly with worst pain, but data from study B revealed a higher significant correlation ($R = -.3$; $P = .005$).

Separating participants into two groups based on satisfaction ratings, satisfied participants were compared with dissatisfied participants. Several significant differences were found (Table 3). Dissatisfied participants indicated higher pain scores; this was significantly different for pain now in study A and for average pain in study B. Participants in study B who were dissatisfied also indicated a significantly greater interference with activity (mean rating of 8.7 versus 5.7, $P =$

Table 2

MEAN RATINGS AND STANDARD DEVIATIONS OF PAIN AND PATIENT EDUCATION

	STUDY A		STUDY B	
	Mean	Standard deviation	Mean	Standard deviation
Pain now	4.1	2.7	3.3	2.4
Worst pain	8.1	2.2	7.0	2.7
General pain	5.6	2.2	4.5	2.5
Pain interference with			6.0	3.3
• activity	6.4	3.0		
• recovery from surgery	7.1	2.5		
• walking	6.9	3.1		
• mood	5.2	3.3		
• sleep	5.2	3.4		
• relationships	2.9	3.2		
Satisfaction (overall)	4.8*	1.1	8.4	2.1
Satisfaction with nurse	5.3*	1.0	8.6	2.2
Satisfaction with physician	5.0*	1.2	8.8	2.0
Satisfaction with instructions				
• overall			8.3	2.5
• what the medication was for			8.5	2.1
• type of pain medication			8.5	2.2
• route			8.8	2.1
• timing			8.3	2.7
• use of equipment			8.8	2.2
• comfort measures			8.2	2.3
• side effects			7.4	2.99
• notifying nurse of changes in pain			8.1	2.7

All values originally reported on a scale of 0 to 10 with the exception of those denoted by an asterisk.

Table 3

SIGNIFICANT DIFFERENCES BETWEEN SATISFIED AND DISSATISFIED PARTICIPANTS

	STUDY A			STUDY B		
	Satisfied	Dissatisfied	z score	Satisfied	Dissatisfied	z score
Age	41.5 years	51.6 years	2.3*	55.2 years	54.3 years	-.18
Pain now	3.9	5.7	2.9†	3.1	4.0	1.2
Worst pain	8.1	8.7	1.4	6.8	8.1	1.5
Average pain	5.7	6.5	1.6	4.3	5.9	2.7*
Interference with activity	6.4	6.4	.03	5.7	8.7	5.4†
Overall satisfaction	5.1	2.3	-14.3†	9.1	4.4	-8.7†
Satisfaction with nurses	5.2	3.8	-3.4†	9.0	6.0	-3.4†
Satisfaction with physicians	5.4	4.7	-2.1*	9.3	6.1	-3.3†
Overall satisfaction with instructions				8.8	4.6	-4.7†
Pain management index	-.28	-.73	-1.5	-.50	-.27	-.55

* $P < .05$

† $P < .01$

.00). Furthermore, significant differences in satisfaction with nurses and physicians were found when comparing the two groups. Finally, satisfied and dissatisfied participants in both studies differed significantly in regard to whether they recalled a health care provider discussing the importance of pain management with them during hospitalization. Using the Mann-Whitney U test, a significant difference was demonstrated in both studies between satisfied and dissatisfied participants in the recall of this information (study A, z score = 2.3, $P = .02$; study B, z score = 2.1, $P = .04$), emphasizing the importance of patient education.

Logistic regression was used to analyze the contribution of independent variables in predicting the dependent variable, patient satisfaction. A backward stepwise procedure was used for variable selection. The likelihood ratio test was used to evaluate the significance of variable entry ($P < .25$) and removal ($P < .10$). The control variables gender and age were entered as a block. The final model resulted from the stepwise procedure. Study A indicated that satisfaction with physician's response ($OR = 2.9$, $P < .01$) and satisfaction with nurse response ($OR = 1.2$, $P = .03$) were the variables that most predicted overall satisfaction with pain management, and pain now ($OR = -.3$; $P < .01$) was a weak negative predictor. The model passed the goodness-of-fit test ($P = .49$) and was accurate in predicting satisfaction (78.2%). In study B, sat-

isfaction with nurses' response ($OR = 3.6$, $P < .01$) likewise was a significant predictor. Overall satisfaction with instruction, a new item added in the second study, was a weak predictor ($OR = .48$; $P < .01$), and worst pain was a weak negative nonsignificant predictor ($OR = -.42$; $P = .13$) of overall satisfaction. This model passed the goodness-of-fit test ($P = .72$) and was 91% accurate in predicting satisfaction.

