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Evaluating patient outcomes in postoperative pain management according to the revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R)

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ABSTRACT

Background: In the first 24 h after surgery, it is necessary to evaluate the patient responses to pain, analgesia and patient satisfaction to prevent complications related to the pain management process.
Aim: To evaluate patients' outcomes (pain qualities, side effects of the pain management, pain treatment satisfaction, non-pharmacological pain treatment methods, predictors of pain management satisfaction and percentage of pain relief) according to the Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) in the first 24 h.
Design: Cross-sectional study.
Methods: The study sample was comprised of 700 patients, who were surgically treated at the surgical clinics of a university hospital and completed the first postoperative 24 h. The data was collected through the "Patient Information Form" and the "Turkish version of the revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R)".
Results: The medians of the lowest and the worst postoperative pain severity level were 3.0 and 7.0, respectively. Patients experienced severe pain in 60 % of the first postoperative 24 h and reported that 70 % of their pain eventually decreased. A positive and significant correlation was found between pain interference, pain-affected mood/emotions, the severity of pain-related side effects, the least and worst pain severity levels and severe pain, and the percentage of time experienced with severe pain.
Conclusions: Most of the patients experienced severe pain, which restricted their daily life activities and led to negative emotions. Acute postoperative pain may negatively affect patient outcomes and delay postoperative recovery during the early period. Therefore, pain should be managed in the early period to prevent physical and psychological side effects.

1. Introduction

Globally, 240 million patients undergo surgical operations each year (Zaslansky et al., 2015), and approximately 60 %–86.7 % patients experience moderate to severe postoperative pain (Chou et al., 2016; Erden et al., 2017a; Keast et al., in press; Macintyre & Schug, 2021). Although pain organizations have studied for years to develop algorithms intended for evidence-based, effective, and safe postoperative pain management (Pogatzki-Zahn, Segelckea, & Stephen, et al., 2018; Reisli et al., 2021; The Joint Commission, 2020, Turkish Anesthesiology and Reanimation Association, 2020), pain management recommendations are not completely implemented in some of the hospitals (Chou et al., 2016; Erden et al., 2015a, Erden et al., 2015b; Erden et al., 2017b; Zaslansky et al., 2015). A multicenter study examining postoperative pain records found that 50 % of 6347 patients had moderate to severe pain, and 23 % reported severe pain during half of the day or the entire

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day, although hospitals insisted that they followed evidence-based pain management recommendations (Zaslansky et al., 2015). In a study conducted in Turkey have reported that postoperative pain management was not at the desired level over a 5-year period and patients were not satisfied with pain management (Erden, Akcali, et al., 2015).

Hemodynamic instability caused by a stress factor such as pain may delay recovery as surgical intervention triggers a stress response. Inadequate pain control negatively affects organ functions, causing delays in recovery, prolonged hospital stay, and patient dissatisfaction (Pogatzki-Zahn, Segelckea, & Stephen, et al., 2018; Kalkan & Guler, 2021). The early postoperative period, and especially the first 24 h, is when patients feel the pain most intensely and pain management is the most important (Erden et al., 2018; Zaslansky et al., 2015). Closely monitoring and evaluating the pain, the effect of pain and analgesia on the patient, the patient's eligibility for analgesia, and the satisfaction of the patient are necessary to help medical personnel in controlling pain during the early postoperative period (Motamed, 2022; Tura & Erden, 2021). In this context, the revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) assesses the pain management strategies based on clinical outcomes, as well as the patient's response to pain and analgesia, the patient's ability to receive information about pain treatment and participate in the treatment, non-pharmacological pain treatment methods, and satisfaction with the pain treatment (Botti et al., 2015; Fang et al., 2017; Gordon et al., 2010). Such a comprehensive scale, wherein pain management, response to pain treatment, and patient's satisfaction with treatment are evaluated together as "patient outcomes" in pain management, covering the early postoperative period was not previously used in Turkey.

Effective pain management in the early postoperative period is essential for every individual, and it is the legal and ethical responsibility of the healthcare team to ensure this (Kalkan & Guler, 2021). Effective pain management involves evaluating the level of pain, reducing it to a tolerable level, and utilizing a patient-centered holistic care approach with a multidisciplinary team to partially or completely eliminate it. For this reason, comprehensive assessment of patient outcomes related the effect of postoperative pain management is important.

This is the first comprehensive study in Turkey that evaluates the effects of pain management in the first 24 h after surgery on patient outcomes in all surgical fields. It is thought that this study will contribute to the evaluation of the pain management process and the patients' satisfaction with pain treatment. The study's findings will provide insights for future research aimed at conducting a thorough analysis of current postoperative pain management methods and enhancing patient outcomes.

2. Methods

2.1. Aim and research questions

In this descriptive and cross-sectional study, we aimed to evaluate patients' outcomes according to the Revised American Pain Society Patient Outcome Questionnaire (APS-POQ-R) in the first 24 h.

The purpose of this study was to answer the following questions:

- What are the patients' outcomes (pain severity, interferences with activities and sleep, affection, side effects of the pain management, participation in decisions about pain management, degree of pain relief, pain treatment satisfaction, and information received about pain management) related pain management in the first postoperative 24 h?
- What are the patients' outcomes related to the use of non-pharmacological pain treatment methods in the first postoperative 24 h?
- What is the relationship between pain characteristics and satisfaction in the first 24 h according to the characteristics of the patients?
- What are the predictors of surgical patients' pain management satisfaction in the first 24 h?
- What are the predictors of surgical patients' percentage of pain relief in the first 24 h?

2.2. Design

A cross-sectional study.

2.3. Setting

The study was performed at the surgical clinics of a state university hospital in Adana, one of the provinces of Turkey situated in the Mediterranean Region. The hospital had an approximate capacity of 1200 beds and there were nine surgical clinics with 30 beds each. The average number of patients per nurse during the day shift and the night shift was 8 and 18, respectively. Nurses work in 8, 12 or 16-h shifts. Although there was no official pain management protocol in the clinics, pain assessment was performed during each shift using Numeric Rating Scale (0–10) at an average of 2–4 times per shift. Multimodal analgesia is used in the treatment of pain in surgical patients'pain treatment. Paracetamol, non-opioid, and opioid analgesics were used in the treatment of postoperative pain in compliance with the physician's recommendations. Analgesics are administered "on time" for the first 24 h and "as needed" after the 24th hour. While planning the pain treatment, the type of surgical intervention applied, the severity and duration of the pain are evaluated, and additional analgesics can be added according to the patient's needs. Cold therapy treatment and positioning, among others, are frequently used non-pharmacological pain treatment methods in surgical clinics. There is no pain nurse specialist in the hospital; thus, clinics provide in-service training on the pain assessment and treatment.

