



Anesthesia-based pain services improve the quality of postoperative pain management

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Abstract

Anesthesia-based pain services are facilitating improvements in the quality of care of surgical patients by developing and directing institution-wide perioperative analgesia programs that include interdisciplinary collaborations. However, the impact of anesthesia-based pain services has not been evaluated in a systematic fashion. This prospective multisite study ($n = 23$ hospitals) utilized a standardized approach to evaluate the quality of pain care provided to patients who were and who were not cared for by an anesthesia-based pain service. A total of 5837 patients were evaluated using a standardized survey that consisted of a medical record review and a patient interview. The data were collected as part of the hospitals' quality improvement activities. Forty-nine percent of the patients were cared for by an anesthesia-based pain service. Patients who received pain service care reported significantly lower pain intensity scores; had lower levels of pain in the postoperative period; had a lower incidence of pruritus, sedation, and nausea; and experienced significantly less pain than expected. In addition, these patients were more likely to receive patient education about postoperative pain management; were more satisfied with their postoperative pain management; and were discharged sooner from the hospital. The findings from this study demonstrate that the care provided by anesthesia-based pain services has a significant impact on patient outcomes. © 1999 International Association for the Study of Pain. Published by Elsevier Science B.V.

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1. Introduction

Anesthesiology-based postoperative pain management services have been developing slowly over the past 10 years (Ready, 1988). However, with the more widespread use of complex technologies (e.g. patient-controlled analgesia (PCA)) and newer therapeutic approaches (e.g. epidural analgesia) for postoperative pain management, the need for proactive leadership to ensure the effective management of postoperative pain is an imperative in most health care facilities. Therefore, the practice guidelines for Acute Pain Management developed by the American

Society of Anesthesiology (ASA; Task Force on Pain Management, Acute Pain Section, 1995) recommend that anesthesiologists provide this leadership by integrating pain management practices into the various aspects of perioperative care. In addition, the ASA guidelines (Task Force on Pain Management, Acute Pain Section, 1995) note that anesthesiologists should facilitate improvements in the quality of care of surgical patients by developing and directing institution-wide perioperative analgesia programs that include interdisciplinary collaborations.

Coupled with the development of anesthesia-based pain services is the need to evaluate whether the quality of perioperative pain management improves when patients receive these services. Both the Quality Improvement Committee of the American Pain Society (American Pain Society Quality

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Improvement Committee, 1995) and the Acute Pain Management Guideline Panel of the Agency for Health Care Policy and Research (AHCPR; Carr, 1992) recommended that institutions develop, as part of their quality improvement activities, a process for evaluating the quality of postoperative pain management. Both groups provided explicit suggestions on the key components of any quality improvement efforts related to postoperative pain management.

Several studies on the quality of postoperative pain management, that utilized the APS (American Pain Society Quality Improvement Committee, 1995) and AHCPR (Carr, 1992) recommendations, have been reported (Miaskowski, 1994; Ward, 1994, 1996; Bookbinder, 1996). These studies were descriptive in nature and in all cases found that patients reported high satisfaction scores despite ratings of severe pain. However, all of these studies (Miaskowski, 1994; Ward, 1994, 1996; Bookbinder, 1996) were done in single institutions with relatively small sample sizes. In addition, none of these quality improvement studies (Miaskowski, 1994; Ward, 1994, 1996; Bookbinder, 1996) reported on whether patients received their postoperative pain management by an anesthesia-based pain service. The purpose of this paper is to report the results of a prospective multisite study that evaluated the quality of postoperative pain management in patients who received their pain care by anesthesiology-based pain services compared to patients who were not cared for by a pain service.

2. Materials and methods

2.1. Settings

A total of 23 hospitals throughout the United States participated in the study. Ten (43.5%) of the hospitals are university medical centers, 12 (52.2%) are community hospitals, and one (4.3%) is a government institution. The mean bed size of these 23 hospitals is 311.2 (SD = 187.3, range 42–714).

Twelve (52.2%) of the hospitals, who participated in the study, have an acute pain service. In these 12 hospitals, 83.3% ($n = 10$) of the pain services are multidisciplinary and are under the direction of an anesthesiologist. Five of the anesthesia-based pain services are in university medical centers and the other five are in community hospitals. Study hospitals volunteered to utilize the Postoperative Pain Management Quality Assessment Survey as part of their quality improvement program.