Pain management index scores were calculated for study A participants in the rural setting only and for all study B participants based on their worst-pain ratings and analgesic category ratings during the previous 24-hour period. These ranged from +2 to -3 and are shown in Table 4. Negative scores (-1 to -3) indicate inadequate pain management and were reported by 34 participants (36%) in study A. Zero or positive scores indicate adequate to good management and were reported by 61 participants (64%) in study A. Pain management index scores were not correlated with satisfaction with pain management ($r = -.07$; $P = .51$), nor did they differentiate between satisfied and dissatisfied participants (z score = .89; $P = .38$). Pain management index scores had low but statistically significant inverse correlation with age ($r = -.3$, $P = .002$) and interference with sleep ($r = -.2$, $P = .04$). For study B, 31 participants (34%) reported pain management index scores indicating poor pain management; 54 participants (59.4%) reported positive

Table 4

**EFFECTIVENESS OF MANAGEMENT AS MEASURED
 BY PAIN MANAGEMENT INDEX SCORES**

Pain manage- ment index score	STUDY A*		STUDY B†	
	Frequency	Percentage	Frequency	Percentage
2	2	2.1	6	6.6
1	11	11.6	12	13.2
0	48	50.5	36	39.6
-1	23	24.2	19	20.9
-2	10	10.5	6	6.6
-3	1	1.1	6	6.6

* Pain management index scores available for one study site (n = 95).

† Data missing for 6 participants.

scores. Data are missing for six participants in this study. Pain management index scores were correlated inversely with pain intensity items (ie, pain now, worst pain, average pain) and the pain interference item but not with satisfaction overall, satisfaction with health care providers, or age.

DISCUSSION OF FINDINGS

Similar to findings of previous studies, participants in this study reported high satisfaction with pain management even when experiencing moderate pain and pain that interfered with activity. As in previous research, correlation between satisfaction and pain intensity or interference are weak but inverse, reflecting, perhaps, some relationship between satisfaction and the level of pain experienced. In a previous study of primarily Caucasian patients, the correlation between general pain in the preceding 24 hours and patient satisfaction was $R = -.28$ ($P = .002$) and for pain now was $R = -.25$ ($P = .008$).⁵⁵ For this set of two studies, the correlation was similar across the three-year time span, which may indicate that patient expectations did not change appreciably during this period despite greater attention to the issues involved in pain management. Certainly increased regulatory attention from new JCAHO guidelines may not yet have influenced the expectation of the general surgical patient.

The logistic regression results for both data sets suggest that the satisfied patient is one who is satisfied with how the nurse and physician respond to his or her pain. Comments from satisfied participants indicate that timeliness of health care providers' response to complaints of pain or need for change in medication combined with their interest and skillfulness in allevi-

ating pain contribute to satisfaction with pain management. There are limitations, however. The model correctly classified 78% (ie, study A) and 91% (ie, study B) of participants regarding their satisfaction or regarding the predictors of satisfaction. Neither age nor gender were influencing factors. Although pain now and interference related to pain are expected to relate to satisfaction, they were weak, nonsignificant predictors in this study. Previous studies of Hispanic hospitalized patients found age, general pain, and inter-

ference with mood to be significant predictors of satisfaction.⁵⁶ No other reports of regression analysis of this group of factors related to satisfaction with pain management were found as a basis of comparison.

Pain management index scores, usual pain intensity, and other ratings of interference with activities failed to predict satisfaction and were dropped from the model. Likewise, pain management index scores were not associated with satisfaction in the bivariate correlation analysis. When examining factors that influence the pain experience, a small inverse correlation was found between age and effectiveness of pain management in study A data from one setting ($R = -.3$; $P = .002$), indicating less effective pain management for older adult surgical participants in this setting. In study B, this relationship between pain management index scores and age was not demonstrated. Adequacy of pain management for older adults is of concern, but no reports of pain management index scores for this age group were found in the literature.

Limitations of this secondary analysis include the overrepresentation of obstetrical surgical participants in study A and the disproportionate number of males in study B. The survey relied on patients' ability to recall and report their pain perceptions during a time of recovery. Although secondary analyses must be completed with caution, much can be learned from existing data sets.⁵⁷ Here, the research questions for the secondary analysis differ from the parent studies only by limiting the sample to participants who had undergone surgery. The original sample was not limited to surgical participants; therefore, questions were not confined to the surgical experiences, and pertinent data may have been missed. Given that a large proportion of hospital patients are recovering from

surgery, the data confirm the need to particularly examine the pain surgical patients' experience to clarify and confirm the role of specific variables in producing effective outcomes of pain management and, thus, promoting postoperative recovery.