2.4. Study sample

The population of the study was comprised of all the patients who underwent an operation at the surgical clinics of the hospital between May 2018 and August 2019. The study sample included the patients, who met the following criteria and agreed to voluntarily participate in the study: Patients aged ≥18 years, hospitalized at least 24 h post-operation, without history of chronic pain or alcohol or drug addiction, without cognitive impairment, with postoperative laparoscopic intervention/surgical incision, without metastatic disease, without need for mechanical ventilation, without postoperative complications (including wound infection, hemorrhagic shock, evisceration), and with American Anesthesiologists Association Physical Status Classification I, II, and III. During the study period, a total of 1000 patients underwent surgical operations at the clinics. The final sample consisted of 700 surgical patients. This represented 70 % of all the eligible admissions during the data collection period (Fig. 1. Flow chart).

2.5. Data collection tools

"Patient Information Form" and the "Turkish version of the APS-POQ-R-TR" were used for data collection. Patient Information Form included 15 close-ended items that related to demographic information of the patients, previous history of surgical operations and severe pain experiences, surgical procedure currently undergone, and analgesic administered. The aim of APS-POQ-R is to assess pain management based on the clinical outcomes in the first postoperative 24 h and concurrently measure patient satisfaction (Erden et al., 2018; Fang et al., 2017). The scale was developed by the American Pain Association in

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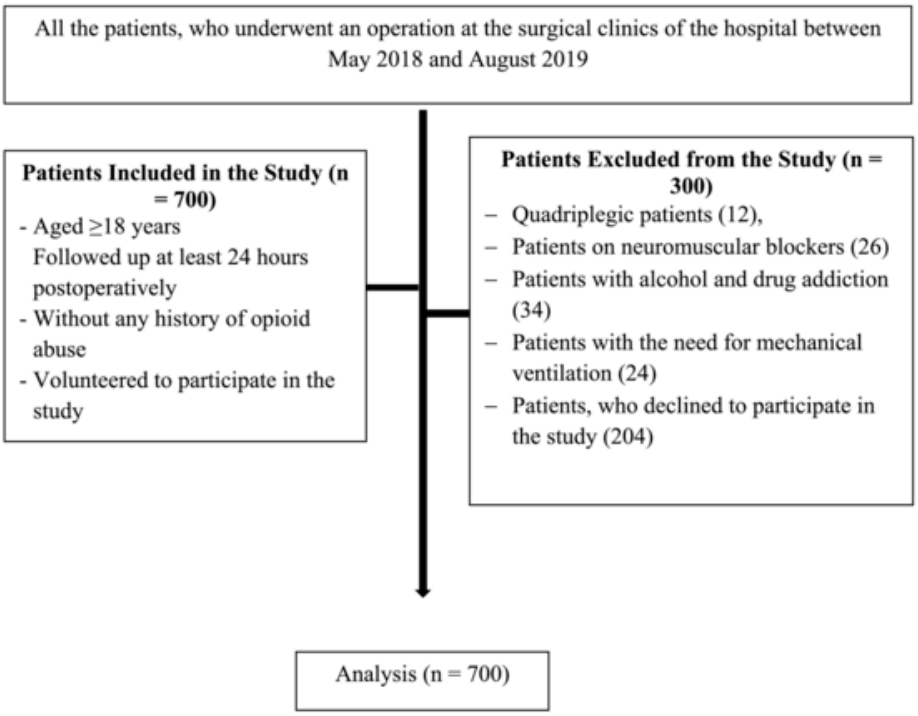


Fig. 1. Flow chart.

1991 and updated in 2010 by incorporating items related to patient satisfaction (Gordon et al., 2010). The validity and reliability study for the Turkish language version of the questionnaire (APS-POQ-R-TR) was performed by Erden et al. (Erden et al., 2018). The Cronbach's alpha of the APS-POQ-R-TR was 0.88 (Erden et al., 2018). The questionnaire is composed of three subscales of (1) pain severity, activity interference, sleep interference, perceptions of care; (2) affection; and (3) adverse effects of the pain management. The questionnaire also includes items related to the patient's satisfaction with the treatment, whether the patient has been informed about and participated in the treatment, and non-pharmacological treatments (Erden et al., 2018; Gordon et al., 2010).

Relevant studies in the literature reported that APS-POQ-R assessed the incidence of pain, pain severity at rest, pain severity that interferes in daily activities, analgesia protocol applied by the doctors and nurses, side effects of analgesia, patients' mood during pain, and patients' satisfaction with analgesic treatment (Farooq et al., 2016; Zoëga et al., 2014).

2.6. Procedure

The study was performed separately from the clinic's practices related to pain assessment and control. Researchers (IT, IFB) conducted two face-to-face interviews (preoperative and postoperative 1st day) with each patient during the study. On the day before surgery, patients were admitted to the clinic and underwent preoperative interviews. All patients were informed preoperatively (one day before surgery) by the researchers related the study via face-to-face interviews. Patients who met the inclusion criteria were determined one day before the operation, and the Patient Information Form and APS-POQ-R-TR were applied to the volunteer patients on the 1st postoperative day, 24 h after surgery. The pain management applied until the end of the first postoperative day of the patients was taken as the basis. The participants were followed for a full 24 h after surgery. Data collection process took approximately 15–20 min per participant.

2.7. Data analysis

Study data were analyzed by the Statistical Package for the Social Sciences Version *25* (*IBM SPSS* Statistics for *Windows*, *IBM Corp*, Armonk, NY, USA) software program. The Mann–Whitney U, Kruskal Wallis, and Spearman Correlation analysis as the non-parametric tests were used in addition to descriptive statistics. Regarding the assessment of the APS-POQ-R-TR results, the frequency of pain and pain relief were expressed in percentages (0 %–100 %), whereas the remaining questionnaire items were expressed in numerical scale (0–10), and the mean and standard deviation values of the scores were calculated. In the study, “the worst level of pain severity” was expressed as no pain (0), mild pain (1–3), moderate pain (4–6), and severe pain (7–10). Stepwise regression was applied to determine the predictors of surgical patients' pain management satisfaction and percentage of pain relief in the first 24 h with the patient outcomes in acute postoperative pain management in linear regression analysis. A p value of <0.05 was considered statistically significant in the evaluation of the data.