2.2. Instrument

A standardized instrument was used to collect data at all of the study sites. The Postoperative Pain Management Quality Assessment Survey was developed by a panel of

experts in pain management and quality of care evaluation for Abbott Laboratories and is intended for use with an inpatient population who undergo a surgical procedure. The components of the Quality Assessment Survey are based on the recommendations made by the APS (American Pain Society Committee on Quality Assurance Standards, 1991) and the AHCPR (Carr, 1992) committees. The Quality Assessment Survey was pilot tested with postoperative patients and underwent several revisions before the final version was distributed for use in the participating hospitals.

The Quality Assessment Survey is divided into two parts. The first part of the survey was completed by hospital personnel based on a review of the patient's medical record. Demographic information (i.e. age and gender), surgical service, and primary analgesic modality (i.e. the analgesic modality used for the first 24–48 h postoperatively) were recorded. The duration of the primary analgesic modality, the patient's length of stay, and whether or not the patient was followed by the pain service were also recorded.

The second portion of the survey is a patient questionnaire which addresses: various aspects of patient education about pain management; patients' impressions of the quality of pain management; side effects associated with pain management; waiting time for pain medications; severity of postoperative pain; amount of postoperative pain the patients experienced compared to what they expected; and patients' satisfaction with postoperative pain management. The patient portion of the survey took approximately ten minutes for each patient to complete.

2.3. Data collection procedures

The data collection was done as part of the hospitals' quality improvement activities and did not require informed consent from the patients. Personnel at each of the study sites were trained in the data collection procedures by one of the professional staff from Abbott Laboratories. However, the professional staff from Abbott Laboratories had no involvement in the data collection or analysis of the study findings. Hospital personnel (primarily nurses) were instructed to interview patients within the first 24 h following discontinuation of the primary analgesic modality. Medical record reviews were done after the patients were discharged from the hospital.

Data from the questionnaires were entered into a database program and then formatted to be analyzed by an independent statistician, using the CRUNCH[®] statistical software package. Appropriate descriptive statistics were generated. In addition, independent Student's *t*-tests, Chi Square analyses, and Mann–Whitney *U*-tests were performed to determine if there were differences in various aspects of the quality of postoperative pain management depending on whether or not the patients were cared for by a pain service.

3. Results

3.1. Sample characteristics

A total of 5837 postoperative patients, from 23 hospitals, were evaluated prospectively. The mean age of the patients was 52.2 years (SD = 19.5 years) and 56.9% of them were female. On average, the patients stayed in the hospital 2.5 days (SD = 4.3 days; median = 1.0 days).

Forty-nine percent of the patients were followed by a pain service. The percentage of patients by surgical category who were followed by a pain service is shown in Fig. 1. Patients having obstetric or gynecologic (OB/GYN) surgery represented the largest percentage of patients followed by a pain service ($\chi^2 = 105.9$, $P = 0.0000$) followed by patients recovering from abdominal surgery. Patients followed by the pain service were significantly younger (49.5 years vs. 54.7 years, $t = 103.4$, $P = 0.0001$) but there were no differences in the number of males and females in the two groups.

3.2. Primary analgesic modalities

Table 1 lists the percentage of patients who had the various analgesic modalities prescribed by a pain service. There was a significant difference in the analgesic modalities prescribed by the pain service ($\chi^2 = 2419.1$, $P = 0.0000$) with patient controlled analgesia with a constant rate or background infusion (i.e. PCA + a continuous infusion) and continuous epidural infusions being prescribed most frequently by the pain service. The average duration of the primary analgesic modality was 2.3 days (SD = 4.9 days; median = 2.0 days). Patients followed by a pain service used their primary analgesic modality significantly longer (mean = 2.6 days, SD = 6.6 days; $t = 15.7$, $P = 0.0001$) than patients who were not followed by a pain service (mean = 2.1 days, SD = 2.4 days).

