JBACHS
Journal of Basic and Clinical Health Sciences

J Basic Clin Health Sci 2025; 9: 278-291
https://doi.org/10.30621/jbachs.1472302
RESEARCH ARTICLE

EVALUATION OF PRE-OPERATIVE AND POST-OPERATIVE PRACTICES OF PATIENTS UNDERGOING ABDOMINAL SURGERY ACCORDING TO ERAS PROTOCOL

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Received: 01.05.2024; **Accepted:** 11.05.2025; **Available Online Date:** 31.05.2025

Cite this article as: Görücü R, Özbas A, Gürler S, Taşçıoğlu R, Özgen S. Evaluation of Pre-Operative and Post-Operative Practices of Patients Undergoing Abdominal Surgery According to ERAS Protocol. J Basic Clin Health Sci 2025; 9: 278-291.

ABSTRACT

Purpose: This study was conducted to evaluate the pre-operative and post-operative practices of patients undergoing abdominal surgery, according to the Enhanced Recovery After Surgery protocol.
Material and Methods: The study was conducted in May-June 2022 as descriptive - cross-sectional. Patients who underwent abdominal surgery in the general surgery clinics of a university hospital in Istanbul constituted the population of the study. No sample was selected and 102 volunteer patients who met the inclusion criteria were included in the study.
Results: In the study, it was observed that although most of the pre-operative and post-operative practices of patients undergoing abdominal surgery had high compliance with ERAS protocols, practices such as pre-operative fasting time (10 hours and above in 96.1% of patients) and post-operative first oral intake time (10 hours or more in 97.1% of patients) were low, and patients undergoing open surgery were discharged in an average of 6 days, while patients undergoing minimally invasive surgery (laparoscopic) were discharged in an average of 3 days.
Conclusion: According to the results of the study, it was seen that compliance with all elements of ERAS protocols in clinics is still low. Regular auditing of compliance with the protocol and reporting of results in clinics is very important and it is recommended to support this research with larger-scale and multicenter studies.

Keywords: Surgery, surgical procedures, enhanced recovery after surgery, surgical nursing

INTRODUCTION

The Enhanced Recovery After Surgery Protocol (ERAS) is a concept pioneered by Danish Dr. Kehlet in the 1990s. This protocol, which proposes changes to the entire course of a patient from pre-operative to post-discharge, is used because of its benefits such as accelerating the time of oral food intake, providing early mobilization, reducing the length of hospital stay

and possible complications, and ensuring rapid return to activities of daily living after discharge (1,2). ERAS protocols, which provide many benefits for the patient, health care professionals and the medical institution, are an effective method to standardize and improve the quality of patient care and improve patient outcomes (3).

Adherence to the elements of ERAS protocols is important to ensure that all processes of a patient undergoing a surgical procedure, from hospitalization to home care, are successful and effective in patient care. Success in implementing ERAS protocols requires the involvement and effort of all members of a multidisciplinary team, including patients and their families. In addition, the entire team should take responsibility for designing and adhering to standard care pathways, providing regular supervision and monitoring results (4). Nurses, as an important part of the multidisciplinary team, are at the forefront of daily patient care and therefore have a major influence on ensuring compliance with the elements of the ERAS (5). In a study examining the role of the nurse in the successful implementation of ERAS protocols in patients undergoing abdominal surgery, it is stated that the role of the nurse is essential for patient education and successful use of ERAS (6). Therefore, trained professional nurses should continue to be assessors, implementers, observers and coordinators in all phases of ERAS protocols (7). However, there are gaps in the understanding and implementation of ERAS protocols by nurses and other health care professionals.

There are significant difficulties in the acceptance and implementation processes of ERAS (Enhanced Recovery After Surgery) protocols due to reasons such as the widespread preference of traditional practices in clinics, insufficient adoption of practices based on scientific evidence, and prioritization of personal experiences (8). In addition, the fact that healthcare professionals do not follow scientific updates closely and are resistant to changing their current practice habits also contribute to these difficulties. Although there are studies in the literature that comprehensively address the benefits of ERAS protocols, the extent to which these protocols are implemented in clinics, the factors that prevent implementation, and the effects of these factors on patients have not been sufficiently investigated (9). The lack of evidence regarding the applicability of ERAS protocols, especially in elective surgeries, creates a gap in the management of the surgical process. Therefore, our study aimed to evaluate the compliance of the pre- and postoperative practices of patients undergoing elective abdominal surgery with the ERAS protocol and to determine the obstacles encountered in this process. The study aims to fill these gaps in the literature regarding the integration of ERAS protocols into clinical practice. Based on this, our study aimed to evaluate the preoperative and postoperative practices of patients undergoing elective abdominal surgery according to the ERAS protocol.