2.8. Ethics approval

Relevant written approval of the University's Ethics Committee for Non-Interventional Clinical Research (Date/No: 13.04.2018/89) and the Hospital Chief Medical Officer (Date/No: 02.04.2018/E.49138) were obtained for conducting the study. All the participating patients were informed about the study and their respective verbal and written consent was obtained.

3. Results

3.1. Surgical Patients' characteristics

A total of 84.4 % patients were aged 18–64 years, 52.4 % were women, and 60.3 % of the patients had prior history of surgical operation (Table 1). The majority of patients underwent open (68.4 %) and minor surgical operations (62.5 %), which almost all the operations were performed under general anesthesia (92.4 %). In total, 18.1 %,

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Table 1
The *characteristics* of the *patients* (n = 700).

Characteristics		n	%
Sociodemographic characteristics			
Age[a]	18–64	591	84.4
	≥65	109	15.6
Gender	Female	367	52.4
	Male	333	47.6
Previous surgery experience	Yes[b]	422	60.3
	No	278	39.7
Previous experience of severe pain	Yes	406	58.0
	No	294	42.0
Cause of severe pain experienced before	Operation	237	33.9
	Labour	125	17.9
	Injury/accident	52	7.4
	Other[c]	286	40.8
Characteristics regarding surgery and pain management			
Surgery performed	Major surgery	263	37.6
	Minor surgery	437	62.4
Type of surgery	Open	479	68.4
	Closed	221	31.6
Type of anesthesia	General anesthesia	647	92.4
	Regional anesthesia	46	6.6
	Other (sedation)	7	1.0
Surgery time	2 h<	203	29.0
	≥2 h	497	71.0
Presence of medical devices that cause pain	Yes[d]	304	43.4
	No	395	56.4
Analgesia application status[e]	Preoperative	127	18.1
	Intraoperative	448	64.0
	Postoperative	625	89.3
Analgesic treatment[e]	Preoperative (n = 127)		
	Opioid[f]	10	7.9
	Non-opioid[f]	116	91.3
	Other[f]	1	0.8
	Intraoperative (n = 448)		
	Opioid[f]	400	89.3
	Non-opioid[f]	48	10.7
	Postoperative (n = 625)		
	Opioid[f]	145	23.2
	Non-opioid[f]	589	94.2
	Other[f]	13	2.1
Postoperative analgesic consumption amount (mg)[e]	Opioid[f]	Median; $\bar{X}$ ± SD (Min-Max)	
	Non-opioid[f]	100; 127.60 ± 71.20 (10–400)	
	Other[f]	1075; 1321.87 ± 913.74 (20–4225)	
		40; 137.50 ± 294.36 (20–1200)	

[a] Age (X ± SD; Min-Max): 46.83 ± 16.75; 18–93.
[b] 69.5 % (n = 283) of the patients who had previous surgery experience had major surgery.
[c] Chronic disease, infection, migraine, low back pain, abdominal pain, toothache, nerve compression, chest pain, renal colic, burn, etc.
[d] Drain, chest tube, NG catheter, Foley catheter, IV catheter, splint, elastic bandage, external fixator.
[e] Multiple responses are given. The percentage is taken over n.

64.0 %, and 89.3 % patients received analgesics preoperatively, intraoperatively, and postoperatively, respectively. The majority (>91 %) of analgesic therapy during the first preoperative and postoperative 24 h included non-steroidal anti-inflammatory drugs, whereas opioids accounted for the vast majority (89.3 %) of the intraoperative analgesic therapies. Furthermore, 43.4 % of patients experienced pain associated with the presence of medical devices (Table 1).

[f] Opioid therapy: Preoperatively tramadol hydrochloride; fentanyl, morphine hydrochloride, tramadol hydrochloride in the intraoperative period; pethidine hydrochloride, morphine hydrochloride and tramadol hydrochloride were administered in the postoperative period. Non-opioid treatment: Diclofenac sodium and paracetamol in the preoperative and intraoperative period; diclofenac sodium, paracetamol, tenoxicam, indomethacin, and ibuprofen were administered in the postoperative period. Hyoscine n butyl bromide in the preoperative period and pregabalin was administered in the postoperative period as other analgesic drug treatments.

3.2. Surgical Patients' outcomes related postoperative pain management

3.2.1. Pain outcomes

The median least pain severity level and the worst pain severity level were reported by the patients as 3.0 (3.59 ± 2.56) and 7.0 (6.83 ± 2.62), respectively. Patients had severe pain during 60.0 % of the first postoperative 24 h, with median degree of interference in some of their activities in and out of bed as 6.0 (5.30 ± 3.12) and 5.0 (5.12 ± 3.39), respectively (Table 2). Pain induced anxiety (5.0 [4.37 ± 3.51]) and fear (4.0 [4.22 ± 3.61]) in the patients, and caused certain symptoms, including mild dizziness (2.0 [2.60 ± 2.92]), nausea (1.0 [2.68 ± 3.25]), and drowsiness (1.0 [2.40 ± 2.98]), among others. Patients reported that 70.0 % of their pain was relieved in the first 24 h and that they participated in decisions on pain treatment at a rate of 7.0 (5.83 ± 3.24). The median rate of satisfaction with pain treatment was 8.0 (7.56 ± 2.43) and approximately one-third (38.3 %) received information about pain treatment (Table 2).

In the present study, 43.3 % of the patients received non-pharmacological pain treatment within the first postoperative 24 h, and the majority of the healthcare team members (62.7 %) failed to encourage patients in using non-pharmacological pain treatment methods. Of these applied analgesia methods, the most cognitive techniques are prayer (41.9 %), distraction (watching TV, reading a book, etc.) (36.3),

Table 2
Surgical patients' outcomes related to pain management in first 24 hours after surgery (n = 700).