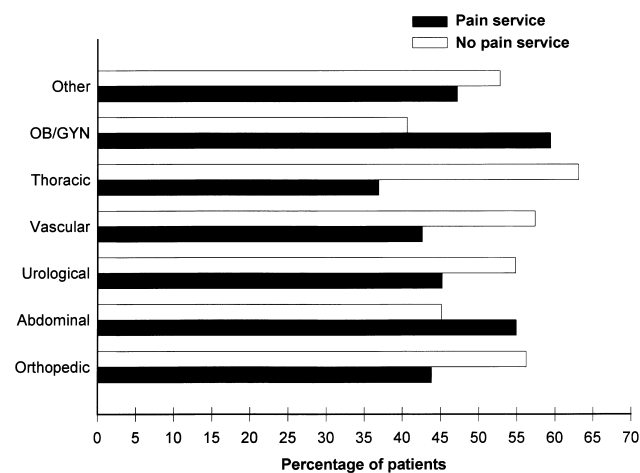


Fig. 1. Percentage of patients in each surgical category who were followed by a pain service. *Total number of patients in each surgical category: orthopedic ($n = 2004$), abdominal ($n = 1145$), urological ($n = 361$), vascular ($n = 338$), thoracic ($n = 358$), OB/GYN ($n = 897$), and other ($n = 690$). Data on the surgical category were missing on 44 patients.

Table 1

Primary analgesic modalities prescribed by the pain service

Primary analgesic modality (total number of patients*)	Pain service care**	No pain service care**
PCA (2091)	37.4	62.6
PCA + continuous infusion (1470)	89.4	10.6
Continuous epidural infusion (675)	83.4	16.6
PCA-epidural (278)	18.0	82.0
IV injection/infusion (214)	1.9	98.1
IM injection (594)	1.9	98.1
Oral (312)	9.3	90.7
Other (177)	41.2	58.8

*Data were missing for 26 patients. **Percentage of patients using this modality. Abbreviations: PCA, patient-controlled analgesia; IV, intravenous; IM, intramuscular.

3.3. Pain intensity ratings

Patients were asked to rate the worst pain and the least pain they had after surgery using a 0 to 10 numeric rating scale (0 = no pain to 10 = worst pain imaginable). Patients cared for by a pain service had significantly lower worst pain intensity ratings (6.8 compared to 7.1, $t = 14.6$, $P = 0.0001$). No differences were found between the two groups in least pain intensity scores (i.e. 1.9 vs. 2.0; pain service versus no pain service).

3.4. Duration of pain

Patients were asked to rate how often they were in moderate to severe pain after surgery using a Likert scale (i.e. always, almost always, often, sometimes, and never). Data on patients' responses, based on whether or not they were cared for by a pain service, are illustrated in Fig. 2. There were significant differences in the responses of patients who were and who were not cared for by a pain service ($\chi^2 = 253.46$, $P = 0.0000$). A higher percentage of patients who were cared for by a pain service reported that they were never in pain following surgery. In contrast, a significantly larger percentage of patients who were not cared for by a pain service reported that they were always, almost always, and often in moderate to severe pain following surgery.

3.5. Patient reported side effects

Patients were asked to agree or disagree with a series of statements about side effects associated with pain management. Table 2 lists the percentage of patients who agreed with the statement based on whether or not they were cared for by a pain service. Patients who were cared for by a pain service had significantly less itching, sedation, and nausea.

3.6. Patient expectations about postoperative pain

Patients were asked to answer the following question

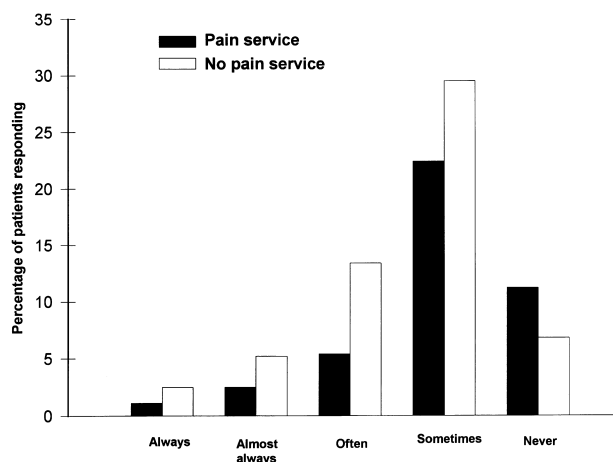


Fig. 2. Differences in duration* of pain in patients who were and were not cared for by a pain service. *How often were you in moderate to severe pain after surgery?

using a 5-point Likert scale (1 = much more than expected to 5 = much less than expected): ‘Compared to what you expected, how much pain did you have after surgery?’ (see Fig. 3). Patients who were cared for by a pain service were significantly more likely to report much less pain than expected following surgery ($\chi^2 = 229.3$, $P = 0.0000$).

