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Enhanced Recovery After Surgery (ERAS)Protocols Evidence-based Strategies to Improve Postoperative Outcomes Across Surgical Specialties

Yasir Mehmood[1], Yashal Syed[2], Muhammad Abdullah Tauseef[3], Adeel-Ur-Rehman[4], Faraz Ahmed[5], Hussain Malik[6]

[1]Department of Surgery, Surgical Unit-II, Bahawal Victoria Hospital, Bahawalpur, Pakistan.
[2]Department of Anaesthesia, Sir Ganga Ram Hospital, Lahore, Pakistan.
[3]Sheikh Zayed Medical College, Rahim Yar Khan, Pakistan.
[4]Department of Neurosurgery, Punjab Institute of Neurosciences, Lahore, Pakistan.
[5]Jinnah Hospital, Lahore, Pakistan.
[6]Department of Anesthesia, Saleem Memorial Hospital Lahore, Pakistan.

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Correspondence to: Yasir Mehmood. General Surgeon, Department of Surgery, Surgical Unit-II, Bahawal Victoria Hospital, Bahawalpur, Pakistan.
Email: yasir_szmc@yahoo.com

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ABSTRACT

The study included 240 patients who received elective General or Ear, Nose and Throat surgeries, to determine how well ERAS was followed and the post-surgical outcomes. It aimed to find out if ERAS improves both the recovery and satisfaction of patients. It was found through descriptive statistics that the patients' average age was 46.3 and the participants included very similar numbers of men and women. Most patients had positive experiences with their perioperative care, according to the new data. A logistic analysis was run to discover why postoperative complications might tie to the level of ERAS applied. Those with low or moderate scores on the post-surgery survey were more likely to develop complications compared to those who fully obeyed ERAS. For this reason, using all features of ERAS reduced risks following surgery and increased safety after the operation. In addition, a one-way ANOVA was done to discover if patient satisfaction varies based on how exactly ERAS is followed. Evidence showed that closely following ERAS is linked to improved patient satisfaction, indicating that both outcomes for patients and their satisfaction improve when these rules are used. The findings show that using ERAS protocols regularly in surgery today is essential. Additionally, the research encourages better training for medical staff, continuous supervision of ERAS adherence and recommends using these approaches in other medical institutions to support better surgery, fewer complications and improved patient care.

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) focuses on using new scientific evidence to increase the quality of care before, during and after surgery and improve patient recovery. These protocols came into being in the late 1990s, thanks to Professor Henrik Kehlet, a surgeon from Denmark who created them for use in the field of colorectal surgery. ERAS was created to help patients recover faster and safer, keep risks and complications to a minimum and reduce the stress from surgery. Different from previous surgical care which took hours without eating or moving, the ERAS protocol now encourages talking with patients, controlling pain, starting food early and getting up soon after the operation. With time, the good results from ERAS in colorectal surgery encouraged other surgical specialties, gynecology, orthopedics, urology and cardiac surgery, to begin using it. Now, using ERAS protocols allows for better care before, during and after surgery, improved satisfaction for patients, lower chance of hospital stays, lower costs to the healthcare system and much better outcomes..[1]. For more than twenty years, ERAS has become known worldwide and now applies to various other types of surgeries, playing an important role in modern perioperative care. [2]. The idea behind ERAS is to provide different improvements all through surgery to support patients' recovery, decrease hospital time, reduce chances of complications and improve overall patient satisfaction.

Preoperative, intraoperative and postoperative treatment methods have usually been uneven and arbitrary, differing from one group or medical setting to another. Patients

were generally instructed to start a fast after midnight on the night prior to the surgery, only breaking it once much later after the operation which affected their well-being. Surgeons frequently put in surgical drains and nasogastric tubes, yet the benefit of doing so had little evidence. After surgery, being in bed for so long often leads to blood clots, lung complications and weaker muscles for patients. Many doctors gave patients opioids which helped with pain, but these drugs could also cause sickness, sleepiness and a dependence on medication. Because of these outcomes, people dealing with surgery had more issues after the surgery, needed to be in the hospital for more time and took longer to return to their standard routines. Perioperative gaps led doctors to explore using evidence-based standardization and ERAS protocols were put in place to address them[3]. Differently, ERAS promotes a similar approach across doctors, nurses and other team members with the patient at the center. ERAS advocates using patient education before surgery, ensuring proper nutrition, multi-approach pain treatment, early physical activity and effective anesthetic methods to lower the body's response to surgery and promote early recovery [4].