Patients' outcomes	Range	Median; $\bar{X}$ ± SD
Lowest level of pain felt in the first 24 h	0–10	3.0;3.59 ± 2.56
Worst level of pain felt in the first 24 h	0–10	7.0;6.83 ± 2.62
Time experienced with severe pain in the first 24 h (%)	0–100	60.0; 53.68 ± 25.18
Pain interference with…		
Turning, straightening, changing position in bed	0–10	6.0;5.30 ± 3.12
Walking out of bed, sitting in a chair, standing at the sink	0–10	5.0;5.12 ± 3.39
Falling asleep	0–10	4.0;4.05 ± 3.19
Resume sleep	0–10	4.0;3.79 ± 3.15
Pain affected mood and emotions…		
Anxious	0–10	5.0;4.37 ± 3.51
Depressed	0–10	2.0;2.99 ± 3.31
Frightened	0–10	4.0;4.22 ± 3.61
Helpless	0–10	2.0;3.30 ± 3.46
Severity of pain related side effects'		
Nausea	0–10	1.0;2.68 ± 3.25
Drowsiness	0–10	1.0;2.40 ± 2.98
Itching	0–10	0.0;0.94 ± 1.92
Dizziness	0–10	2.0;2.60 ± 2.92
Percentage of pain relief in the first 24 h (%)	0–100	70.0; 64.01 ± 25.60
The degree to which the patient is allowed to participate in decisions about pain management to the extent they want.	0–10	7.0;5.83 ± 3.24
Degree of satisfaction with pain treatment	0–10	8.0;7.56 ± 2.43
Degree of benefit from information received about pain management[a]	0–10	8.0;7.24 ± 2.26

[a] The percentage is taken from the number of patients (268, 38.3 %) who received information about pain treatment options.

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and deep breathing (33.3 %). The most used peripheral and behavioral techniques were the cold pack (34.3 %) and walk (32.7 %), respectively (Table 3).

3.3. Relationship between pain characteristics and satisfaction

The median of least pain severity was significantly higher in patients with a previous experience of severe pain, patients, who underwent open and major surgery, who received general anesthesia, and who experienced pain from medical instruments ($p < .001$) (Table 4). The median of worst pain severity was significantly higher in women, patients with a previous experience of severe pain, patients who underwent open and major surgery, who received preoperative and postoperative analgesia, and who experienced pain from medical devices ($p < .001$). The percentage of time with severe pain was significantly higher in women, in patients without a previous surgery experience, in patients with a previous history of severe pain, in patients, who underwent open and major surgery, in patients, who received general anesthesia and postoperative analgesia, and in patients who experienced pain from medical devices ($p < .001$). Percentage of pain relief was significantly higher in the patients with a previous surgery experience, patients who underwent closed surgery, and patients who were operated under regional anesthesia ($p < .001$). The degree of satisfaction with pain treatment was significantly higher in patients with a previous surgery experience and in patients, who underwent general and regional anesthesia ($p < .001$) (Table 4).

Although it is not displayed in the table, statistical analysis indicates that there was a positive and significant correlation between the least and the worst pain severity ($r = 0.461/p = .000$). Furthermore, there

Table 3
Patients' outcomes related use of non-pharmacological methods in pain control (n = 700).

Patients' outcomes	n (%)
Use of non-pharmacological methods in pain control	
Yes	303 (43.3)
No	397 (56.7)
Non-pharmacological methods used[a]	
Cognitive	
Prayer	127 (41.9)
Distraction (watching TV, reading a book, etc.)	110 (36.3)
Deep breathing	101 (33.3)
Listen to music	70 (23.1)
Relaxation	51 (16.8)
Dreaming	37 (12.2)
Meditation	6 (2.0)
Peripheral	
Cold pack	104 (34.3)
Massage	25 (8.3)
Hot application	11 (3.6)
Behavioral	
Walk	99 (32.7)
Position	37 (12.2)
Exercise	2 (0.7)
Other (using a corset)	1 (0.3)
Frequency of nurse or doctor encouraging the use of non-pharmacological methods of pain	
None	439 (62.7)
Sometimes	211 (30.1)
Often	50 (7.1)

[a] Multiple responses are given. The percentage is taken over the number of patients using non-pharmacological methods in pain control.

Table 4
The relationship between pain characteristics and satisfaction in the first 24 h according to some characteristics of the patients.

Characteristics	Least pain (Median; $\bar{X} \pm SD$)	Worst pain (Median; $\bar{X} \pm SD$)	Percentage of time spent in severe pain (%) (Median; $\bar{X} \pm SD$)	Percentage of pain relief (%) (Median; $\bar{X} \pm SD$)	Degree of satisfaction with pain treatment (Median; $\bar{X} \pm SD$)
Gender					
Female	3.0; 3.8 ± 2.6	8.0; 7.3 ± 2.3	60.0; 56.9 ± 23.7	70.0; 63.8 ± 24.2	8.0; 7.6 ± 2.4
Male	3.0; 3.4 ± 2.5	7.0; 6.3 ± 2.8	50.0; 50.1 ± 26.3	70.0; 64.3 ± 25.1	8.0; 7.6 ± 2.5
Statistical analysis p[d]	0.127	0.000	0.000	0.656	0.684
Previous surgery experience					
Yes	3.0; 3.7 ± 2.6	7.5; 6.8 ± 2.8	50.0; 51.8 ± 26.2	70.0; 66.1 ± 25.4	8.0; 7.9 ± 2.3
No	3.0; 3.4 ± 2.6	7.0; 6.9 ± 2.6	60.0; 56.5 ± 23.3	60.0; 60.9 ± 23.0	8.0; 7.1 ± 2.5
Statistical analysis p	0.100	0.753	0.025	0.001	0.000
Previous experience of severe pain					
Yes	3.5; 3.9 ± 2.5	8.0; 7.3 ± 2.4	60.0; 56.2 ± 23.5	70.0; 63.8 ± 23.4	8.0; 7.6 ± 2.4
No	3.0; 3.2 ± 2.6	6.5; 6.2 ± 2.8	50.0; 50.2 ± 26.9	70.0; 64.3 ± 26.2	8.0; 7.6 ± 2.5
Statistical analysis p	0.000	0.000	0.002	0.594	0.748
Surgery performed					
Major surgery	4.0; 4.5 ± 2.6	8.0; 7.4 ± 2.5	60.0; 58.6 ± 23.6	60.0; 63.4 ± 22.2	8.0; 7.8 ± 2.3
Minor surgery	3.0; 3.1 ± 2.4	7.0; 6.5 ± 2.6	50.0; 50.7 ± 25.6	70.0; 64.4 ± 70.0	8.0; 7.4 ± 2.5
Statistical analysis p	0.000	0.000	0.000	0.291	0.082
Type of surgery					
Open	4.0; 3.9 ± 2.5	8.0; 7.2 ± 2.5	60.0; 55.7 ± 24.4	60.0; 62.9 ± 23.9	8.0; 7.5 ± 2.5
Closed	2.0; 2.9 ± 2.6	6.0; 6.0 ± 2.7	50.0; 49.2 ± 26.2	70.0; 66.5 ± 25.8	8.0; 7.6 ± 2.3
Statistical analysis p	0.000	0.000	0.002	0.018	0.967
Type of anesthesia					
General anesthesia[a]	3.0; 3.7 ± 2.5	6.9; 3.7 ± 2.5	60.0; 54.4 ± 24.8	70.0; 63.7 ± 24.2	8.0; 7.5 ± 2.4
Regional anesthesia[b]	1.5; 2.3 ± 2.6	6.0; 2.3 ± 3.0	50.0; 45.9 ± 30.2	80.0; 70.7 ± 28.9	9.0; 8.4 ± 2.4
Other (sedation)[c]	3.0; 3.6 ± 1.7	7.4; 3.6 ± 1.7	40.0; 40.0 ± 11.5	50.0; 45.7 ± 23.0	5.0; 6.0 ± 3.1
Statistical analysis p[±]*	0.001 a > b (p = .000)	0.166	0.024 b > c (p = .023)	0.009 b > c (p = .032); b > a (p = .002)	0.001
Preoperative analgesia application status					
Yes	3.0; 3.6 ± 2.3	8.0; 7.2 ± 2.6	50.0; 51.6 ± 25.7	70.0; 62.6 ± 25.5	8.0; 7.4 ± 2.5
No	3.0; 3.6 ± 2.6	7.0; 6.7 ± 2.6	60.0; 54.0 ± 25.0	70.0; 64.4 ± 25.4	8.0; 7.6 ± 2.4
Statistical analysis p	0.741	0.029	0.225	0.521	0.449
Postoperative analgesia application status					
Yes	3.0; 3.6 ± 2.5	8.0; 7.0 ± 2.5	60.0; 55.5 ± 24.2	70.0; 63.9 ± 24.0	8.0; 7.6 ± 2.4