MATERIAL AND METHODS

Study Design

This research is a descriptive, cross-sectional study.

Setting and Time of the Study

The study was conducted in the general surgery clinics of a university hospital in Istanbul between May 2022 and June 2022.

Population and Sample of the Study

Patients underwent abdominal surgery in the general surgery clinics of a university hospital in Istanbul between May 2022 and June 2022 were the population of the study. No sample selection was made and all patients who underwent abdominal surgery between May and June 2022 and met the inclusion criteria were included in the study. A total of 115 patients underwent abdominal surgery within two months and 3 of these patients were transferred to post-operative intensive care unit and 10 patients reject to be a volunteer to participate in the study. Therefore, a total of 102 patients constituted the study sample. According to the known universe sample calculation (Cochran formula), the sufficient sample size with a 95% confidence interval is 89 patients. Since 102 patients participated in this study, it has already exceeded the sufficient sample size of 89 with a 95% confidence interval. Therefore, the current sample size is sufficient for reliable results.

Criteria of Inclusion in the Study

- History of elective abdominal surgery
- Age above 18
- No severe vision and hearing problems
- Volunteering to participate in the study

Criteria of Exclusion from the Study

- Transfer from the operating room to the intensive care unit
- Communication problem

Table 1. Descriptive characteristics of the patients (N=102)

Characteristic		**Mean ± SD**	**Min-Max. (Median)**
Operation time		**3.68±2.18**	**1-10 (4)**
		n	**%**
Age	18-25	6	5.9
	26-35	4	3.9
	36-45	16	15.7
	45-55	17	16.7
	55-65	32	31.4
	Above 65 years	27	26.5
Gender	Male	53	52.0
	Female	49	48.0
Education status	Primary school	51	50.0
	Secondary School	12	11.8
	High School	21	20.6
	Two-year degree	2	2.0
	Bachelor's degree.	12	11.8
	Postgraduate	4	3.9
Presence of chronic disease	Yes	49	48.0
	No	53	52.0
Smoking status	Yes	31	30.4
	No	71	69.6
Previous hospitalization	Yes	71	69.6
	No	31	30.4
Previous operation	Yes	62	60.8
	No	40	39.2
Type of anesthesia	Epidural	1	1.0
	General	92	90.2
	Spinal	9	8.8
Type of operation	Open	76	74.5
	Minimally invasive surgery (laparoscopic)	26	25.5
Total		**102**	**100**

SD: Standard deviation

Data Collection Tools

Data were collected using the 11-question personal information form prepared by the researchers in line with the literature (8,10,11) and the questionnaire form containing information about the pre-operative ERAS practices with 11 questions and the information about the post-operative ERAS practices with 11 questions.

Collection of Data

Routine clinical pre-operative and post-operative practices of each patient who was planned for abdominal surgery and accepted to participate in the study were evaluated according to the form prepared by the researchers. Patients were followed up from admission to the clinic until discharge. The study

Table 2. Pre-operative practices (N=102)

Characteristic		**n**	**%**
Pre-operative information about the operation process	Yes	97	95.1
	No	5	4.9
Improving the pre-operative physical, emotional and nutritional status, informing and practicing about optimizing nutrition	Yes	80	78.4
	No	22	21.6
Pre-operative cessation of bad habits such as smoking and alcohol	2 weeks	16	15.7
	4 weeks	8	7.8
	6 weeks	3	2.9
	8 weeks	4	3.9
	No habit	71	69.6
Enema the night before surgery	Yes	44	43.1
	No	58	56.9
Duration of solid food withdrawal the night before surgery	10 hours and above	98	96.1
	8 hours	4	3.9
Duration of liquid food withdrawal the night before surgery	4 hours	1	1.0
	6 hours	1	1.0
	8 hours and above	100	98.0
Wearing compression stockings before surgery	Yes	99	97.1
	No	3	2.9
Low Molecular Weight Heparin (LMWH) status in pre-operative treatment	Yes	16	15.7
	No	86	84.3
Fluid supplementation status in pre-operative treatment	Yes	54	52.9
	No	48	47.1
Antibiotic status before going to surgery	Yes	33	32.4
	No	69	67.6
Pre-operative pre-medication status	Yes	24	23.5
	No	78	76.5
Total		**102**	**100**

questionnaire, nurse observation form and patient files were used for data collection and verbal statements of the patients were utilized. The questionnaire form including information about ERAS applications was filled out before discharge by interviewing the patients face-to-face for 10 minutes.