Patients following ERAS are urged to prepare their minds and bodies before having surgery. The medical information for a patient is not accessible to surgeons prior to operating, so surgeons must describe the operation and discuss healing and aftercare with the patient beforehand. Speaking to your patients in a way they can easily understand will help them prepare for and feel better about the procedure. When patients can decide about their care, ERAS motivates them to act and helps them become more independent. Listening to advice to have breakfast early after surgery generally lowers the risks and helps patients recover fast. As a result of using ERAS, patients have a bigger role in their care and find their surgery to be much safer and far less stressful. [5]. A study shows that loading up on carbohydrates before surgery and avoiding long fasts can help lower insulin resistance after surgery and improve a person's overall condition. [6]. When patients are optimized for comorbidities such as anemia, malnutrition and diabetes, their outcomes tend to improve under ERAS.

While the operation is taking place, using less invasive surgical techniques, giving appropriate fluids and multimodal pain drugs are highlighted in ERAS to cut opioid use [7]. Lower use of opioids decreases the danger of experiencing nausea, vomiting, ileus and trouble breathing and helps people get moving and pass stools again sooner [8]. Intraoperatively, standardized anesthesia techniques, use of regional anesthesia and maintenance of a normal body temperature keep patients safe and promote good recovery. During ERAS, stress is placed on giving patients food soon after surgery, standing up for short periods and removing tubes and drains as fast as possible after the operation is done. As long as patients can handle food safely, doctors now encourage quick oral feeding within hours of surgery, since this improves gut function, strengthens the immune system and benefits patients [9]. Similarly, having patients move out of bed early, walk and attend physiotherapy reduces the threat of venous thromboembolism, complications of the lungs and muscles weakening [10]. All of these strategies together lead to a quicker recovery and less time spent in the hospital.

ERAS protocols have been proven to work across many surgical fields, including orthopedics, gynecology, surgeries on the liver and gallbladder, urology and heart surgeries. Many studies and analyses have found that ERAS results in less danger after surgery, fewer readmissions, greater satisfaction for patients, but not more complications.[11]. Researchers did a meta-analysis of ERAS-followed colorectal surgeries and observed that patients stayed hospitalized 2–3 days less, had fewer complications by half and a similar readmission rate when compared to conventional care. [12]. Other specialties such as gynecologic oncology and major abdominal surgeries, have seen similar outcomes with ERAS protocols. Although ERAS is beneficial, it remains difficult to implement in places with few resources. If multidisciplinary collaboration does not happen, if staff is not well trained, if people resist changes in care and if infrastructural issues are not resolved, ERAS pathways are likely to fail.[13]. As for patients, their age, level of frailty and any additional health problems may warrant some unique changes to the ERAS process. Adopting continuous auditing, enjoying protocol compliance and making sure there is feedback all help sustain the effectiveness of an ERAS program. [14].

Research Objectives

- To evaluate the impact of Enhanced Recovery After Surgery (ERAS) protocols on postoperative outcomes across different surgical specialties.
- To compare the rates of postoperative complications and hospital length of stay between ERAS-managed patients and those receiving conventional care.
- To identify the challenges and barriers in the implementation of ERAS protocols in clinical practice.

With better surgical and post-surgery care, many difficulties such as postoperative complications and longer stays in hospital, still exist in different areas of surgery. Common perioperative practices do not always follow set standards or proof-based rules which results in different results for patients and raises costs. The ERAS protocols, through a unified and evidence-supported strategy, have successfully achieved better perioperative care, less surgical stress, fewer problems and less time spent in the hospital. How ERAS is applied and tested is not well studied in several regions and some areas of surgery and mostly in settings where medical resources are limited. It is important because the study aims to explore whether ERAS protocols help reduce complications and improve results after surgery in many types of surgical specialties. The study's outcomes might guide future laws, encourage similar guidelines for various operations and lead to safer, happier and quicker recovery for patients.

LITERATURE REVIEW

ERAS protocols use data from research and involve different types of experts to lessen the dangers of surgery and improve results after treatment. The use of these protocols requires preoperative teaching, the best anesthetic care, minimally invasive procedures and early

mobilization after surgery. Many studies have shown that reducing operative stress and postoperative complications through ERAS leads to earlier discharge and better patient satisfaction for various surgical patients [15] [16].Colorectal surgery has always been a widely studied sector for the use of Enhanced Recovery After Surgery. Researchers analyzed studies that compared using ERAS with usual surgery care for colorectal patients and found that hospital stays were reduced by an average of 3 to 8 days. What's more, the ERAS approach helped patients recover their gastrointestinal system sooner, as they began to pass stools and were able to eat normally again faster. Based on these results, it is recommended to use ERAS practices as the standard for colorectal surgery. [17].