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Table 4 (*continued*)

Characteristics	Least pain (Median; X̄ ± SD)	Worst pain (Median; X̄ ± SD)	Percentage of time spent in severe pain (%) (Median; X̄ ± SD)	Percentage of pain relief (%) (Median; X̄ ± SD)	Degree of satisfaction with pain treatment (Median; X̄ ± SD)
No	3.0; 3.3 ± 2.9	5.0; 5.2 ± 3.0	30.0; 38.5 ± 28.2	70.0; 65.2 ± 29.1	8.0; 7.4 ± 2.7
Statistical analysis p[*]	0.185	0.000	0.000	0.364	0.984
Presence of medical devices that cause pain					
Yes	4.0; 4.1 ± 2.5	8.0; 7.3 ± 2.5	60.0; 56.1 ± 24.4	70.0; 63.9 ± 23.4	8.0; 7.6 ± 2.5
No	3.0; 3.2 ± 2.6	7.0; 6.5 ± 2.7	50.0; 51.8 ± 25.6	70.0; 64.1 ± 25.5	8.0; 7.5 ± 2.4
Statistical analysis p[*]	0.000	0.000	0.030	0.624	0.351

[*] Man-Whitney *U* Test.
[±] Kruskal Wallis Test.
[d] p* = Significance value; p < 0.05

was a positive and significant correlation between the worst pain severity and the percentage of time with severe pain (r = 0.553/p = .000). In addition, there was a positive and significant correlation between the least pain severity and the percentage of time with severe pain (r = 0.311/p = .000), and the percentage of pain relief (r = 0.311/p = .000), where there was a negative and significant correlation between the least pain severity and the degree of satisfaction with pain management (r = −0.258/p = .000). There was a positive and significant correlation between the percentage of pain relief and degree of satisfaction with pain management (r = 0.495/p = .000).

There was a positive and highly significant correlation between pain interference, pain-affected moods/emotions, and severity of pain-related side effects of the patients and the least and the worst pain severity levels and the percentage of time with pain (p < .001). There was a negative and significant correlation between allowing patients' participation in pain treatment and the least pain severity level (p < .05) (Table 5).

The percentage of time with severe pain and pain interfering sleep latency, sleep maintenance, and activities inside and outside the bed were significantly higher in patients with postoperative severe pain level (p = .000). Also, pain affected mood and emotions (anxious, depressed, frightened, helpless) was significantly higher compared to the patients with moderate-to-mild pain (p < .05). Similarly, in patients with severe pain, pain associated with side effects (nausea, drowsiness, itching, and dizziness) was significantly higher compared to the patients with moderate-to-mild pain (p < .05). The percentage of pain relief within the first 24 h was significantly lower in the participants with severe pain levels (p = .000) (Table 6).

Although not specified in the table, the analysis showed that the median worst pain severity level in patients who received non-pharmacological pain treatment (8.0 [7.6 ± 2.2]) was higher than that in patients who did not receive the same (7.0 [6.3 ± 2.8]; p = .000) and the median time percentage with severe pain in patients who received non-pharmacological pain treatment (60.0 [60.1 ± 21.7]) (p = .000) was higher than that in patients who did not receive the same (50.0 [48.8 ± 26.6]; p = .000).

3.4. Predictors of surgical patients' pain management satisfaction and percentage of pain relief in the first 24 h

Table 7 shows the linear regression analysis (stepwise) of some characteristics of the patients, their satisfaction with pain management, and the factors affecting the percentage of pain relief in the first 24 h. Accordingly, previous surgery experience and frequency of nurse or

Table 5
Relationship between some pain-related patient outcomes and some pain characteristics.