3.7. Patient education about pain management

Eighty-seven percent of the patients who were cared for by a pain service received an explanation of how their pain would be managed postoperatively compared with only 74.4% of patients who were not cared for by a pain service ($\chi^2 = 144.1$, $P = 0.0000$).

3.8. Patients’ impressions about pain management

Patients were asked to agree or disagree with a series of statements regarding their impressions about the quality of pain management. Table 3 lists the percentage of patients who agreed with each statement based on whether or not they were cared for by a pain service. Patients who were not cared for by a pain service were significantly more likely to report that the method of pain relief was painful; that they had to wait too long to get pain medicine; that the pain relief

Table 2

Percentage of patients who reported side effects

Side effect	Pain service care*	No pain service care*	Statistical significance
Itching ^a	11.6	15.2	$\chi^2 = 16.4$, $P = 0.0001$
Numbness ^b	6.6	7.8	$\chi^2 = 3.0$, $P = 0.08$
Sedation ^c	14.5	26.2	$\chi^2 = 119.6$, $P = 0.0000$
Nausea ^d	13.7	22.1	$\chi^2 = 67.9$, $P = 0.0000$

^aI had lots of itching. ^bI had numbness or tingling in my legs. ^cI felt sleepy too often. ^dI often felt nauseous or sick to my stomach. *Percentage of patients who agreed with the statement.

was too slow; that they never got good pain relief; that they were concerned about bothering the nurse to ask for pain medicine; and that they were concerned about becoming addicted to the pain medication.

3.9. Patient satisfaction with pain management

Patients were asked to rate their satisfaction with pain management using a 5-point Likert scale (1 = very dissatisfied to 5 = very satisfied). The percentage of patient responses to each of the satisfaction ratings based on whether or not they were cared for by a pain service is illustrated in Fig. 4. A significantly larger percentage of patients who were cared for by a pain service reported that they were very satisfied with the pain relief they received after surgery ($\chi^2 = 377.4$, $P = 0.0000$).

3.10. Average length of stay

Patients who were cared for by a pain service were discharged significantly sooner (i.e. 2.3 ± 5.2 days) than patients who were not cared for by a pain service (i.e. 2.8 ± 3.9 days, $t = 10.6$, $P = 0.001$).

3.11. Additional analyses by surgical category

For each surgical category, differences in pain intensity ratings, duration of primary analgesic modality, duration of pain, expectations about postoperative pain, and average length of stay were evaluated based on whether or not the patients were cared for by a pain service. The results are summarized in Table 4.

4. Discussion

This multisite study is the first to document significant improvements in the quality of postoperative pain management when care is provided by an anesthesia-based pain

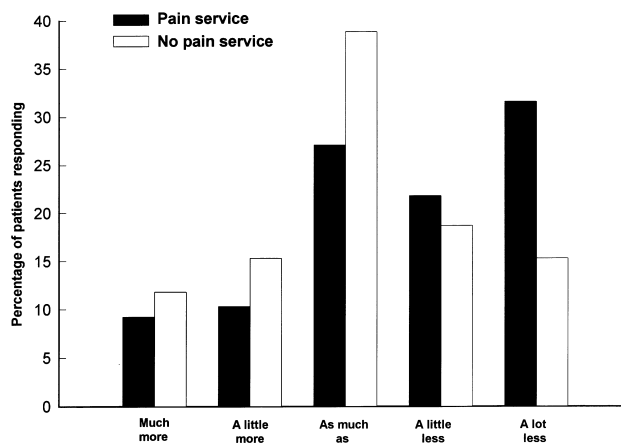


Fig. 3. Patients’ expectations about postoperative pain, i.e. Compared to what you expected, how much pain did you have after surgery?