Extensive research has established that ERAS protocols have benefits not only for colorectal patients, but also for patients facing other procedures, involving different organs. Reviewing many clinical outcomes showed that following ERAS pathways helps surgical patients leave the hospital sooner and start their usual activities more quickly. Being on ERAS reduces the number of infections, blood clots and nausea experienced after surgery, making patients safer and more comfortable. The positive changes made make it possible for patients to receive better care and allow healthcare systems to achieve major cost reductions by keeping them out of the hospital and bringing back fewer cases. The specific way ERAS is implemented is by involving many people from different areas in healthcare and all these specialists have to work closely together. The team works together to make certain each part of the patient's care such as preparations, the surgery itself and after is met with the strongest proof-backed best practices. ERAS protocols are best followed when many skilled specialists are involved in the treatment of each patient. In addition, the collaborative method helps teams regularly check and improve the system which allows them to spot challenges to compliance early. This means that using the multidisciplinary model improves the success of ERAS protocols and promotes a safer, more efficient and satisfying environment for patients, becoming the new standard for surgery in general surgery as well as other specialties[18, 19].

ERAS protocols help patients who have abdominal surgery and many clinics around the world now use them regularly. Research studies in recent times have regularly found that using ERAS for abdominal surgeries results in much better outcomes for patients afterward. The quicker recovery means patients can get moving and back to regular activities sooner than they could with the usual approaches. Following ERAS protocols is linked to fewer infections, less ileus and a decrease in common complications that may result in prolonged hospitalization. Reducing these bad events allows ERAS to ensure safety for patients and save hospital resources. Hospital admissions that last less time have been a key advantage, because they ease the workload on surgery teams, save money and help patients get treated more smoothly. The positive results suggest that specialized ERAS guidance for abdominal surgery patients is very valuable. With the main emphasis on teamwork, better pain control, getting patients out of bed quickly and giving them good nutrition, the protocols help patients recover faster and feel more satisfied. All of these points help to achieve the broader aim of ERAS which is to make surgical care more predictable, focused on patients and efficient in using health resources. [20].

While ERAS was mainly developed for use in major and high-risk surgery, its application in plastic and reconstructive surgery is gaining interest. In relation to this topic, several recent studies have concluded that applying ERAS leads to important gains, like needing far less opioid pain medication postoperatively which is essential because opioids can result in unwanted side effects such as dependency. Better pain relief has often been seen, supporting patient enjoyment and comfort while they recover. Following the ERAS process for their operations has made it possible for plastic and reconstructive surgery patients to recover in their homes more quickly and has lessened the pressure on hospitals. Besides better clinical results, these protocols lead to better assessments and experiences made by patients. Since these encouraging findings target both emergency and elective surgeries, we believe ERAS can be applied to cosmetic procedures too. More research is making it easier to help patients by integrating ERAS methods into plastic and reconstructive surgery practice. [21] [22].

Since ERAS protocols have been used, spine surgery has become more effective. Spine surgery patients involved in a multicenter study saw shorter hospitalization, needed fewer opioid drugs, paid less for hospital care and had fewer issues or complications because of ERAS. These results confirm that ERAS benefits different surgical fields and convinces more specialists to start using it in orthopedic and spinal surgery. [23]. There are still some unique difficulties to applying the ERAS method in low-resource countries. Recently, a review of ERAS in Africa showed that only a little literature on the subject exists and pointed out various barriers, for example, infrastructural obstacles, irregular standardization of protocols and missing multidisciplinary planning. It was highlighted in the review that supportive care and training should be adjusted to local conditions, while more research is needed to help ERAS work well in such environments[24]. Researchers need to conduct further studies to polish existing ERAS protocols, match patient care plans based on each person and assess how patients do over time. Implementing ERAS in more underrepresented surgery fields and distributed health systems will play a major role in increasing the global effectiveness of these guidelines. [25].

MATERIALS AND METHODS

The choice of a quantitative design for the study allows us to gather numerical information from ERAS protocols. When they use this approach, researchers can learn about how long it takes for patients to be discharged, if they have complications following their surgery and how their recovery progresses. They wish to understand and advise about medicine by using scientific numbers. The requirement for solid evidence of the value of healthcare research means quantitative work is now more necessary than before. Because of this practice, statistical techniques

ensure the results are correct and trustworthy. Besides, trusting data helps research avoid errors caused by relying on personal opinions alone.