Statistical Analysis of the Data

The data obtained in the study were analyzed in SPSS 25 for Windows (SPSS, Chicago, United States). In descriptive statistics, variables were expressed as number and percentage (%), and continuous variables determined by measurement were expressed as mean, ± standard deviation and minimum-maximum.

Ethical Dimension of the Study

Ethical approval was received from the Istanbul Unıversity Cerrahpaşa Social Sciences and Humanities Research Ethical Committee (Date:

Table 3. Post-operative practices (N=102)

Characteristic		**n**	**%**
The use of analgesic in post-operative treatment	Yes	101	99.0
	No	1	1.0
Time of post-operative removal of the urine catheter	2 to 6 hours	3	2.9
	7 to 12 hours	-	-
	13 to 24 hours	6	5.9
	25 to 48 hours	10	9.8
	Above 48 hours	56	54.9
	Not catheterized	27	26.5
Time of post-operative removal of the drain	2 to 6 hours	-	-
	7 to 12 hours	-	-
	13 to 24 hours	-	-
	25 to 48 hours	10	9.8
	Above 48 hours	80	78.4
	Not catheterized	12	11.8
Post-operative transition time to liquid food	4 hours	1	1.0
	6 hours	4	3.9
	8 hours	19	18.6
	10 hours and above	78	76.5
Post-operative transition time to solid food	4 hours	-	-
	6 hours	-	-
	8 hours	3	2.9
	10 hours and above	99	97.1
Post-operative blood glucose monitoring status	Yes	41	40.2
	No	61	59.8
Time to first post-operative standing up	2 to 4 hours	1	1.0
	5 to 6 hours	16	15.7
	7 to 8 hours	22	21.6
	8 hours and above	63	61.8
Total		**102**	**100**

10.05.2022, Decision No: 2022/156) and institutional approval (06.05.2022-375455) were obtained. Before starting the study, patients were asked about their willingness to participate in the study and informed consent was obtained from those who agreed. The articles of the Declaration of Helsinki were followed at all stages of the study.

Table 4. Information status on discharge (N=102)

Characteristic		**n**	**%**
Status of pre-discharge written and oral training on discharge	Yes	101	99.0
	No	1	1.0
Time to be called for a follow-up appointment after discharge	7 days	67	65.7
	10 days	34	33.3
	15 days	1	1.0
Total		**102**	**100**
Discharge period (day)		**Mean ± SD**	**Min-Max. (Median)**
Open surgery patients (n: 76)		6.15 ± 4.51	1-10 (4)
Minimally invasive surgery (laparoscopic) (n: 26)		3.68±2.18	1-10 (4)

SD: Standard deviation

RESULTS

The patients who participated in the study were mostly in the 55-65 age group (31.4%). Of the patients, 52% (n: 53) were male and 50% were primary school graduates. 48% (n: 49) of the patients had chronic diseases and 30.4% (n: 31) were smokers. Of the patients, 69.6% (n: 71) had a history of hospitalization and 60.8% (n: 62) had a history of surgery. Of the patients, the most common last abdominal surgery procedure was calculous gallbladder (21.6% n: 22) and the most common reasons for hospitalization were colon surgery (15.7% n: 16) and gastric surgery (12.7% n: 13). Average operation time was 3.68±2.18 hours. It was observed that 90.2% (n: 92) of the patients underwent general anesthesia, 74.5% (n: 76) underwent open surgery, and 25.5% (n: 26) underwent laparoscopic surgery (Table 1).

