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Original Contributions

Effectiveness of an Acute Pain Service Inception in a General Hospital

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Study Objectives: *To assess the effects of an Acute Pain Service (APS) inception on postoperative pain management in a general teaching hospital using pain indicators as performance measures.*
Design: *Open, prospective, nonrandomized, observational study.*
Setting: *Postanesthesia Care Unit, surgical wards of University Hospital Center of Charleroi.*
Patients: *1304 patients in the pre-APS inception phase and 671 patients after its implemention who have undergone various types of surgery (orthopedics, gynecology, urology, neurosurgery, stomatology, ear, nose, and throat, ophthalmic, abdominal, vascular-thoracic, plastic, and maxillofacial).*
Interventions: *An APS, nurse-based, anesthesiologist-supervised model was devised, based on the concept that postoperative pain relief can be greatly improved by providing in-service training for surgical nursing staff and optimal use of systemic analgesics.*
Measurements and Main Results: *Postoperative pain was assessed using a visual analog scale (VAS) every 4 hours for 72 hours in the two phases. Analgesic consumption was registered at the same time. Time-related VAS scores were summarized using several pain indicators. There was an overall improvement in the pain scores after APS inception. The differences were most pronounced, around 50%, in patients undergoing vascular, maxillofacial, gynecologic, and urologic surgeries, and stomatology. Regular administration of paracetamol and nonsteroidal antiinflammatory drugs decreased morphine consumption in the second phase.*
Conclusion: *This study validates the benefits of a formal APS, using continuous monitoring of rest pain intensity and analgesic consumption in the postoperative period. Results not only support previous research findings but also offer outcome-based tools to evaluate current practices as compared with desired outcomes.*

Keywords: Analgesics, opioid; morphine; pain, postoperative; pain service, acute: audit; visual analog scale.

Introduction

In September 1990, in their "Report of the Working Party on Pain After Surgery," The Royal College of Surgeons of England and the College of

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Anesthetists suggested that all major hospitals should establish an Acute Pain Service (APS).[1] Since then, the problem of acute pain has been addressed by a number of professional bodies, including the Agency for Health Care Policy and Research (AHCPR) in 1992, the International Association for the Study of Pain (IASP) in 1992, the American Pain Society, and the American Society of Anesthesiologists (ASA) in 1995.[2–5]

First described by Ready *et al.*[6] in 1988, a number of publications on the establishment of APSs have appeared during the last few years.[6–12] Two main types of APS models have been proposed: anesthesiologist-based or nurse-based. Anesthesiologist-based APS organizations usually provide "high-tech" pain management services.[6] This situation is not surprising, as anesthesiologists clearly have special expertise in the field of advanced analgesic techniques, such as patient-controlled or epidural analgesia. Although implementation of an anesthesiologist-based APS has had considerable impact on pain management in surgical wards, only a small percentage of patients receive the benefits of the Service.[12]

Others have proposed a complete approach to the management of postoperative pain, e.g., the nurse-based anesthesiologist-supervised APS model described by Rawal and Berggren[12] in 1994, which is expected to benefit to all surgical patients. As these authors stated, the solution to the problem of inadequate postoperative pain relief lies not so much in the development of new techniques but rather in the establishment of a formal organization inside the hospital.

In Europe, a survey of APS availability in 105 hospitals from 17 countries showed that 50% of anesthesiologists were dissatisfied with postoperative pain management on surgical wards. Only 34% of hospitals had an organized APS, and few hospitals used quality assurance measures such as repeated pain assessment and documentation.[13]

The present study was intended to describe the effectiveness of a nurse-based APS inception on postoperative pain management in a general teaching hospital. We also attempt to define criteria, including pain indicators and analgesic consumption, which might be considered as performance measures.

Materials and Methods

The study was conducted in a general university teaching hospital of 1,005 beds, 240 of which are located on surgical wards. University Hospital Center of Charleroi Local Ethics Committee approval was obtained prior to the start of the study, and verbal informed consent was given by all patients who agreed to participate.