Patient outcomes related to pain	Least pain severity r/p[a]	Worst pain severity r/p[a]	Percentage of time spent in severe pain (%) r/p[a]
Pain interference with…			
Turning, straightening, changing position in bed	0.305/ 0.000[b]	0.532/ 0.000	0.361/0.000
Walking out of bed, sitting in a chair, standing at the sink	0.231/ 0.000	0.495/ 0.000	0.339/0.000
Falling asleep	0.304/ 0.000	0.530/ 0.000	0.438/0.000
Resume sleep	0.357/ 0.000	0.497/ 0.000	0.435/0.000
Pain affected mood and emotions…			
Anxious	0.238/ 0.000	0.421/ 0.000	0.367/0.000
Depressed	0.269/ 0.000	0.334/ 0.000	0.272/0.000
Frightened	0.197/ 0.000	0.423/ 0.000	0.372/0.000
Helpless	0.212/ 0.000	0.388/ 0.000	0.351/0.000
Severity of pain related side effects'			
Nausea	0.046/ 0.221	0.312/ 0.000	0.194/0.000
Drowsiness	0.089/ 0.018	0.256/ 0.000	0.121/0.001
Itching	0.156/ 0.000	0.128/ 0.000	0.071/0.060
Dizziness	0.142/ 0.000	0.410/ 0.000	0.266/0.000
The degree to which the patient is allowed to participate in decisions about pain management to the extent they want.	−0.189/ 0.000	−0.006/ 0.872	0.058/0.127

[a] Spearman correlation test.
[b] p* = Significance value; p < 0.05

doctor encouraging the use of non-pharmacological methods of pain significantly predicted the level of satisfaction with pain management (p < .05). In the model related to the level of satisfaction with pain management, 0.43 % of the variance was explained by the independent variables. In this context, the satisfaction level of patients with previous surgical experience from pain management is 0.691 (B) times higher than those who have not had surgery before, and the satisfaction level of patients who are frequently encouraged to non-pharmacological analgesia methods is 1.417 (B) times higher than those who are not encouraged (Table 7).

In addition, previous surgery experience and type of surgery significantly predicted the percentage of pain relief in the first 24 h (p < .05), and 0.14 % of the variance was explained by the independent variables. In this sense, the percentage of pain relief in patients with no previous surgery experience is 5.526 (B) times less than those who have had previous surgery, and 4.103 (B) times higher in patients who underwent open surgery than those who underwent closed surgery (Table 7).

4. Discussion

Comprehensive pain assessment allows the involvement of the patient in the pain management team, while also providing the healthcare professionals with the opportunity to assess the effectiveness of the pain management in place. In this context, the assessment of patient outcomes for an effective pain assessment and management plays a "*key role*" in effective pain management (Erden et al., 2017b; Erden et al., 2017a; Kalkan & Guler, 2021).

In the present study, patients experienced severe pain (7.0 [6.83 ± 2.62]) during the first postoperative 24 h and reported severe

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Table 6
Distribution of some patient outcomes related to pain by worst experienced pain intensity levels.

Patient outcomes related to pain	The worst level of pain severity[a]				*Statistical analysis (p)*[b]
	No pain (0) (Median/ X̄ ± SD)	Mild pain (1–3) (Median/ X̄ ± SD)	Moderate pain (4–6) (Median/ X̄ ± SD)	Severe pain (7–10) (Median/ X̄ ± SD)	
Percentage of time spent in severe pain (%)	0.0/ 4.2 ± 13.3	20.0/ 25.0 ± 17.7	50.0/ 46.0 ± 23.0	60.0/ 64.2 ± 18.8	0.000[c]
Pain interference with…					
Turning, straightening, changing position in bed	0.0/ 1.0 ± 2.4	2.0/ 2.3 ± 2.1	4.0/ 4.2 ± 2.9	7.0/ 6.5 ± 2.7	0.000
Walking out of bed, sitting in a chair, standing at the sink	0.0/ 0.8 ± 2.2	1.0/ 2.1 ± 2.4	4.0/ 4.1 ± 2.9	7.0/ 6.3 ± 3.1	0.000
Falling asleep	0.0/ 0.1 ± 0.4	1.0/ 1.6 ± 2.1	2.0/ 2.5 ± 2.4	6.0/ 5.4 ± 3.0	0.000
Resume sleep	0.0/ 0.2 ± 0.5	1.0/ 1.6 ± 2.1	2.0/ 2.4 ± 2.4	5.0/ 5.0 ± 3.1	0.000
Pain affected mood and emotions…					
Anxious	0.0/ 1.3 ± 3.1	0.0/ 1.4 ± 2.3	3.0/ 3.3 ± 2.8	6.0/ 5.5 ± 3.5	0.000
Depressed	0.0/ 0.9 ± 2.6	0.0/ 1.0 ± 1.9	0.5/ 2.0 ± 2.6	3.0/ 3.9 ± 3.5	0.000
Frightened	0.0/ 1.4 ± 3.3	0.0/ 1.4 ± 2.3	3.0/ 3.0 ± 2.9	6.0/ 5.4 ± 3.6	0.000
Helpless	0.0/ 1.1 ± 2.9	0.0/ 1.1 ± 2.1	0.0/ 1.8 ± 2.4	4.0/ 4.4 ± 3.6	0.000
Severity of pain related side effects					
Nausea	0.0/ 1.8 ± 3.3	0.0/ 0.8 ± 2.0	0.0/ 1.6 ± 2.5	3.0/ 3.5 ± 3.4	0.000
Drowsiness	0.0/ 0.5 ± 1.8	0.0/ 1.0 ± 1.8	0.0/ 1.7 ± 2.4	2.0/ 3.1 ± 3.2	0.000
Itching	0.0/ 0.6 ± 2.2	0.0/ 0.4 ± 1.2	0.0/ 0.7 ± 1.4	0.0/ 1.2 ± 2.1	0.001
Dizziness	0.0/ 0.2 ± 1.0	0.0/ 0.6 ± 1.3	0.0/ 1.5 ± 2.2	3.0/ 3.5 ± 3.0	0.000
Percentage of pain relief in the first 24 h (%)	100.0/ 74.2 ± 41.9	80.0/ 70.3 ± 26.2	70.0/ 64.3 ± 28.2	60.0/ 62.4 ± 20.8	0.000
The degree to which the patient is allowed to participate in decisions about pain management to the extent they want.	7.6/ 5.5 ± 4.5	5.0/ 4.8 ± 3.9	6.0/ 5.9 ± 3.2	7.0/ 6.0 ± 3.0	0.308
Degree of satisfaction with pain treatment	10.0/ 7.6 ± 3.9	8.0/ 7.6 ± 2.6	8.0/ 7.6 ± 2.5	8.0/ 7.5 ± 2.3	0.168

[a] The worst level of pain severity: No pain (0), mild pain (1–3), moderate pain (4–6), and severe pain (7–10).
[b] Kruskal Wallis Test.
[c] p* = Significance value; p < 0.05

pain for 60.0 % (~14.4 h) of the first postoperative day. Relevant studies have reported that postoperative pain frequently reaches to its highest level within the first two postoperative days (Ustunel & Erden, 2022). Therefore, pain should be controlled so as to facilitate respiratory cough exercises and mobilization especially during the early postoperative period, when respiratory and circulatory problems may occur. It was reported in the literature that patients were physically and psychologically affected by pain (Lorentzen et al., 2012; Yıldırım et al., 2015), avoided mobilization out of fear of pain (Cremeans-Smith, 2018; Kehlet, 2018; Lorentzen et al., 2012), thromboembolism and pulmonary complications occurred due to inactivity, and that breathing, coughing, mobility, and sleep were restricted owing to postoperative pain (Ayhan & Kurşun, 2017; Kehlet, 2018; Lorentzen et al., 2012). Indeed, the results of the present study are suggestive of the fact that acute surgical pain inhibits patients' activities inside and outside the bed.