It was found that 95.1% of the patients were informed about the operation process before surgery. Of the patients, 78.4% (n: 80) answered that prehabilitation was performed before surgery while 21.6% (n: 22) answered that it was not. Within the scope of prehabilitation, when patients with bad habits such as smoking and alcohol were asked how long ago they quit smoking and alcohol, 15.7% (n:16) of the patients said they quit two weeks before surgery, 7.8% (n:8) four weeks before surgery and 2.9% (n:3) six weeks before surgery. While 56.9% (n: 58) of the patients did not perform pre-operative mechanical bowel preparation, 43.1% (n: 44) did. When the patients were asked about the time of stopping solid food before surgery, 96.1% (n: 98) said that they stopped solid food 10 hours or more pre-operatively, 3.9% (n: 4) stopped before 8 hours pre-operatively, and 98% (n: 100) stopped liquid food before 8 hours. When asked, “Did you wear compression stockings before surgery?” 97.1% (n: 99) of the patients stated that they did. To answer the last four items in Table 2, the patient's file was reviewed and it was found that 15.7% (n:16) were started on Low Molecular Weight Heparin (LMWH) in preoperative treatment, 52.9% were given fluid supplementation, 32.4% (n: 33% (n: 33) received preoperative antibiotics and 67.6% (n: 69) did not receive antibiotics, 23.5% (n: 24) received preoperative pre-medication and 76.5% (n: 78) did not receive pre-medication (Table 2).

According to the patient files, 99% (n: 101) of the patients received postoperative analgesics, of which 74.8% were non-opioid analgesics and 25.2% were non-steroidal anti-inflammatory drugs (NSAIDs). When patients with urinary catheters were asked when the urinary catheter was removed post-operatively, the rate of removal was 2.9% (n: 3) in the first 6 hours, 5.9% (n: 6) in 7 to 24 hours, 9.8% (n: 10) in 25 to 48 hours and 54.9% (n: 56) after 48 hours. The post-operative drain removal rate was 9.8% (n: 10) in the first 48 hours and 78.4% (n: 80) after 48 hours. When the patients were asked about the post-operative transition time to liquid food, 76.5% (n: 78) answered 10 hours or later, 18.6% (n: 19) after 8 hours, and 3.9% (n: 4) after 6 hours, while the transition time to solid food was answered as 10 hours or later in 97.1% (n: 99) and after 8 hours in 2.9% (n: 3). When the patient files were examined to determine the status of post-operative blood glucose monitoring, it was seen that 40.2% (n: 41) of the patients who participated in the study had blood

glucose monitoring and 59.8% (n: 61) did not. When patients were asked when they were first mobilized post-operatively, 61.8% (n: 63) answered after 8 hours, 21.6% (n: 22) after 7-8 hours and 15.7% (n: 16) after 5-6 hours (Table 3).

When asked, “Were you given a written and oral training for discharge?”, 99% (n: 101) of the patients answered yes. 65.7% (n: 67) and 33.3% (n: 34) of the patients stated that they were called for a follow-up appointment after 7 days and 10 days, respectively. Of the patients, 102 who underwent abdominal surgery and participated in the study, 76 patients who underwent open surgery were discharged in an average of 6 days and 26 patients who underwent minimally invasive surgery (laparoscopic) were discharged in an average of 3 days (Table 4).

DISCUSSION

Although ERAS protocols provide many positive outcomes for the patient and the hospital, such as early recovery, early discharge, minimal complications and hospital costs, compliance with these protocols and their use in clinical practice is very low and progresses slowly (8,12,13).

In ERAS protocols, informing the patient before surgical intervention is the first important step and pre-operative education is recommended (14). This is because patients experience anxiety due to pre-operative uncertainty, pain and fear of death. Informing them about the surgery process and the post-operative period verbally and written and through tools such as brochures or videos and providing psychological support will reduce their anxiety (14–16). Studies on this matter have shown that most or all patients are informed about the surgical process (10,11,17,18). According to the findings of the study, it was understood that most of the patients were informed pre-operatively and the results obtained were similar to the ERAS protocol. This result showed that surgical clinic nurses mostly included pre-operative patient information in their practices because they were aware of the importance of education. However, it should be noted that this education is not exclusively performed by nurses; it is a multidisciplinary effort involving surgeons, anesthetists, and other healthcare professionals. The process of informing the patient begins with the decision for surgery and continues through pre-operative preparation and post-operative care. This multidisciplinary approach ensures that all aspects of the patient's journey are covered comprehensively. When evaluated in terms of ERAS protocols, it can be said that the pre-operative education observed in this study partially meets the expected standards, as it was provided to most patients. However, further investigation is needed to determine whether the education is comprehensive, timely, and effective in reducing pre-operative anxiety and improving post-operative outcomes.