Phase I: The Pre-APS Period

An initial survey of postoperative pain management quality was performed over a 6-month period (January to June 1997), including all surgical inpatients, undergoing various procedures [orthopedics, gynecology, urology, neurosurgery, stomatology, ear, nose, and throat (ENT), ophthalmic, abdominal, vascular-thoracic, plastic, and maxillofacial surgeries]. Patients were included in the study if they were more than 15 years old, were able to read and understand French, had normal mental health, and were hospitalized for elective surgery. Inclusion was prospective and consecutive. At the time of the preoperative visit, patients were familiarized with a 10-cm visual analog scale (VAS) device (0 = no pain at all, 10 = worst imaginable pain). Exclusion criteria involved patients unable to understand or realize the VAS test, patients transferred directly to an intensive care unit (ICU) bypassing the postanesthesia care unit (PACU), and patients with emergency or ambulatory procedures. Patients receiving postoperative epidural analgesia were observed in the ICU and excluded from the present survey.

The study focused on postoperative VAS pain scores of patients treated with systemic analgesics administered intravenously (IV), including patient-controlled analgesia (PCA), intramuscular (IM) and oral routes, prescribed by anesthesiologists, and administered by ward nurses. No special instructions were given to the attending anesthesiologist regarding anesthesia and postoperative analgesia regimens.

On arrival in the PACU, patients were asked to rate their pain experience on the VAS device, which was held by the nurse. This process was repeated every 2 hours for the first 4 hours. When the patient moved to the general surgical ward, it was continued every 4 hours for 72 hours. Only rest pain was assessed, defined as the pain experienced by the patient while lying in bed. The pain threshold was set at 3 cm on the VAS scale.[12] Pain was not assessed while the patient was asleep. Participation of nurses was voluntary at first, based on interest and/or involvement in the pain management process, but it rapidly was extended to all surgical ward staff as a new nursing activity.

All analgesic medications given for pain control were carefully recorded for each patient on a specially designed documentation form. This included the type, dose, and frequency of injected opioid ordered by the attending anesthesiologist. All results were later expressed in terms of mg morphine equivalents.[14] The administration of peripherally acting analgesics, such as paracetamol and nonsteroidal antiinflammatory drugs (NSAIDs), was registered. Patient records were reviewed in detail by the study investigators.

The demographic and clinical variables used in this study included age, gender, type of surgery, type of anesthesia (regional or local/regional), VAS scores, morphine consumption (mg), paracetamol consumption (g), and NSAID administration (no/yes) during the 72-hour postoperative period.

Phase II: The APS Inception Period

An APS nurse-based anesthesiologist-supervised model was set up in October 1997. This model, developed by Rawal and Berggren,[12] is based on the concept that postoperative pain relief can be greatly improved by providing in-service training for surgical nursing staff, and optimal use of systemic paracetamol, NSAIDs, and opioids.[12] Reg-

ular assessment of pain intensity by VAS every 4 hours and recording of treatment efficacy on a bedside vital-sign chart are the cornerstones of this model. The organization is based on an acute pain nurse (APN) and pain representatives, namely, acute pain and section anesthesiologists, ward ,surgeons and day or night nurses. The APN makes daily rounds on all surgical departments and registers problems with analgesia, side effects of treatments, and patient satisfaction. The satisfaction of patient is assessed using a four-point verbal descriptive scale as follows: very dissatisfied, dissatisfied, satisfied, and very satisfied. The pain representatives day and night nurses are responsible for implementation of pain management guidelines and monitoring routines on his or her surgical ward, and the pain representative surgeon is in charge of pain management for his or her surgical specialty. They participate at quarterly "pain representative" meetings. Pain management guidelines were established by the department of anesthesia and agreed on by surgeons, with an emphasis on multimodal pain therapy using a combination of paracetamol, NSAIDS, and opioid analgesics.[2,15,16] Analgesia option includes routine 6-hourly use of paracetamol IV or orally, and subcutaneous morphine injection if VAS is greater than 3 cm. If the patient reports inadequate pain relief within 45 minutes after injection (VAS $>$ 3), he or she is administered a rescue injection that corresponds to 50% of the initial dose of morphine. If pain control is still unsatisfactory, the anesthesiologist on call is contacted. NSAIDs are given at fixed dosage, depending on the type of surgical procedure. Intensive in-service training of nursing and medical staff was undertaken. Nursing guidelines establishing the assessment of pain every 4 hours and reassessment 45 minutes after rescue medication were defined. The 4-hourly interval was chosen in consideration of the 3- to 4-hour duration of morphine action and our nursing care schedule.[2] Information pamphlets are given to all patients, whereby they are informed preoperatively that every effort would be made to maintain their VAS below the previously defined threshold of 3 cm. Patient-controlled analgesia prescription is restricted to selected patients suffering severe pain or for long-duration treatment. All these pain management procedures were installed and implemented simultaneously following the Rawal and Berggren[12] APS description.