Table 3

Percentage of patients* who agreed with specific statements about the quality of their pain management

Impression	Pain service care*	No pain service care*	Statistical significance
Method was painful ^a	3.3	12.3	$\chi^2 = 159.9, P = 0.0000$
Wait too long ^b	3.7	10.5	$\chi^2 = 101.7, P = 0.0000$
Relief too slow ^c	6.5	17.0	$\chi^2 = 151.7, P = 0.0000$
Never had good relief ^d	5.2	11.2	$\chi^2 = 66.2, P = 0.0000$
Bother the nurse ^e	5.9	12.2	$\chi^2 = 68.6, P = 0.0000$
Concerned about addiction ^f	6.5	10.1	$\chi^2 = 23.9, P = 0.0000$

^aThe method of pain relief was painful. ^bI had to wait too long to get pain medicine. ^cThe pain relief was too slow. ^dI never had good pain relief. ^eI was concerned about bothering the nurse to ask for pain medicine. ^fI was concerned about becoming addicted to the pain medicine.

service. Patients who received pain service care reported significantly lower pain intensity scores; had lower levels of pain in the postoperative period; had a lower incidence of pruritus, sedation, and nausea; and experienced significantly less pain than expected. In addition, these patients were more likely to receive patient education about postoperative pain management; were more satisfied with their postoperative pain management; and were discharged sooner from the hospital.

The large sample size and the use of a standardized approach for data collection at multiple sites allows us to suggest that these results may serve as benchmark data for other institutions who want to conduct similar surveys. The pain intensity ratings reported by the patients in this study are comparable to previous studies (Miaskowski, 1994; Ward, 1994, 1996; Bookbinder, 1996). In addition, patient satisfaction ratings are comparable across these studies.

With regard to the worst pain intensity ratings, while the differences were statistically significant with patients who were cared for by a pain service reporting lower scores (i.e. 6.8 vs. 7.1), these data are not clinically significant. Additional work is warranted to improve the approaches that pain services use to apply treatment algorithms to rapidly relieve severe pain.

Anesthesia-based pain services utilized PCA devices with a continuous infusion and continuous epidural infusions as the most common analgesic modalities. This finding is consistent with recommendations made in the ASA (Task Force on Pain Management, Acute Pain Section, 1995) and the AHCPR (Carr, 1992) acute pain guidelines that the use of these modalities should be assigned to 'experts working in dedicated groups'. The goal of this recommendation is to provide for the safe administration of analgesics using these approaches with minimal deleterious effects.

Data from this study support the belief that these modalities can be used safely and that patients experience minimal side effects when these modalities are managed by an

anesthesia-based pain service. The three most common side effects associated with the use of PCA + continuous infusion and continuous epidural infusions are nausea, sedation, and pruritus. The percentage of patients experiencing these side effects was significantly lower when patients were cared for by an anesthesia-based pain service. As part of the medical record review, data were collected on critical incidents (e.g. catheter migration, infection at catheter site, respiratory depression). The prevalence of these problems were extremely small in both groups of patients.

While patients' perceptions of the barriers to postoperative pain management have not been documented as they have for cancer pain (Ward, 1993) findings from this study are the first to suggest that patients who are cared for by an anesthesia-based pain service perceive fewer barriers to pain management (Table 3). Only a small percentage of patients were concerned about bothering the nurse for pain medication or about becoming addicted to the analgesics. These observations may be directly related to the higher percentage of patients who received education about pain management by the anesthesia-based pain service.

Anesthesia-based pain services need to document their impact particularly within the managed care environment. Two outcome measures that are often used as critical indices in most evaluation studies are length of stay and patient satisfaction. The patient satisfaction data for this study demonstrate that anesthesia-based pain services have a positive impact on the quality of care that postoperative patients receive. Overall, patients who are cared for by an anesthesia-based pain service were discharged on average a half a day sooner (i.e. the time in hospital was reduced by 21%). When differences in length of stay were compared for each surgical category, it was determined that patients who underwent orthopedic, thoracic, and OB/GYN surgeries and were cared for by a pain service were discharged from the hospital significantly sooner. This type of outcome data is extremely important in the managed care environment. It should be noted that a higher percentage of patients who were cared for by the anesthesia-based pain services