According to the ERAS protocol, pre-habilitation and optimization of the general condition of all patients undergoing surgery is recommended. This includes cardiorespiratory assessment, smoking and alcohol cessation, nutritional optimization, anemia treatment, and cognitive evaluation to prevent delirium (14). In this study, the application of ERAS protocols was evaluated based on patients' perspectives. Most patients reported receiving information about improving their preoperative physical, emotional, and nutritional status and stated that they were guided on practices such as smoking cessation, nutritional supplementation, and blood glucose monitoring. However, while patients acknowledged being informed, they also indicated that follow-up on the implementation of these recommendations was limited. Furthermore, when asked about other critical pre-habilitation components, such as nutritional assessment, anemia treatment, and cognitive evaluation, some patients stated that they were not aware of whether these evaluations had been conducted. This suggests a possible gap in the comprehensive implementation of ERAS protocols. The lack of clarity in patient responses regarding these aspects may reflect the absence of standardized tools or procedures for assessing and communicating these elements during preoperative preparation. From the patients' perspective, the preoperative education and guidance they received were perceived as beneficial but lacked systematic follow-up and comprehensive evaluation, which are essential to fully meet ERAS protocol standards. According to the ERAS protocol, smoking and alcohol cessation four weeks or more preoperatively is recommended (19). In this study, the rate of smokers was lower than that of non-smokers. It was observed that most of the smokers quit smoking two weeks before surgery, while the number of smokers who quit four or eight weeks before surgery was low, thus not complying with ERAS protocols. This suggested that patients were informed about smoking cessation by nurses and other health care professionals in the clinic, but there was no follow-up and control of the

implementation and duration of cessation. The clinic has a smoking cessation protocol as part of its preoperative preparation, and patients are routinely informed by nurses and other healthcare professionals about the importance of quitting smoking before surgery. However, while many patients successfully quit smoking at least two weeks prior to surgery, follow-up and control of the implementation and duration of cessation remain limited. This highlights the need for a more structured follow-up process to ensure compliance with ERAS protocols and improve long-term cessation rates. Health care professionals, especially nurses, are largely responsible for following up and guiding patients in this regard.

According to the ERAS protocol, mechanical bowel cleansing should not be routinely performed even when bowel resection is planned (20). In this study, more than half of the patients did not undergo pre-operative bowel preparation in accordance with the protocols. In the clinic where the study was conducted, it was seen that routine bowel cleansing is not practiced before each surgery, and evidence-based practices have started to be adopted instead of traditional practices. Similarly, a study conducted in Turkey showed a gradual shift towards evidence-based practices in bowel preparation with increasing awareness of ERAS protocols among healthcare professionals (21). However, there are still some centers where traditional practices persist, highlighting the need for further education and standardization in preoperative care across the country.

The ERAS protocol recommends that clear liquids such as water, tea, coffee without milk or fruit juice without pulp can be consumed up to two hours pre-operatively and solid food (light meal) up to six hours pre-operatively. In addition, for metabolic satiety, patients should be given 800 ml of carbohydrate-rich liquid food until midnight before surgery and 400 ml until 2-3 hours before surgery (20). Studies on this matter have shown that most or all patients are starved after midnight before surgery (10,11,17,18). In this study, patients similarly reported fasting after midnight, with the average cessation duration for both solid and liquid food exceeding 10 hours. Many patients also stated that they stopped consuming solids and liquids simultaneously, which deviates from the ERAS protocol. This finding reflects the ongoing challenges in changing traditional practices in surgical care. Studies suggest several reasons for this resistance to adopting ERAS recommendations. Özkeçeci and Yavan (2020) found that healthcare professionals often fear aspiration or other intraoperative complications, leading them to favor prolonged fasting. Similarly, Kırık (2018) highlighted insufficient training and a lack of institutional policies supporting ERAS as barriers to implementation. Çelebi (2019) noted inadequate preoperative patient education, resulting in misunderstandings about appropriate fasting durations. The persistence of outdated practices in preoperative nutrition management underscores the need for significant changes in clinical protocols. Healthcare professionals, particularly surgeons, anesthetists, and nurses, must receive comprehensive training on the evidence-based benefits of ERAS protocols. One of the most important and fatal post-operative complications is venous thromboembolism (VTE). ERAS protocols recommend that every patient undergoing elective abdominal or pelvic surgery should receive VTE prophylaxis. For these cases, a combination of low molecular weight heparin (LMWH) or unfractionated heparin with compression stockings and/or intermittent pneumatic compression is advised, with prophylaxis continued throughout hospitalization (14,22). Despite these recommendations, studies in the literature have reported varying levels of adherence to these protocols (10, 11,17). For example, Yıldırım (2017) and Kırık (2018) observed that while the use of compression stockings was widespread, LMWH administration was often inconsistent, primarily due to concerns over bleeding risks and a lack of standardized guidelines in surgical clinics. Çelebi (2019) also noted that LMWH was frequently administered based on cardiology consultations rather than as a routine prophylactic measure in line with ERAS protocols. In this study, similar to the literature, the rate of patients wearin compression stockings was high, but the rate of LMWH administration was low. This discrepancy may be attributed to patient-specific factors, such as an increased risk of bleeding or co-existing conditions like cardiovascular diseases, which might require individualized VTE prophylaxis approaches. Additionally, the study revealed that LMWH administration in the clinic where the study was conducted was predominantly initiated based on cardiologist recommendations rather than a protocol-driven approach. This finding suggests potential gaps in interdisciplinary communication and adherence to