Phase III: The Post-APS Period

Four months after the APS inception, a new survey was conducted during a 3-month period (February to April 1998) on consecutive surgical inpatients, using the same methodology as that described for Phase I.

Statistical Analysis

Results were expressed as means ± SD for quantitative variables and as frequencies for categorical findings. Time-related VAS measurements were summarized using a series of pain indicators as described elsewhere: *AUC*: Area under the VAS-time curve (cm × hr); *Mean VAS* (cm); *VASmax*: peak of VAS (cm); *Tmax*: time of VASmax (h); *PVAS* $>$ *3*: the persistence of VAS over 3 cm, i.e., the time period during which VAS was above the critical threshold (h); *Pdur*: pain duration, i.e., the time period during which the patient reported pain (VAS $>$ 0) during the 72 hours (h).[17] The comparison of mean values (age, pain indicators, and paracetamol and morphine consumption) observed in the pre-APS and post-APS periods was done by the Student *t*-test, whereas proportions (gender, NSAID use) were compared by the classic χ^2 test. To assess the efficacy of the APS on pain indicators and drug consumption while adjusting for age, gender, type of anesthesia, and surgical procedure, a general linear model (GLM) was applied to the data. The number of patients included in the post-APS study period was based on a power calculation assuming a 20% reduction in pain indicators, with $\alpha = 0.05$ and $\beta = 0.20$. All statistical calculations were carried out using the SAS package (version 6.12; SAS Institute, Cary, NC) and always using all data available. Results were considered to be significant at the 5% critical level ($p < 0.05$).

Table 1. Demographic Data and Distribution of Patients According to Type of Surgery and Type of Anesthesia in the Pre-APS and Post-APS Phases

Variable	Pre-APS (n = 1,304)	Post-APS (n = 671)	*p*-Value
Age (yrs)	48.4 ± 17.9	47.7 ± 17.4	0.394
Gender			
Female	704 (54%)	354 (53%)	0.603
Male	600 (46%)	317 (47%)	
Type of surgery			
Orthopedic	407 (31%)	141 (21%)*	<0.001
Neurosurgery	140 (11%)	54 (8.1%)	
Vascular	37 (2.8%)	32 (4.8%)	
Ophthalmology	42 (3.2%)	8 (1.2%)*	
Maxillofacial	55 (4.2%)	41 (6.1%)	
Gynecologic	84 (6.4%)	69 (10%)*	
Urologic	68 (5.2%)	58 (8.6%)*	
Plastic	54 (4.1%)	32 (4.8%)	
Abdominal	339 (26%)	184 (27%)	
Stomatology	22 (1.7%)	23 (3.4%)*	
ENT	56 (4.3%)	29 (4.3%)	
Type of anesthesia			
GA	990 (76%)	480 (72%)	0.034
LRA	314 (24%)	191 (28%)	

APS = Acute Pain Service; ENT = ear, nose, and throat; GA = general anesthesia; LRA = local/regional anesthesia.

*Statistically significant at $p < 0.05$.