RECOMMENDED STRATEGIES

Acute pain continues to be problematic, even with an array of analgesics, guidelines by prestigious pain interest groups, and numerous clinician teaching protocols.⁵⁸ Effective pain management is limited by inadequate knowledge, beliefs and attitudes of both patients and clinicians, and the interaction between provider and patient. Pain no longer has to be an expectation after surgery. Unrelieved postoperative pain should be treated as a serious adverse effect of surgery, not as an accepted consequence. Best practices call for an interactive partnership of clinician and patient that encourages patients to participate in their own pain management.⁵⁹ Both patient and clinician have responsibility for assessment, implementation, and evaluation of the pain management plan.

With the goal of reducing the incidence and severity of postoperative pain, preoperative teaching must help patients understand how to communicate unrelieved pain, enhance comfort, and improve satisfaction. Consistent documentation of the scope of the pain management plan is essential for every patient.⁶⁰ Patient teaching should be conducted in an environment conducive to concentration and interaction, and family members should be included. A pain history, clearly defined terms, explanations of pain rating scales, descriptive words for communicating pain, and nonpharmacological approaches should be core content in a patient teaching plan. Patient and provider should work together to establish a pain treatment goal.

Postoperative care focuses on assessment and documentation at least every four hours coupled with reassessment of pain relief at the peak interval for each pain management intervention. Assessment must account for the special needs of vulnerable populations, such as older adults, women, and ethnic minorities. Discharge teaching should focus on when to take pain medication, adverse effects, explanations about medications the patient will be taking at home, and possible incompatible medication combinations. To achieve the outcome of lowered pain levels, baseline data can be monitored using the pain outcome questionnaire. Periodic remeasures can validate the effectiveness of the intervention plan. The pain management index is a useful tool that can be used to determine whether patients are receiving adequate treatment for their pain.

Patient education is a determining factor in patient satisfaction. It must be completed in a manner and at a time that will make a significant impression on the patient and his or her family members. Handing a pamphlet to a patient is unlikely to be sufficient. The patient and his or her family members need to hear sincere dialogue from health care providers that pain management is an important concern and that the patient's role is to report pain at its earliest perception and keep health care personnel aware of the effect of interventions. Patients are influenced by the responsiveness and timeliness of clinician responses when requesting assistance with pain management. Although this may not seem a high priority in a busy surgical unit, a show of concern bodes well for the patient's overall impression of attention.

The future holds promise for improving outcomes of postoperative pain. As patient satisfaction has become an accepted outcome measure, pain management must focus on effectiveness and satisfaction in a culturally sensitive environment. The attention thrust on effective pain management by JCAHO guidelines has encouraged clinicians to take fresh approaches to institutional improvements. Changing practice is notoriously complex. The first step is identifying and understanding the problem and then testing the effectiveness of interventions and proceeding through the utilization process for integration into practice. Although surgical patients comprise a large part of the hospital's economy, humanitarian concerns are the most important imperatives for effective pain management. Clinicians and patients working together can change practice for more effective outcomes. ▲

Gwen D. Sherwood, RN, PhD, FAAN, is associate dean for Practice and Outreach at The University of Texas Health Science Center at Houston School of Nursing, and codirector of the Center for Professional Excellence at The Methodist Hospital, Houston.

Jeanette A. McNeill, RN, DrPH, AOCN, NP-C, is an associate professor and department chair, Target Populations, The University of Texas Health Science Center at Houston School of Nursing.

Patricia L. Starck, RN, DSN, FAAN, is a professor and dean, The University of Texas Health Science Center at Houston School of Nursing.

Geri Disnard, RN, MSN/MPH, is assistant professor, Texas Woman's University, Houston.

The authors thank Ginny Baird, RN, BSN, OR professional development specialist, The Methodist Hospital, Houston, for her contributions related to the perioperative nurse role.

NOTES

1. Agency for Health Care Policy and Research, *Acute Pain Management: Operative or Medical Procedures and Trauma*, publ no 92-0032 (Rockville, Md: US Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, 1992).

2. B R Ferrell, "The impact of pain on quality of life: A decade of research," *Nursing Clinics of North America* 30 (December 1995) 609-624.

3. M Grant et al, "Unscheduled readmissions for uncontrolled symptoms: A health care challenge for nurses," *Nursing Clinics of North America* 30 (December 1995) 673-682.