ERAS guidelines. To address these issues, clinical teams should prioritize training and standardizing VTE prophylaxis practices in alignment with ERAS protocols, ensuring that LMWH is appropriately prescribed unless contraindicated.

The main goal of perioperative fluid management is to maintain intravascular volume to ensure adequate tissue and organ perfusion and prevent electrolyte imbalances (14). ERAS protocols recommend avoiding too restrictive or too liberal fluid regimen to maintain fluid-electrolyte balance.(20). With conventional perioperative intravenous fluid regimens in abdominal surgery, patients should receive 3.5 to 7 liters of fluid on the day of surgery and more than 3 liters for 3-4 days post-operatively (14). In this study, fluid replacement therapy was evaluated and it was found that more than half of the patients were given pre-operative fluid supplementation that was continued post-operatively. For treatment in the clinic, ERAS protocol recommendations were followed.

Many studies and meta-analyses have identified the benefit of intravenous antibiotic prophylaxis to reduce Surgical Site Infections (SSI) (14,23). ERAS recommends that I.V. antibiotics (first generation cephalosporins or amoxy-clav) be administered within 60 minutes prior to skin incision and that additional doses may be administered during prolonged surgery, in severe blood loss and in obese patients (14,16,23). According to the findings of this study, less than half of the patients were administered antibiotics less than one hour before surgery, while most were administered antibiotics but not exactly one hour before the time of surgery. Although antibiotics were included in the pre-operative treatment protocol in the clinic where the study was conducted, it can be said that compliance with ERAS protocols in long-lasting abdominal surgeries is low because the time of administration to patients does not coincide with exactly 60 minutes before the operation time. This may reflect challenges in coordinating the timing of antibiotic administration in the operating room rather than in the clinic, where case flow and patient preparation processes may affect adherence to strict time frames. To address these challenges, it is crucial to ensure that antibiotic administration occurs in the operating room, where precise timing can be managed under sterile conditions. Regular staff training on ERAS guidelines and close monitoring of antibiotic administration timing can improve compliance.

ERAS protocols recommend avoiding unnecessary premedication before anesthesia (20). This is because long-term effective premedication may cause delayed return to full psychomotor function, mobilization and feeding, and increased delirium. Studies have shown that no pre-operative premedication was administered to most or all patients (10,11,17,18). In this study, it was observed that most of the patients who underwent abdominal surgery and participated in the study were not given premedication (anxiolytic or sedative agent) in the pre-operative period and compliance with the literature and ERAS was achieved in this regard.

One of the most important problems experienced by patients in the post-operative period is pain. Post-operative pain prolongs the recovery process and early discharge as it negatively affects the functions of many organs/systems, including the respiratory and circulatory systems (24). One of the key elements of ERAS is the control of post-operative pain and a multimodal analgesia approach is adopted. ERAS recommends avoiding the use of opioids for pain control (20). Although ERAS protocols do not recommend the use of intravenous opioids for pain control, they do indicate that opioids may be included in multimodal analgesia. For open abdominal surgery, thoracic epidural analgesia (TEA) is recommended to be initiated T7-10 pre-operatively and ideally maintained for 48 to 72 hours post-operatively. In addition, the routine use of paracetamol 4 mg/day and, if this protocol is inadequate, the use of nonsteroidal anti-inflammatory drugs in between is recommended (14,20). In this study, when the treatment protocol of the patients was examined, it was determined that postoperative analgesia was mostly applied and paracetamol and nonsteroidal anti-inflammatory drugs were mostly preferred. However, it is stated that continuous analgesic infusion should be used via epidural catheter and paracetamol should be applied in addition to multimodal analgesia approach in accordance with ERAS protocols (14,20). In the clinic where the study was conducted, the fact that TEA was not used sufficiently with continuous infusion and epidural analgesia was not widespread in the pain control protocol shows that full compliance with the ERAS protocol was not achieved. In order to ensure full compliance with ERAS protocols in pain management, training for health professionals should be increased and technical facilities should be developed.