Results

A total of 1,304 patients with complete file was included in the pre-APS study period, and 671 patients were retained for the post-APS phase. Patients of the two groups were homogenous with respect to age and gender *(Table 1)*. Mean age was 48.4 ± 17.9 years in the evaluation study and 47.7 ± 17.4 years in the reevaluation study ($p = 0.39$). In the pre-APS phase, there were 704 (54%) women and 600

Table 2. Number (percent) of Patients According to Type of Surgery and Type of Anesthesia in the Pre-APS and Post-APS Phases

Type of Surgery	Pre-APS		Post-APS	
	GA	LRA	GA	LRA
Orthopedic	246 (60.4)	161 (39.6)	74 (52.5)	67 (47.5)
Neurosurgery	129 (92.1)	11 (7.9)	51 (94.4)	3 (5.6)
Vascular	15 (40.5)	22 (59.5)	13 (40.6)	19 (59.4)
Ophthalmology	42 (100)	0	8 (100)	0
Maxillofacial	52 (94.5)	3 (5.5)	41 (100)	0
Gynecologic	78 (92.9)	6 (7.1)	54 (78.3)	15 (21.7)*
Urologic	33 (48.5)	35 (51.5)	25 (43.1)	33 (56.9)
Plastic	54 (100)	0	28 (87.5)	4 (12.5)*
Abdominal	263 (77.6)	76 (22.4)	137 (74.5)	47 (25.5)
Stomatology	22 (100)	0	20 (87.0)	3 (13.0)
ENT	56 (100)	0	29 (100)	0
Total	990 (75.9)	314 (24.1)	480 (71.5)	191 (28.5)

APS = Acute Pain Service; GA = general anesthesia; LRA = local/regional anesthesia; ENT = ear, nose, and throat.

*Proportions of LRA patients in pre-APS and post-APS significantly different ($p < 0.05$).

(46%) men. In the post-APS phase, 355 (53%) women and 316 (47%) male patients were involved ($p = 0.60$).

The distribution of patients according to type of surgery differed significantly between the two phases ($p < 0.001$). Multiple comparisons revealed that this fact was due mainly to a decrease in the proportion of orthopedic patients (31% in the pre-APS phase *vs.* 21% in the post-APS phase) and to a lesser extent of ophthalmologic patients (3.2% *vs.* 1.2%), compensated by a relative increase in the proportion of patients undergoing gynecologic (6.4% *vs.* 10%), urologic (5.2% *vs.* 8.6%), and stomatology (1.7% *vs.* 3.4%) interventions.

As for the type of anesthesia, we found a significantly higher proportion of patients operated given local/regional anesthesia in the post-APS phase (28% *vs.* 24% in the pre-APS phase; $p = 0.034$). As seen from *Table 2*, this increase essentially occurred in gynecologic and plastic surgery interventions.

The values of pain indicators observed in the pre-APS and post-APS periods are listed in *Table 3*. A highly significant reduction ($p < 0.0001$) of all pain indicators was observed after APS inception, except for the time of maximum VAS, which remained unchanged. The APS effect on pain indicators remained highly significant, even when adjusting for age, gender, surgical procedure, and type of anesthesia ($p < 0.0001$). As seen in *Table 4*, there was a major improvement (>50%) in the pain scores observed following APS inception in patients undergoing vascular, maxillofacial, gynecologic, and urologic surgeries, and stomatology. In the post-APS phase, pain intensity was the highest in orthopedics and neurosurgery patients. In the latter group, most of the patients underwent disc surgery. In ophthalmology, ENT, and plastic surgeries, pain scores did not significantly improve in the post-APS phase.

Table 3. Comparison of Pain Indicators in the Pre-APS and Post-APS Phases

Pain Indicator	Pre-APS (n = 1,304)	Post-APS (n = 671)	*p* Value*
AUC (cm × hr)	99 ± 94	59 ± 69	<0.0001
Mean VAS (cm)	1.5 ± 1.4	1.0 ± 1.1	<0.0001
VASmax (cm)	4.8 ± 2.6	3.9 ± 2.5	<0.0001
Tmax (hr)	8.2 ± 12	8.2 ± 13	0.9812
PVAS > 3 (hr)	12 ± 16	6.1 ± 11	<0.0001
Pain duration (hr)	39 ± 25	28 ± 22	<0.0001

APS = Acute Pain Service; VAS = visual analog scale; PVAS = persistence of VAS over 3 cm.