Uncontrolled pain may increase the severity of pain by inducing postoperative physiological side effects in addition to physiopathological responses, including insomnia, anxiety, and fear, which lead to experiencing greater pain (Acar et al., 2016; Kalkan & Guler, 2021; Üstünel & Erden, 2022). Lorentzen et al. (2012), in their prospective cohort study of 424 surgical patients, reported that general activity, mood, walking ability, sleep, relationships with others, and coughing and deep breathing functions of the patients with severe pain were more affected than those of patients with moderate pain. Tano et al. (2021), in their study examining the factors affecting the satisfaction of postoperative pain management, determined that postoperative pain interferes the activities of patients in bed, deep breathing and coughing, and sleeping. Consistently, in the present study, patients' emotions were adversely affected during the first postoperative 24 h due to acute pain and the patients reported certain symptoms, including anxiety and fear. During the preoperative period in particular, the nurse in charge of the psychological preparation of the patient should explain the causes of pain (surgical incision, painful medical interventions) and explain to the patient that pain may occur due to certain activities, including movement, breathing/coughing exercises etc., which would relieve upon elimination of the causative factor or during the wound healing process and should reassure the patient.

Opioid and non-opioid drugs are used to treat acute surgical pain during the early postoperative period (Acar et al., 2016; Erden et al., 2017a; Lorentzen et al., 2012). In the present study, the majority (> 91 %) of preoperative and postoperative analgesia included non-steroidal anti-inflammatory drugs, while opioids were mostly preferred during the intraoperative period (89.3 %) and used at a low rate (23.2 %) during the first postoperative 24 h. These data indicate that opioids are more readily administered during the operation owing to easier provision of airway management and hemodynamic stability due to the fact that patient is connected to the monitor and respirator, suggesting that healthcare professionals may not be comfortable administering opioids. Consistent with the results of the present study, it was reported in the relevant literature that the healthcare teams preferred limited use of opioids and feared of the development of addiction in patients (Erden et al., 2017a; Meissner & Zaslansky, 2019; Tura & Erden, 2021). The high rate of minor surgery (62.4 %), the widespread use of general anesthesia (92.4 %), use of analgesia and especially the greater use of opioids (89.3 %) during the intraoperative period in the patients included in the study sample may also account for the abovementioned results. Although the healthcare professionals continue using opioids as the "gold standard" of postoperative pain management (Gan, 2017), it is suggested that they adopted a cautious approach considering the risk of respiratory depression during the early postoperative hours and development of opioid addiction in the patients.

It is noteworthy that the rate of postoperative analgesia treatment was lower than expected (100 %) in the study. In the guidelines on pain management, it is stated that analgesia is the basic patient's right and

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Table 7
Predictors of surgical patients' pain management satisfaction and percentage of pain relief in the first 24 h.

Predictors[a]	*Coefficients*								*95.0 % CI*	
	Unstandardized coefficients		Standardized coefficients							
	B	SE	β	r	t	p	R^2	Adj R^2	Lower limit	Upper limit
Pain management satisfaction[b]										
(Constant)	8.476	0.280			30.226	0.000	0.047	0.043	7.925	9.026
Previous surgery experience (1: Yes 2: No)	−0.691	0.184	−0.139	−0.141	−3.757	0.000			−1.052	−0.330
Frequency of nurse or doctor encouraging the use of non-pharmacological methods of pain										
(1: None 2: Sometimes)	−0.163	0.199	−0.130	−0.031	−0.817	0.414			−0.554	0.228
(1: None 3: Often)	1.417	0.355	0.151	0.150	3.991	0.000			0.720	2.113
Percentage of pain relief[b]										
(Constant)	66.337	3.694			17.960	0.000	0.017	0.014	59.085	73.589
Previous surgery experience (1: Yes 2: No)	−5.526	1.892	−0.110	−0.110	−2.921	0.004			−9.241	−1.811
Type of surgery (1: Open 2: Closed)	4.103	1.992	0.078	0.078	2.060	0.040			0.192	8.013

R^2: Explained variance Adj R^2: Adjusted R^2 *$p < .05$.
[a] Regression analysis (stepwise).
[b] Dependent variable B: regression coefficient SE: Standard error β: Estimated risk ratio.

should be applied by taking into account the developments (Reisli et al., 2021; Turkish Anesthesiology and Reanimation Association, 2020). However, it is reported in the literature that there are still deficiencies in postoperative pain management (Reisli et al., 2021), analgesia treatment is applied at irregular intervals or not applied to all patients (Erden et al., 2017a), and healthcare personnel do not apply analgesics unless the patient requests it (Erden et al., 2017a; Shoqirat et al., 2019). Among the reasons for these findings in the studies; Health personnel may think that analgesia is given to the patient in the intraoperative period or that the surgery is too minor to cause severe pain, or it may be opiophobia in healthcare personnel. Pain management practices should be evaluated holistically and periodically for effective pain management using multimodal analgesia.