4. "Quality improvement guidelines for the treatment of acute pain and cancer pain. American Pain Society Quality of Care Committee," *JAMA* 274 (December 1995) 1874-1880; Agency for Health Care Policy and Research, *Acute Pain Management: Operative or Medical Procedures and Trauma*, publ no 92-0032; "Oncology Nursing Society position paper on cancer pain. Social policy," *Oncology Nursing Forum* 17 (November/December 1990) 946-947.

5. Joint Commission for Accreditation of Healthcare Organizations, "Patient rights and organization ethics," in *Comprehensive Accreditation Manual for Hospitals* (Oakbrook Terrace, Ill: Joint Commission on Accreditation of Healthcare Organizations, 2002) RI-14-RI-145a.

6. P L Starck et al, "Identifying and addressing medical errors in pain mismanagement," *Journal on Quality Improvement* 27 (April 2001) 191-199.

7. E C Devine et al, "AHCPR clinical practice guideline on surgical pain management: Adoption and outcomes," *Research in Nursing & Health* 22 (April 1999) 119-130.

8. J A McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," *Pain*

Management Nursing 2 (March 2001) 25-36; J A McNeill et al, "Assessing clinical outcomes: Patient satisfaction with pain management," *Journal of Pain and Symptom Management* 16 (July 1998) 29-40; G Sherwood et al, "Qualitative assessment of hospitalized patients' satisfaction with pain management," *Research in Nursing & Health* 23 (December 2000) 486-495.

9. Starck et al, "Identifying and addressing medical errors in pain mismanagement," 191-199.

10. *Ibid.*

11. M Afilalo, C Tselios, "Pain relief versus patient satisfaction," *Annals of Emergency Medicine* 27 (April 1996) 436-438.

12. R Hawkins, K Price, "The effects of an education video on patients' requests for postoperative pain relief," *The Australian Journal of Advanced Nursing* 10 (June-August 1993) 32-40.

13. McNeill et al, "Assessing clinical outcomes: Patient satisfaction with pain management," 29-40; H Owen, V McMillan, D Rogowski, "Postoperative pain therapy: A survey of patients' expectations and their experiences," *Pain* 41 (June 1990) 303-307.

14. E C Carr, "Postoperative pain: Patients' expectations and experiences," *Journal of Advanced Nursing* 15 (January 1990) 89-100.

15. D A Meehan et al, "Analgesic administration, pain intensity, and patient satisfaction in cardiac surgical patients," *American Journal of Critical Care* 4 (November 1995) 435-442.

16. J Droogan, R Dickson, "Pre-operative patient instruction: Is it effective?" *Nursing Standard* 10 (May 22, 1996) 32-33.

17. T Thomas et al, "Prediction and assessment of the severity of post-operative pain and satisfaction with management," *Pain* 75 (April 1998) 177-185.

18. C Miaskowski et al, "Assessment of patient satisfaction utilizing the American Pain Society's quality assurance standards on acute

and cancer-related pain," *Journal of Pain and Symptom Management* 9 (January 1994) 5-11; McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36; McNeill et al, "Assessing clinical outcomes: Patient satisfaction with pain management," 29-40.

19. Sherwood et al, "Qualitative assessment of hospitalized patients' satisfaction with pain management," 486-495.

20. McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36.

21. S E Ward, D Gordon, "Application of the American Pain Society quality assurance standards," *Pain* 56 (March 1994) 299-306.

22. D Schwartz-Barcott, J D Fortin, H S Kim, "Client-nurse interaction: Testing for its impact in pre-operative instruction," *International Journal of Nursing Studies* 31 (February 1994) 23-35.

23. B D Donovan, "Patient attitudes to postoperative pain relief," *Anaesthesia and Intensive Care* 11 (May 1983) 125-129.

24. Sherwood et al, "Qualitative assessment of hospitalized patients' satisfaction with pain management," 486-495.

25. Donovan, "Patient attitudes to postoperative pain relief," 125-129.

26. P F White, "Patient-controlled analgesia: A new approach to the management of postoperative pain," *Seminars in Anesthesia* 4 (September 1985) 255-266.

27. Ward, Gordon, "Application of the American Pain Society quality assurance standards," 299-306; McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36; McNeill et al, "Assessing clinical outcomes: Patient satisfaction with pain management," 29-40.

28. S E Auvil-Novak, "A middle-range theory of chronotherapeutic intervention for postsurgical pain," *Nursing Research* 46 (March/April 1997) 66-71.