**p*-Values remained significant when adjusting for age, gender, surgical procedure, and type of anesthesia.

Analgesic consumptions in the pre-APS and post-APS phases are listed in *Table 5*. Paracetamol and NSAID use increased markedly in the post-APS as compared with the pre-APS phase (paracetamol: 5.3 ± 4.0 g *vs.* 9.7 ± 6.2 g; $p < 0.0001$; NSAIDs: 20% *vs.* 64% of patients, $p < 0.0001$). At the same time, morphine administration decreased significantly from 14 ± 23 mg to 11 ± 23 mg ($p = 0.038$). When adjusting for age, gender, surgical procedure, and type of anesthesia, results remained highly significant ($p < 0.0001$) for paracetamol and NSAIDs but became nonsignificant for morphine ($p = 0.51$). *Table 6* lists analgesic consumption in the various surgical groups. In the post-APS phase, paracetamol and NSAIDs were given more regularly to patients of all but one (ophthalmology) surgical department. However, morphine consumption increased in neurosurgery (from 15 ± 26 mg to 28 ± 36 mg; $p < 0.001$) but significantly decreased in vascular, gynecologic, urologic, and abdominal surgeries. The range of morphine consumption was extremely variable, from 0 to 177 mg in the pre-APS period and 0 to 240 mg in the post-APS period. No life-threatening respiratory events associated with opioid administration were reported during the study period.

Patient-controlled analgesia prescription did not increase after APS inception: 20 patients (1.5%) received PCA in the pre-APS and 10 in the post-APS (1.4%) phases (NS).

Discussion

This study demonstrates the improvement in pain management quality after introducing a nurse-based, anesthesiologist-supervised, APS model into a general teaching hospital. All surgical subpopulations benefited from the new organization of pain management. These results are in agreement with previous surveys.[8–10,12,18,19] But, in our survey, the improvement was more pronounced in some surgical specialties, such as vascular, maxillofacial, gynecologic, and urologic surgeries, and stomatology, than after painless procedures, such as ophthalmology, ENT, and plastic surgeries.[20]

Rest pain intensity was measured using five endpoints

Table 4. Comparison of Three Major Pain Indicators in the Pre-APS and Post-APS Phases According to Type of Surgery

	AUC (cm × h)		PVAS > 3 (h)		Pain duration (h)	
Type of Surgery	**Pre-APS**	**Post-APS**	**Pre-APS**	**Post-APS**	**Pre-APS**	**Post-APS**
Orthopedic	112 ± 101	86 ± 94	15 ± 18	9.8 ± 15	40 ± 26	33 ± 23
Neurosurgery	136 ± 123	98 ± 80	17 ± 21	12 ± 14*	46 ± 24	38 ± 23
Vascular	62 ± 67	22 ± 31	6.4 ± 12	2.1 ± 4.5*	27 ± 19	13 ± 15
Ophthalmology	19 ± 18	27 ± 30*	0.93 ± 1.7	2.0 ± 5.3*	13 ± 10	13 ± 13*
Maxillofacial	92 ± 83	55 ± 47	11 ± 15	5.0 ± 7.2	39 ± 26	28 ± 17
Gynecologic	105 ± 97	52 ± 67	14 ± 16	5.4 ± 10	39 ± 27	25 ± 25
Urologic	77 ± 91	33 ± 47	9.7 ± 15	3.1 ± 7.7	32 ± 29	18 ± 18
Plastic	87 ± 69	57 ± 73*	9.3 ± 13	6.1 ± 14*	41 ± 22	27 ± 20
Abdominal	102 ± 79	57 ± 54	11 ± 14	5.1 ± 8.8	45 ± 23	30 ± 20
Stomatology	34 ± 24	17 ± 20	4.2 ± 5.2	0.8 ± 1.8	16 ± 6	13 ± 14*
ENT	40 ± 45	34 ± 40*	2.8 ± 5.8	2.2 ± 4.3*	23 ± 18	18 ± 19*