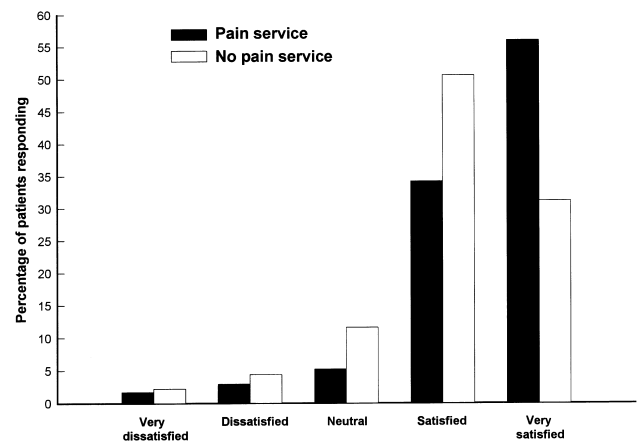


Fig. 4. Patient satisfaction with pain management.

Table 4

Comparisons by surgical category of select quality variables

Surgical category	Quality variable	Pain service care (mean \pm SD)	No pain service (mean \pm SD)	Statistical significance
Orthopedic	LOS ^a	1.9 \pm 4.4	3.2 \pm 3.1	$t = 45.1, P = 0.0000$
	Duration of 1° analgesic ^b	2.2 \pm 3.1	2.0 \pm 1.4	$t = 5.8, P = 0.02$
	Worst pain ^c	7.2 \pm 2.6	7.3 \pm 2.6	n.s.
	Least pain ^d	2.2 \pm 1.9	2.0 \pm 2.0	$t = 4.4, P = 0.04$
	Moderate to severe pain ^e	3.9 \pm 0.9	3.6 \pm 1.0	$U = -6.2, P = 0.0000$
	Expected pain ^f	3.4 \pm 1.3	3.1 \pm 1.3	$U = -5.6, P = 0.0000$
Abdominal	Satisfaction ^g	4.4 \pm 0.8	4.0 \pm 0.9	$U = -9.5, P = 0.0000$
	LOS	2.4 \pm 6.0	2.8 \pm 5.1	n.s.
	Duration of 1° analgesic	3.3 \pm 13.1	2.4 \pm 2.3	n.s.
	Worst pain	6.6 \pm 2.5	7.1 \pm 2.4	$t = 7.2, P = 0.007$
	Least pain	1.7 \pm 1.8	1.9 \pm 1.9	n.s.
	Moderate to severe pain	3.9 \pm 0.9	3.5 \pm 0.8	$U = -8.7, P = 0.0000$
Urological	Expected pain	3.6 \pm 1.3	3.1 \pm 1.1	$U = -6.8, P = 0.0000$
	Satisfaction	4.4 \pm 0.9	4.0 \pm 0.9	$U = 10.2, P = 0.0000$
	LOS	1.7 \pm 2.4	1.8 \pm 2.4	n.s.
	Duration of 1° analgesic	2.6 \pm 1.3	1.8 \pm 1.8	$t = 22.2, P = 0.0000$
	Worst pain	5.5 \pm 3.2	6.7 \pm 2.6	$t = 12.5, P = 0.0005$
	Least pain	1.2 \pm 1.6	1.7 \pm 1.9	$t = 6.3, P = 0.01$
Vascular	Moderate to severe pain	4.2 \pm 0.9	3.6 \pm 1.0	$U = -5.8, P = 0.0000$
	Expected pain	3.9 \pm 1.3	3.0 \pm 1.3	$U = -5.5, P = 0.0000$
	Satisfaction	4.5 \pm 0.8	4.0 \pm 0.8	$U = -7.3, P = 0.0000$
	LOS	2.3 \pm 4.9	2.9 \pm 3.9	n.s.
	Duration of 1° analgesic	2.5 \pm 1.8	2.2 \pm 2.3	n.s.
	Worst pain	5.7 \pm 3.2	6.8 \pm 2.8	$t = 9.7, P = 0.002$
Thoracic	Least pain	1.4 \pm 1.8	1.7 \pm 1.8	n.s.
	Moderate to severe pain	4.1 \pm 1.0	3.6 \pm 1.0	$U = -4.5, P = 0.0000$
	Expected pain	3.6 \pm 1.4	3.1 \pm 1.2	$U = -3.6, P = 0.0004$
	Satisfaction	4.3 \pm 0.9	4.1 \pm 0.9	$U = -4.2, P = 0.0000$
	LOS	1.2 \pm 3.0	2.6 \pm 3.4	$t = 11.9, P = 0.0006$
	Duration of 1° analgesic	3.0 \pm 1.9	2.7 \pm 2.9	n.s.
OB/GYN	Worst pain	7.0 \pm 2.7	6.9 \pm 2.7	n.s.
	Least pain	1.7 \pm 1.9	2.3 \pm 2.1	$t = 5.2, P = 0.02$
	Moderate to severe pain	3.9 \pm 0.9	3.5 \pm 1.1	$U = -3.6, P = 0.0003$
	Expected pain	3.7 \pm 1.5	3.1 \pm 1.2	$U = -3.8, P = 0.0002$
	Satisfaction	4.5 \pm 0.7	4.1 \pm 1.0	$U = -3.6, P = 0.0003$
	LOS	1.4 \pm 2.0	2.0 \pm 1.6	$t = 22.6, P = 0.0000$
Other	Duration of 1° analgesic	1.8 \pm 1.1	1.5 \pm 0.8	$t = 23.6, P = 0.0000$
	Worst pain	7.1 \pm 2.3	7.4 \pm 1.7	$t = 4.2, P = 0.04$
	Least pain	1.9 \pm 1.5	1.6 \pm 1.7	$t = 6.7, P = 0.01$
	Moderate to severe pain	4.0 \pm 0.7	3.6 \pm 0.8	$U = -8.1, P = 0.0000$
	Expected pain	3.6 \pm 1.1	3.1 \pm 0.9	$U = -6.8, P = 0.0000$
	Satisfaction	4.5 \pm 0.8	4.1 \pm 0.7	$U = -8.8, P = 0.0000$
Other	LOS	5.0 \pm 8.0	2.6 \pm 6.1	$t = 16.1, P = 0.0001$
	Duration of 1° analgesic	3.3 \pm 3.5	2.3 \pm 4.8	$t = 9.2, P = 0.003$
	Worst pain	6.9 \pm 2.8	6.8 \pm 2.7	n.s.
	Least pain	2.1 \pm 2.1	2.2 \pm 2.0	n.s.
	Moderate to severe pain	3.7 \pm 1.1	3.5 \pm 1.0	$U = -2.8, P = 0.004$
	Expected pain	3.5 \pm 1.3	3.1 \pm 1.3	$U = -3.7, P = 0.0002$
	Satisfaction	4.2 \pm 0.9	4.0 \pm 1.0	$U = -3.4, P = 0.0006$