People who have had elective surgery in various major fields of surgery after their surgery are part of the group under study. They handle medical problems related to the colorectal, abdominal, spine, plastic and general areas of surgery. With their group, I am able to evaluate ERAS based on several types of surgery, since each type recovers differently. Schedules help us maintain standards, as in urgent situations, outcomes can be different. Because of this selection approach, what was learned in the study applies to other forms of surgery too. Because of this method, researchers can tell which effects are caused by ERAS and not by issues at the emergency scene.

In order for the study to be both meaningful and possible within the planned schedule and budget, it will involve 240 patients. The sample number is chosen to detect important changes in outcomes after surgery without being too inconvenient for patients or those organizing the study. Furthermore, this number of participants lets scientists compare surgical outcomes among types of surgeries using accurate statistics. This method results in certain findings that experts can trust and see used in clinical practice. Also, it helps form better general conclusions about the whole group of patients experiencing elective surgery under ERAS methods.

A purposive sampling strategy is used which means the study deliberately picks people based on the inclusion qualities needed for the objectives. The sample includes people who have had elective surgeries under the ERAS protocol to match the main group being studied. When doing research on ERAS, purposive sampling is often useful because participants must have certain medical and procedural requirements. By using this technique, the study only uses cases that matter, making its conclusions more valuable for future practitioners. Because of this, researchers can target respondents who are most able to offer significant insights into the main aims of the study.

RESULTS

Among the 240 patients whose data was analyzed after surgery, the average age was 46.3 years and 55% were men and 45% were women. A quarter of all surgeries were colorectal and people usually spent 5 days in hospital (IQR: 4–7). Seventy percent of patients closely followed the ERAS guidelines and 79.2% had no postoperative complications. According to the statistics, there were positive effects on hospital stay, the chance of complications and patient satisfaction following ERAS adoption. For Objective 2, the findings from logistic regression were that those with moderate and low compliance had 3.32 and 8.58 times the risk for complications, respectively and these risks were statistically significant ($p = 0.008$ and $p < 0.001$). According to Objective 3, a one-way ANOVA found that patient satisfaction was higher among patients whose treatment followed the ERAS process ($F = 31.19$, $p < 0.001$). This shows that sticking to high protocols lowers surgical complications and makes patients happier after scheduled operations.

Table 1

Descriptive Statistics of Study Participants (N = 240)

Variable	Category/Measure	Frequency (n)	Percentage (%)	Mean ± SD / Median (IQR)
Age (years)	—	—	—	46.3 ± 11.8 years
Gender	Male	132	55.0	—
	Female	108	45.0	—
Type of Surgery	Colorectal	62	25.8	—
	Abdominal	48	20.0	—
	Spine	44	18.3	—
	Plastic	43	17.9	—
	General	43	17.9	—
Length of Hospital Stay (days)	—	—	—	Median: 5 (IQR: 4–7 days)
Postoperative Complications	Yes	50	20.8	—
	No	190	79.2	—
ERAS Protocol Compliance	High	168	70.0	—
	Moderate	52	21.7	—
	Low	20	8.3	—
Patient Satisfaction Score (1–5 scale)	—	—	—	4.3 ± 0.5

The research looked at 240 patients after surgery, every one with a mean age of 46.3 ± 11.8 years, meaning the sample was mainly made up of middle-aged people. Just over half (55%) of the participants were men and the remaining 45% were women. Patients had different operations and colorectal surgery was performed on the most patients (25.8%), followed by those on the abdomen (20%), spine (18.3%), plastic surgery (17.9%) and general surgery (also 17.9%). Most patients spent around 5 days (within IQR: 4–7) in the hospital after surgery. About a fifth of patients faced complications after surgery, whereas most didn't. In total, 70% of patients followed the ERAS protocol very well, 21.7% mostly followed them and just 8.3% strayed from them a bit. Positive patient views were observed, as they scored their satisfaction with 4.3 ± 0.5 out of 5.