APS = Acute Pain Service; AUC = area under the curve; PVAS = persistence of visual analog scale over 3 cm; ENT = ear, nose, and throat surgery.
*NS.

during the 72-hour study period: AUC, mean VAS, VASmax, PVAS > 3, and Pdur. These items, which may be considered as outcome measurements, were sensitive enough, particularly AUC, mean VAS, PVAS > 3, and Pdur, to demonstrate the predictable reduction of pain in the post-APS phase. They appear clinically relevant to pain management practices, and they are both reliable and valid. In conducting the present study, a database was instituted, which can serve as a source of information for further statistical analysis and research, and it ensures that trends of efficacy or complications can be addressed. The five endpoints described in the present study may be used to monitor quality of pain relief, providing the hospital with clear information on which areas of pain management need improvement. These outcome data also could be used as report cards.[21] Designing tools to guide physicians and nurses to initiate and modify analgesic treatments expertly is an immediate challenge for implementing a quality assurance project.

Nurse-based APS have been previously described. Gould *et al.*[9] reported improvement in postoperative analgesia after introduction of such services. The general organization of our APS has been modeled on the APS described by Rawal and Berggren[12] in 1994. The Swedish model has been introduced in our hospital without any modification. Briefly, pain management is based on regular recording of patient's pain intensity using VAS, regular administration of paracetamol and NSAIDs, and optimal use of systemic opioids protocols. Pain management guidelines, standard order, and monitoring routines have been developed for each surgical specialty in cooperation with surgeons and section anesthesiologists. An acute pain anesthesiologist and a nurse coordinate pain management and chair the quarterly APS meetings of section anesthesiologists, surgeons, and pain representative ward nurses. The usual topics of discussion at these meetings are practical pain problems, protocol modifications, suggestions for improvement of services, and introduction of newer techniques. Adoption of a multidisciplinary team approach leads to marked improvement in postoperative pain relief. The acute pain anesthesiologist has the overall responsibility for the APS, including monitoring routines and teaching programs for all staff. Another advantage of this model is the low cost, estimated at $3 to $4 U.S. per patient.[12]

Table 5. Comparison of Analgesic Consumption in Pre-APS and Post-APS Phases

Drug	**Pre-APS**	**Post-APS**	***p*-Value**
Paracetamol (g)	5.3 ± 4.0	9.7 ± 6.2	<0.0001
NSAIDs (%)	20%	64%	<0.0001
Morphine (mg)	14 ± 23	11 ± 23	0.0385

APS = Acute Pain Service; NSAIDs = nonsteroidal antiinflammatory drugs.

**p*-Values remained significant when adjusting for age, gender, surgical procedure, and type of anesthesia, except for morphine ($p = 0.51$).

Our data are in line with previous studies or suggestions from different professional groups, such as the American Pain Society, ASA, and AHCPR, showing that a multidisciplinary approach leads to marked improvement in postoperative pain relief.[2,4–10]

One of the major goals of the study was implementation of clinical nursing standards for pain management. Standardization and stabilization of nursing practice related to pain management is an essential aspect of improving patient clinical outcomes. This finding is in agreement with the literature, which advocates the necessity of developing institutional programs for improving pain management.[22,23]

Morphine is still the treatment of reference for the relief of acute postoperative pain.[24] The most common method of opioid use is IM or subcutaneous administration on an as-needed basis. Nevertheless, the inadequacies of this method of pain management have long been recognized.[25–27] In our protocol, morphine is adminis-

Table 6. Comparison of Analgesic Consumption in Pre-APS and Post-APS Phases According to Type of Surgery