Before major abdominal or pelvic surgery, Foley catheters are inserted to prevent urinary retention, increase patient comfort, and perform intake-output monitoring (IOM). However, the presence of a long-term post-operative urinary catheter increases the risk of urinary tract infection and prolongs hospitalization (25). According to ERAS protocols, the Foley catheter should be removed within 24 hours post-operatively in most of cases and individualized in patients at high risk of retention (14). In studies on this subject, it was found that urinary catheters of most of the patients were removed within 24 hours post-operatively (10,11,26). Likewise, ERAS protocols recommend avoiding the routine use of nasogastric tubes and drains in elective abdominal surgery. In this study, it was found that most of the patients had their drains and urinary catheters removed after 48 hours post-operatively and very few patients had their drains and urinary catheters removed within the first 24 hours. According to this result, compliance with the literature and ERAS protocols was low. This study was performed on patients who underwent abdominal surgery, and in the clinic, post-operative IOM and drain follow-up are important and frequently followed in major surgeries such as abdominal surgery. Therefore, it can be said that the rate of compliance with ERAS is low because catheters and drains are removed within the first post-operative 48 hours instead of the first post-operative 24 hours.

After major surgery, oral nutrition is usually introduced slowly and the process progresses gradually from liquid to solid foods. Studies have showed that prolonged fasting is associated with increased risk of post-operative infectious complications and delayed recovery (27). According to ERAS, patients should be encouraged and guided to take oral fluids in the second post-operative hour and solid food in the fourth hour (14). In this study, it was found that the time to start post-operative liquid and solid food intake was mostly 10 hours or more. According to this result, compliance with the ERAS protocols was found to be low. In the clinic where the study was conducted, after major surgery, such as abdominal surgery, oral intake is usually restricted until gas and stool output and bowel function are judged to have returned. However, it is aimed to switch to early feeding after minor surgeries. We considered that these were the reasons why the procedure for switching patients to oral food in clinics was not performed according to the protocol. This approach stands out as a general view of the current practice in the clinic and the recovery process of the patients. However, according to ERAS protocols, waiting for gas and stool discharge should not be a factor that prevents patients from switching to early feeding (20).

Instead of waiting for bowel functions to return to normal, the protocol recommends switching to early feeding to support the patient's general recovery process (14,20,27). As a result, one of the main reasons for non-compliance with ERAS protocols in the clinic is that patients are unnecessarily waiting for gas and stool discharge for post-operative feeding transition and symptoms such as nausea and vomiting are not taken into account. This situation has negatively affected the timing of the transition to feeding and reduced compliance with the protocol. In order to better comply with ERAS protocols, it is recommended that the recovery processes of the patients be evaluated more comprehensively and the transition to feeding be accelerated according to these evaluations.

Insulin resistance occurs as an inflammatory response to surgical intervention and hyperglycemia occurs due to increased glucose production. Hyperglycemia increases the risk of post-operative complications and decreases the rate of recovery (7). According to ERAS protocols, Especially diabetic patients should be well prepared pre-operatively and followed up post-operatively. (20). According to the findings of this study, nearly half of the patients had postoperative blood glucose (BG) monitoring, but more than half did not. It was considered that this result may occur because only patients with diabetes mellitus were monitored in the clinic and not all patients were routinely monitored for blood glucose.

Early mobilization is an important component of ERAS protocols to counteract the negative physiological consequences of post-operative surgical stress and immobilization (26,28). The current recommendation is for the patient to sit out of bed for 30 minutes on day zero and then for 6 hours a day and to start walking on day one (14). Early mobilization increases functional capacity and accelerates recovery in patients undergoing major abdominal surgery (28). Studies on the rate of early mobilization have reported that most patients are mobilized in the first 6 or 8 hours post-operatively and show high compliance with early mobilization (8,10,11,17,18,30–32). In this study, although it was observed that the patients were mobilized within the

first 6-8 hours in accordance with early mobilization protocols, the majority (61.89%) were mobilized after 8 hours. These findings contradict the results supporting early mobilization in the literature; because the literature states that early mobilization should be performed within the first 6-8 hours for most patients (8,10,11,17,18,30-32). The reason for delayed mobilization may be based on various factors. The delayed mobilization in this study is a situation that contradicts the literature. The reasons for the delay should be considered as pain management, clinical decisions, general condition of the patients and the effect of the treatment methods used in the hospital.