Postoperative multimodal analgesia approach includes the combined use of different techniques, central/peripheral nerve blocks and pharmacological agents targeting different receptors and pain transmission pathways to provide analgesic effect. In addition to this, non-pharmacological methods are often preferred in postoperative pain management (Bayoumi et al., 2021; Reisli et al., 2021; Tura & Erden, 2021; Tura & Erden, 2022; Yüksel, 2021). In addition, relevant studies suggested that nurses in surgical clinics preferred using pharmacological methods as a priority for the purposes of pain control (Midilli et al., 2019; Özveren et al., 2018) and resorted to non-pharmacological analgesia methods at different rates (0 %–95 %) (Erden et al., 2017a), and that most commonly used approaches were the proper positioning, distracting, touching, cold/hot procedures, patient information about pain, encouraging the patient toward expressing his/her feelings about pain, relaxation exercises, etc. (Erden et al., 2017a; Midilli et al., 2019). It was found in the present study that only 43.3 % of the patients received postoperative non-pharmacological pain treatment, and the most common methods were prayers (41.9 %) and distraction (36.3 %). These are self-help cognitive-behavioral techniques, easy to practice in the hospital and at home after discharge and are inexpensive (Bayoumi et al., 2021). Healthcare professionals' preference of the cognitive-behavioral methods in pain management indicates that they leave the non-pharmacological pain control practices to the patient. As a matter of fact, this is consistent with the results of the present study that the majority of healthcare professionals (62.7 %) failed to encourage patients to use non-pharmacological pain treatment methods and that the worst pain severity (8.0 [7.5 ± 2.2]) and the percentage of time with severe pain (60.0 [60.1 ± 21.7]) were higher in patients that used the abovementioned methods. According to our observations and some of the results of the present study suggest that the medical team believes that pharmacological pain treatment is more effective and that analgesics render provide faster results.

Active involvement of the patients in pain management process is important to ensure an effective pain management (Erden et al., 2018; Erden et al., 2017a). Ingadóttir & Zoëga (2017) suggested in their study that healthcare professionals should provide patients with training on pain assessment, treatment, and management during the preoperative and postoperative period, and that it was vital that patients understand why pain management is necessary for their recovery and comfort, and how they could assume an active role in pain management. Studies also indicated that the patient's active involvement in decision-making process for pain management positively affected pain-related patient outcomes, and that the time spent with severe postoperative pain and functional insufficiency was shorter than those who did not receive training (Ingadóttir & Zoëga, 2017; Meissner et al., 2017; Zoëga et al., 2015).

However, relevant studies also suggested that the medical teams did not adequately inform the patients about the treatment and management of pain (Aslan et al., 2018; Katz et al., 2022; Meissner & Zaslansky, 2019). Consistent with the results reported in the relevant literature, approximately one-third (38.3 %) of the patients were informed about pain treatment and the degree of having been benefited from this information was high (8.0;7.24 ± 2.26) in the present study. This result in our study shows the efforts of the healthcare team to involve the patient in pain management. Informing the patient in pain management supports the autonomy of the patients.

The health team's "efforts" also reflect positively on and increased the satisfaction of patients with pain treatment. In their respective studies, Gan et al. (2014) and Lorentzen et al. (2012) reported that patients reported high satisfaction with postoperative pain management (88.4 % and 90 %, respectively). Furthermore, although the patients reported higher pain severity levels and that the pain could not have been controlled, there was high satisfaction with pain management (Gan et al., 2014; Lorentzen et al., 2012), and that the higher satisfaction rates were associated with the fact that patients expected postoperative pain and the levels of satisfaction were rather dependent upon such factors as the interest of hospital staff, cleanliness of the hospital, and food quality rather than physical complications related to surgical intervention (Gan et al., 2014). Similarly, in our study, it was determined that

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the satisfaction rate from pain management was high, the healthcare team's encouragement of patients to non-pharmacological analgesia applications, and the previous experience of the patients had a positive effect on analgesia satisfaction. Encouragement of patients is an approach that shows the importance of patient's individuality and conveys the message that "your participation in pain relief is invaluable". The fact that 70.0 % of the pain experienced by patients in the first 24 h was relieved, that patients were allowed to participate in the decisions regarding pain treatment (7.0 [5.83 ± 3.24]) to the extent they wanted to, and that pain considered "normal/natural" during the postoperative period might have a positive effect on the above result of the present study.

In the study, it was determined that the percentage of postoperative pain relief was lower in patients who had no previous surgical experience, and higher in those who had open surgery. This finding in the study is similar to the decrease in the worst pain intensity experienced by the patients on the first postoperative day, and the increase in the percentage of pain relief and satisfaction with analgesia. In this context, surgical nurses should evaluate the previous pain experiences of the patients in the preoperative period and plan the pain management process according to the patient and the surgery performed.

4.1. Limitations

The limitations of the study included that the study was conducted as a single-center study and that the study included the outcomes of the patients, who underwent surgical intervention at the time of the study, related to pain management applied in the early postoperative period. Furthermore, the study's limitations include the heterogeneity of the study group and the inclusion of various types of surgery.

5. Conclusions

Surgical patients experience the mild pain at best and severe pain at worst on the first postoperative day and there is pain during 60.0 % of the first day. Acute surgical pain restricts the activities of patients inside and outside the bed, causes anxiety and fear, and is associated with dizziness, nausea, and lethargy, among others. Patients' none previous surgery experience and frequently encouraging the use of non-pharmacological methods of pain contributes increasing the pain management satisfaction degree. Having previous surgery experience and open surgery increases the percentage of pain relief in the first 24 h. Furthermore, approximately one-third of the patients included in the present study received information about pain treatment and benefited from the information they received. Although multimodal analgesia was applied in pain management, opioid drugs were used at a low rate (23.2 %) and that 70.0 % of the postoperative pain was relieved, and the satisfaction rate was relatively high. The majority (62.7 %) of the healthcare professionals failed to encourage patients to use non-pharmacological pain treatment methods and the patients did not use the same adequately. Acute postoperative pain may negatively affect the patient outcomes and delay postoperative recovery during the early period, which may include hemodynamic instability. Therefore, the severity and duration of pain in the patients should be minimized in the early period to avert physical and psychological side effects. Patients should be educated about pain assessment and management from the preoperative period.

CRediT authorship contribution statement

The authors confirm contribution to the paper as follows:
Study conception and design: S. Erden, S. Güler.
Data collection: S. Erden, S. Güler.
Analysis and interpretation of results: İ. Tura, İ.F. Başibüyük.
Draft manuscript preparation: U.E Arslan, S. Erden, S. Güler.

All authors reviewed the results and approved the final version of the manuscript.

Declaration of competing interest

The authors hereby declare no conflict of interest related to the research. The study was not sponsored by any source of funding.

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Ethics approval

Relevant written approval of the University's Ethics Committee for Non-Interventional Clinical Research (Date/No:13.04.2018/89) and the Hospital Chief Medical Officer (Date/No: 02.04.2018/E.49138) were obtained for conducting the study. All the participating patients were informed about the study and their respective verbal and written consent was obtained. The study was conducted in accordance with the principles of the Declaration of Helsinki.

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