	Paracetamol (g)		NSAIDs		Morphine (mg)	
Type of Surgery	**Pre-APS**	**Post-APS**	**Pre-APS**	**Post-APS**	**Pre-APS**	**Post-APS**
Orthopedic	5.1 ± 3.9	10 ± 7.3	93 (23)	81 (57)	19 ± 26	22 ± 37*
Neurosurgery	5.3 ± 3.6	12 ± 6.5	29 (21)	43 (80)	15 ± 26	28 ± 36
Vascular	4.6 ± 2.8	7.5 ± 5.9	0 (0)	16 (50)	5.6 ± 9.8	1.3 ± 4.8
Ophthalmology	2.8 ± 1.7	3.0 ± 2.4*	2 (5)	1 (12)*	1.4 ± 9.3	0.6 ± 1.8*
Maxillofacial	6.3 ± 4.5	11 ± 5.7	15 (27)	27 (66)	13 ± 17	10 ± 13*
Gynecologic	6.4 ± 4.0	9.3 ± 6.9	10 (12)	41 (59)	14 ± 25	5.1 ± 10
Urologic	6.0 ± 4.7	9.5 ± 5.4	8 (12)	25 (43)	15 ± 30	3.2 ± 8.2
Plastic	6.0 ± 3.5	9.5 ± 4.5	9 (17)	18 (56)	8.7 ± 18	14 ± 15*
Abdominal	5.6 ± 4.4	9.8 ± 5.7	74 (22)	136 (74)	12 ± 20	7.6 ± 12
Stomatology	5.0 ± 2.3	7.4 ± 2.2	7 (32)	20 (87)	5.3 ± 13	2.4 ± 4.4*
ENT	3.8 ± 2.4	9.3 ± 5.8	10 (18)	21 (72)	5.7 ± 13	5.2 ± 8.5*

Note: Values for paracetamol and morphine are given as means ± SD, and values for NSAIDs are given as number (percent).

APS = Acute Pain Service; NSAIDs = nonsteroidal antiinflammatory drugs; ENT = ear, nose, and throat.

*NS.

tered if the level of pain reached 3 on the VAS. With attentive nursing care, conventional subcutaneous opioid therapy appears as effective as PCA.[12,28] As Choinière *et al.*[28] recently stated, most studies establishing the analgesic superiority of PCA compare PCA with on-demand IM dosing, and not with a regularly scheduled mode of administration of the drug. These authors also showed that PCA is more costly and does not appear to have clinical advantages in terms of patient satisfaction, the side-effect profile, or the rate of postoperative recovery after hysterectomy.[28] Sophisticated analgesia techniques such as PCA is neither necessary nor realistic for all surgical patients. Equipment problems are an additional concern. In our hospital, PCA is targeted specifically to patients expected to do poorly with regularly administered subcutaneous injections (e.g., severe pain or long duration of treatment) representing 1.4% of patients in the post-APS phase.[29,30] Perhaps PCA is better suited to other patient categories or surgical procedures.

Paracetamol and NSAIDs given by the clock and supplemented with subcutaneous opioid remain the mainstay of postoperative pain relief.[31] In our study, these "basic analgesics" induce a light, nonsignificant morphine-sparing effect, but the range of morphine consumption is extremely variable. This finding is in line with previous surveys.[24] In addition, Egberg *et al.*[32] showed that the postoperative requirement for morphine could be reduced by one half by providing preoperative information about severity and duration of postoperative pain and twice daily postoperative visits and support. This phenomenon of "opioid sparing" by the nonpharmacologic method of providing psychological support and information to patients must be integrated. Although comparison with other studies is difficult, these results compare favorably with published data on opioid analgesia.

Regional techniques were restricted to selected patients not included in the present survey. These patients were managed in the ICU, where staff and equipment ensure appropriate monitoring and management of complications. In the present study, we focused only on patients managed in surgical wards. We are convinced that regional techniques are ideal after most major surgical procedures and that their use should be extended to the general wards after development of appropriate facilities. Formal protocols, with monitoring of sedation level, respiration, and blood pressure, permit systematic and epidural analgesic drugs to be given safely in the general wards.[15,33]

The principal limitation related to the study design is that only rest pain was assessed. Adequate control of this kind of pain is easier than movement pain.[9] Further studies will now focus on pain during mobilization using the same methodologic approach. Moreover, the impact of improved postoperative analgesia in terms of overall surgical outcome remains to be determined.

The present study validates the benefits of a formal nurse-based APS, using continuous monitoring of rest pain intensity and analgesic consumption in the postoperative period. Results not only support previous research findings but also offer outcome-based tools to evaluate current practices as compared with desired outcomes.

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