^aLength of stay (days). ^bDuration of primary analgesic modality (days). ^cWorst pain after surgery (0 = no pain to 10 = worst pain imaginable). ^dLeast pain after surgery (0 = no pain to 10 = worst pain imaginable). ^eHow often were you in moderate to severe pain after surgery? (1 = always, 2 = almost always, 3 = often, 4 = sometimes, 5 = never). ^fCompared to what you expected, how much pain did you have after surgery? (1 = much more, 2 = a little bit more, 3 = as much as I expected, 4 = a little less, 5 = a lot less). ^gSatisfaction with pain management (1 = very dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied, 5 = very satisfied).

received more complex analgesic strategies (e.g. PCA with a continuous infusion, continuous epidural infusion). Even with these complex strategies, the patients were discharged sooner. Future studies that examine the impact of an

anesthesia-based pain service need to evaluate not only the type of analgesic strategy used but the patients' severity of illness within the context of the length of their hospitalization. This type of evaluation would provide more data on

the beneficial impact of an acute pain service on patient outcomes.

Most of the studies on the undertreatment of postoperative pain (Marks, 1973; Donovan, 1987) and the poor quality of postoperative pain management (Miaskowski, 1994; Ward, 1994, 1996; Bookbinder, 1996) have called for the education of physicians and nursing personnel. However, work by Max (1990) noted that traditional educational approaches do not change clinicians' behaviors related to pain management. He suggests that traditional educational approaches must be complimented by interventions in health care systems that more directly influence the routine behaviors of clinicians and patients. Data from this study suggest that the addition of an anesthesia-based pain service to a health care system significantly enhances the quality of postoperative pain management as well as patients' satisfaction.

Acknowledgements

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