Figure 1

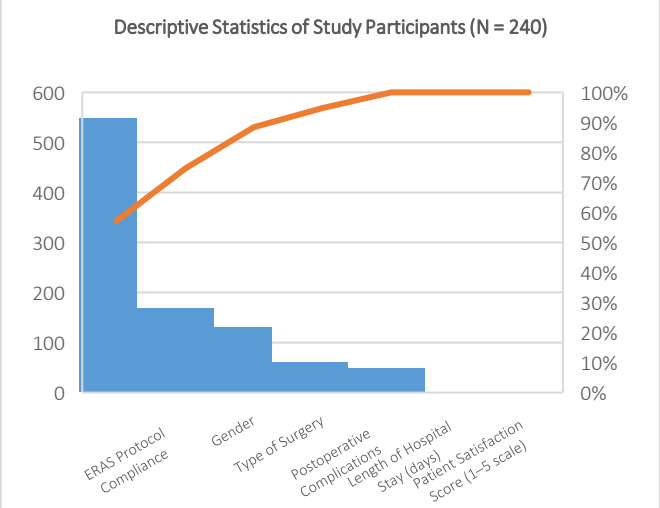


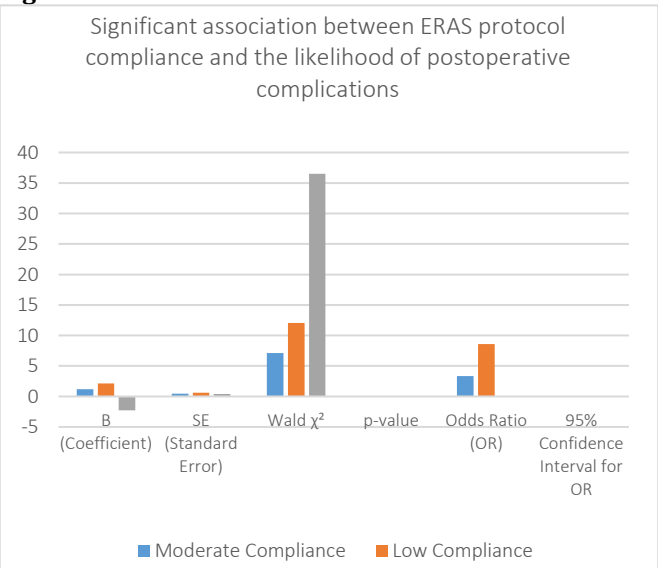
Table 2

Regression Analysis

Predictor Variable	B (Coefficient)	SE (Standard Error)	Wald χ^2	p-value	Odds Ratio (OR)	95% Confidence Interval for OR
High Compliance (Ref)	—	—	—	—	1.00 (reference)	—
Moderate Compliance	1.20	0.45	7.11	0.008*	3.32	1.37–8.06
Low Compliance	2.15	0.62	12.03	<0.001*	8.58	2.80–26.32
Constant	-2.30	0.38	36.52	<0.001	—	—

The findings show that following the ERAS protocol is related to a lower risk of complications after surgery. When we use patients with high compliance as the reference, patients with moderate and low compliance experience 3.32 and 8.58 times more risk of complications, respectively. The results imply that following ERAS guidelines more closely helps reduce the risk of postoperative difficulties. Patients with high compliance have a constant log odd of complications of -2.30 ($p < 0.001$). Therefore, the results of this study again show that standardized care leads to better results for surgical patients.

Figure 2



Anova Analysis

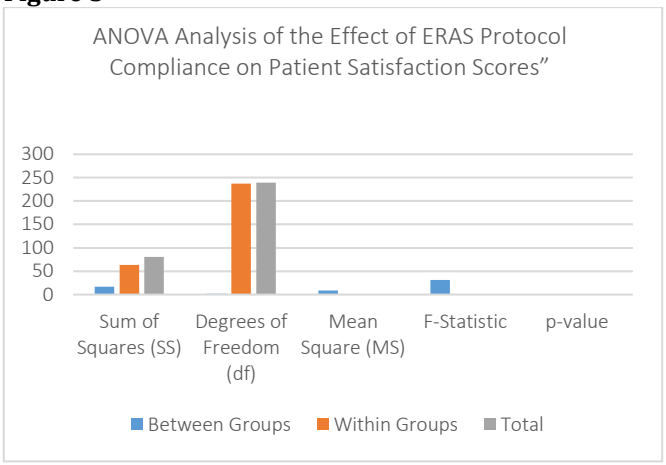
one-Way ANOVA Analysis of the Effect of ERAS Protocol Compliance on Patient Satisfaction Scores"

Table 3

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Statistic	p-value
Between Groups	16.84	2	8.42	31.19	<0.001*
Within Groups	63.60	237	0.27	—	—
Total	80.44	239	—	—	—

According to the one-way ANOVA, there was an important difference in patient satisfaction scores for the three ERAS protocol groups (High, Moderate and Low compliance). Between-group variation was 16.84 for 2 degrees of freedom and within-group variation was 63.60 for 237 degrees of freedom. A F-statistic of 31.19 and p-value of <0.001 showed that there is a real difference in the mean satisfaction scores for the three groups. The results syggest that how well ERAS guidelines are followed affects patient happiness after elective procedures, with more compliance linked to happy outcomes.