Improving these factors may contribute to greater compliance with ERAS protocols by accelerating the mobilization process. Nurses and other healthcare professionals need to cooperate more effectively for mobilization in accordance with ERAS protocols.

Post-operative discharged patients and their relatives face many problems in home care. The importance of discharge education is emphasized to solve these problems, improve the quality of patient care, and reduce readmission (33). Discharge education and post-discharge follow-up are important stages in ERAS protocols. According to ERAS recommendations, the patient's discharge home should be planned at the time of admission. In addition, patients should be fully informed about the entire surgical process and post-operative period, and patients discharged home should be phoned 24 to 48 hours later to inquire about their condition. On post-operative days seven to ten, the patient should be called for a follow-up visit for wound reassessment and suture removal (20,34). In this study, we found that almost all patients received discharge education before leaving the clinic and a follow-up appointment was scheduled on days seven to ten post-discharge. The discharge protocol at the clinic followed the recommendation of ERAS protocols.

According to studies on ERAS protocols, following the ERAS protocols has been shown to reduce length of hospital stay by up to two to three days compared to conventional care, with hospital stays is 9 days for open surgery, 7 days for laparoscopic surgery and 6 days for robotic surgery (35–36). Similar to the literature, this study showed that patients undergoing open surgery were discharged in an average of six days and patients undergoing laparoscopic surgery in an average of three days, and that compliance with ERAS protocols was effective in early discharge. These results show that ERAS protocols are successful in reducing hospital stay and complications (37-39).

Despite the valuable insights provided by this study, several limitations must be acknowledged. First, the study was conducted in a single clinic, which may limit the generalizability of the findings to other settings. Second, the data were collected retrospectively, which may introduce recall bias or missing information. Furthermore, although adherence to ERAS protocols was assessed, patient adherence and specific factors affecting adherence were not examined in depth. Given these limitations, larger, multicenter, and prospective studies are recommended.

CONCLUSION

As a conclusion, it was considered that most of the pre-operative and post-operative practices in abdominal surgery operations were appropriate according to ERAS protocols, although practices such as pre-operative fasting time and post-operative first oral food intake time were different from ERAS recommendations in the clinic where the study was performed. Despite these positive results, ERAS protocols have not yet been sufficiently adopted due to the difficulty of changing traditional practices. Therefore, an official ERAS protocol should be established in institutions and adequate training on the importance of multidisciplinary implementation of the protocol should be provided to all members of the team, especially nurses who have a major role in patient care. Because, the recognition and implementation of ERAS protocols by nurses, who accompany patients throughout the surgical process and play a key role, will improve the quality of care. An important component of the ERAS program is auditing compliance with the guidelines and monitoring the results. Regular monitoring of compliance with the guidelines and reporting of results is recommended, and the results of this study should be supported by larger-scale, multicenter studies.

Acknowledgement: We would like to thank all the participants.

Author contribution: Conceptualization; Rabia Gorucu, Ayfer Ozbas; Data curation; Sevdan Gurler, Recep Tascioglu, Saniye Ozgen; Formal analysis; Rabia Gorucu, Ayfer Ozbas; Funding acquisition; Rabia Gorucu; Investigation; Methodology; Rabia Gorucu, Ayfer Ozbas, Sevdan Gurler, Recep Tascioglu, Saniye Ozgen; Project administration; Rabia Gorucu, Ayfer Ozbas; Resources; Rabia Gorucu; Software; Rabia Gorucu, Ayfer Ozbas; Supervision; Rabia Gorucu, Ayfer Ozbas; Validation; Rabia

Gorucu, Ayfer Ozbas; Visualization; Rabia Gorucu; Roles/Writing - original draft; Rabia Gorucu, Ayfer Ozbas; Writing - review & editing Rabia Gorucu, Ayfer Ozbas

Conflict of interests: The authors declare no conflict of interest.

Ethical approval: Ethical approval was received from the Istanbul Unıversity Cerrahpaşa Social Sciences and Humanities Research Ethical Committee (Date: 10.05.2022, Decision No: 2022/156) and institutional approval (06.05.2022-375455) were obtained. Before starting the study, patients were asked about their willingness to participate in the study and informed consent was obtained from those who agreed.

Funding No funding applied for or received.

Peer-review: Externally peer-reviewed.

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