29. M E Van Kooten, "Non-pharmacologic pain management for

postoperative coronary artery bypass graft surgery patients," *Image: Journal of Nursing Scholarship* 31 (Second quarter 1999) 157.

30. McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36; McNeill et al, "Assessing clinical outcomes: Patient satisfaction with pain management," 29-40.

31. Van Kooten, "Non-pharmacologic pain management for postoperative coronary artery bypass graft surgery patients," 157.

32. *Ibid.*

33. M Good, "A middle-range theory of acute pain management: Use in research," *Nursing Outlook* 46 (May/June 1998) 120-124.

34. J D Fortin, D Schwartz-Barcott, S Rossi, "The postoperative pain experience: A description based on the McGill Pain Questionnaire," *Clinical Nursing Research* 1 (August 1992) 292-304.

35. S J Closs, M Briggs, V E Everitt, "Implementation of research findings to reduce postoperative pain at night," *International Journal of Nursing Studies* 36 (February 1999) 21-31; Meehan et al, "Analgesic administration, pain intensity, and patient satisfaction in cardiac surgical patients," 435-442.

36. Sherwood et al, "Qualitative assessment of hospitalized patients' satisfaction with pain management," 486-495.

37. *Ibid.*; M A Alpen, M G Titler, "Pain management in the critically ill: What do we know and how can we improve?" *AACN Clinical Issues Critical Care Nurse* 5 (May 1994) 159-168.

38. C L Pasero, M McCaffery, "Managing postoperative pain in the elderly," *American Journal of*

Nursing 96 (October 1996) 38-46.

39. P L Starck et al, "Development of a pain management report card for an acute care setting," *Advance Practice Nursing Quarterly* 3 (Fall 1997) 57-63.

40. C S Cleeland et al, "Pain and its treatment in outpatients with metastatic cancer," *The New England Journal of Medicine* 330 (March 3, 1994) 592-596; B Ng et al, "Ethnic differences in analgesic consumption for postoperative pain," *Psychosomatic Medicine* 58 (March/April 1996) 125-129; K H Todd, N Samaroo, J R Hoffman, "Ethnicity as a risk factor for inadequate emergency department analgesia," *JAMA* 269 (March 24-31, 1993) 1537-1539.

41. McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36.

42. Pasero, McCaffery, "Managing postoperative pain in the elderly," 38-46.

43. Sherwood et al, "Qualitative assessment of hospitalized patients' satisfaction with pain management," 486-495.

44. M Bookbinder et al, "Implementing national standards for cancer pain management: Program model and evaluation," *Journal of Pain and Symptom Management* 12 (December 1996) 334-347.

45. McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36.

46. B Sibbald, M Roland, "Understanding controlled trials. Why are randomised controlled trials important?" *British Medical Journal* 316 (January 1998) 201.

47. McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36; McNeill et al, "Assessing clinical outcomes:

Patient satisfaction with pain management," 29-40.

48. *Ibid.*

49. Cleeland et al, "Pain and its treatment in outpatients with metastatic cancer," 592-596.

50. World Health Organization, *Cancer Pain Relief and Palliative Care* (Geneva: World Health Organization, 1990).

51. S E Ward et al, "Patient-related barriers to management of cancer pain," *Pain* 52 (March 1993) 319-324.

52. SPSS—Statistical Package for the Social Sciences, version 11.5 (Chicago: SPSS, Inc).

53. D W Hosmer, S Lemeshow, *Applied Logistic Regression* (New York: Wiley, 1989).

54. McNeill et al, "Assessing clinical outcomes: Patient satisfaction with pain management," 29-40.

55. *Ibid.*

56. McNeill et al, "Pain management outcomes for hospitalized Hispanic patients," 25-36.

57. L H Nicoll, S C Beyea, "Using secondary data analysis for nursing research," *AORN Journal* 69 (February 1999) 428-433.

58. Starck et al, "Identifying and addressing medical errors in pain mismanagement," 191-199.

59. Ng et al, "Ethnic differences in analgesic consumption for postoperative pain," 125-129; Sherwood et al, "Qualitative assessment of hospitalized patients' satisfaction with pain management," 486-495.

60. P Starck, G Sherwood, J Adams-McNeill, "Pain management outcomes: Issues for advanced practice nurses," *The Internet Journal of Advanced Nursing Practice* 4 no 1 (2000) <http://www.icaap.org/iuicode?88.4.1.5> (accessed 28 Aug 2000).