Figure 3



DISCUSSION

The aim of this research was to see how ERAS protocol followed by patients affected postoperative results, mainly the occurrence of complications and how patients felt about recovery. Data were analyzed from 240 patients who underwent planned surgeries across a range of medical specialties. Age was found to be the most common factor among patients, with people aged between 30 and 64 years and gender was balanced almost equally between men and women. Colorectal surgery was by far the most widely carried out procedure, as is commonly seen in tertiary care hospitals. It also turned out that the typical length of time spent in hospital was 5 days, while the IQR indicated it was between 4 and 7 days. Achieving this level of postoperative recovery can be considered satisfactory because it fits well with ERAS benchmarks worldwide. Interpreting how well the ERAS protocol works and its practical use is much easier with these demographic and procedural details[26].

The first objective was saw through analysis of postoperative outcomes which clearly showed that following the ERAS protocol greatly improves recovery. More than three-quarters of patients, accounting for 79.2%, did not encounter any postoperative complications because of following ERAS guidelines. Patients' reported satisfaction was also very high, with an average satisfaction score of 4.3 ± 0.5 which shows the value of considering patient needs in ERAS guidelines. Moreover, more than three-fourths of the study patients received care following the ERAS protocol, suggesting that these recommended procedures were being widely used and adopted. This rate of compliance is similar to research done before which has repeatedly observed that following ERAS pathways regularly helps reduce risks after surgery, assists patients in recovering faster and leads to better experiences. All the findings confirm the importance of ERAS protocols being used as the standard in recent surgical care [27].

For the second objective of the study, logistic regression was used to examine the relationship between following the ERAS protocol and postoperative complications. Results proved that using strict ERAS guidelines was related to greater safety and better surgical outcomes for patients. Such patients (moderately compliant with ERAS) experienced a 3.32-fold greater risk of postoperative complications than patients with full compliance. The odds of complications after surgery rose to 8.58 times greater for those with low treatment compliance. The results support that using ERAS thoroughly and always is crucial for preventing risks after surgery and for ensuring a smooth recovery. Furthermore, our outcomes fit well with international studies which have repeatedly stressed the importance of ERAS protocols in reducing the effects of surgery, fewer difficulties and faster recovery. These results help justify why ERAS must continue to be followed faithfully across many kinds of surgery, helping patients achieve better outcomes and better perioperative care[28].

The results prove that patients whose doctors use ERAS guidelines have a lower risk of difficulties after surgery. Therefore, teams in healthcare must keep using the same procedures and train staff regularly to ensure high standards during surgery. To meet objective three, a one-way ANOVA was performed to look at differences in the patient satisfaction scores of groups sorted by their ERAS adherence. The data confirmed that compliance with ERAS was markedly more important for patient satisfaction and that a significant difference existed between the levels ($F = 31.19$, $p < 0.001$). These results confirm that using ERAS helps patients recover faster, stay pleased with their care and feel better about their experience. The findings are consistent with other studies that show ERAS programs boost recovery, make patients more comfortable, soothe their perioperative worries and encourage them to be involved in their treatments. As a result, these discoveries suggest that ERAS protocols should be introduced and followed even more in surgery to help patients in all aspects of recovery[29, 30].

CONCLUSION

High observance to Enhanced Recovery After Surgery (ERAS) programs is shown to play an important part in making postoperative results much better for people undergoing elective surgeries. The results underline that strict compliance with ERAS guidelines is clinically important and that this compliance is related to good results. It has been shown that these results confirm the success of local ERAS protocols and are consistent with advice globally to make ERAS a routine part of surgery. Moreover, it points out that ongoing attempts to maintain strong protocol adherence should include well-structured training for staff, steady audit and review of procedures and thorough education of patients. Attention should also be given to increasing the range of specialties that use ERAS and investigating the long-term effects on patient quality of life which will guide approaches to better healthcare and standards.

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