

Impact of Enhanced Recovery After Surgery (ERAS) Protocols on Patient Outcomes in Laparoscopic Hysterectomy

Misha Javid¹, Jaweria Tariq¹, Rehab Ishaq¹, Awais Akhtar^{2*}, Inam Ullah³, Taimoor Riaz Ullah³

¹ Anesthesia Technology, Department of Health Professional Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan

² Demonstrator, Department of Health Professional Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan

³ Lecturer, Department of Health Professional Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan

*Correspondence: Awais Akhtar, awaisakhtar724@gmail.com

Received: 09 September 2024 | Accepted: 10 December 2024 | Published: 31 December 2024

How to Cite: Javid, M. et al. 2024. Impact of Enhanced Recovery After Surgery (ERAS) Protocols on Patient Outcomes in Laparoscopic Hysterectomy. Journal of Perioperative and Critical Care Sciences. 2, 2 (Dec. 2024), 1–8.

ABSTRACT

Background: Enhanced Recovery After Surgery (ERAS) pathways combine evidence-based perioperative interventions intended to reduce surgical stress and accelerate functional recovery, but evidence from resource-constrained gynecological practice remains limited. **Objective:** To compare perioperative outcomes after elective laparoscopic hysterectomy under ERAS and conventional care pathways. **Methods:** This prospective, non-randomized comparative study included 90 women aged 40–60 years undergoing elective laparoscopic hysterectomy at Doctors Hospital and Medical Center, Lahore, during September–October 2024. Forty-five patients received ERAS care and 45 received conventional care. Baseline, intraoperative, recovery, pain, opioid-consumption, length-of-stay, and complication outcomes were compared using independent-samples t tests, Mann–Whitney U tests, and categorical tests as appropriate. **Results:** ERAS was associated with shorter mean operative duration (93.98 ± 9.73 vs 108.56 ± 7.67 minutes; mean difference -14.58 , 95% CI -18.25 to -10.91), lower mean intravenous-fluid use (1814.1 ± 183.2 vs 2190.7 ± 163.3 mL; mean difference -376.6 , 95% CI -449.3 to -303.9), lower median blood loss (303 vs 371 mL), and shorter median hospital stay (2.8 vs 5.7 days; all $p < 0.001$). Pain scores at 6, 24, and 48 hours and total opioid consumption were lower with ERAS (all $p < 0.001$). Nausea/vomiting, urinary-tract infection, and fever were also less frequent. **Conclusion:** In this single-center observational comparison, ERAS care was associated with faster postoperative recovery, reduced resource use, and fewer selected complications after laparoscopic hysterectomy. **Keywords:** Enhanced recovery after surgery, Hysterectomy, Laparoscopy, Postoperative recovery, Multimodal analgesia, Length of stay

EDITORIAL INFORMATION

Author Contributions: Concept: Concept: MJ, AA, IU; Design: MJ, JT, AA, IU; Data Collection: MJ, JT, RI, AA; Analysis: AA, IU, TRU; Drafting: MJ, JT, RI, AA, IU, TRU.

Ethical Approval: Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan.

Informed Consent: Written informed consent was obtained from all participants

Conflict of Interest: The authors declare no conflict of interest; **Funding:** No external funding; **Data Availability:** Available from the corresponding author on reasonable request; **Acknowledgments:** N/A.

INTRODUCTION

Enhanced Recovery After Surgery (ERAS) is a structured, multimodal approach to perioperative care that integrates preoperative preparation, evidence-based anesthesia and analgesia, physiological optimization, and early postoperative rehabilitation. By reducing avoidable variation and attenuating the metabolic and inflammatory response to surgery, ERAS pathways aim to accelerate functional recovery while maintaining safety (1,2). International guidance has adapted these principles to gynecological surgery, emphasizing patient education, minimized fasting and bowel preparation, multimodal opioid-sparing analgesia, normothermia, rational fluid therapy, early oral intake, mobilization, and timely removal of urinary catheters (2–5).

Laparoscopic hysterectomy already limits tissue trauma compared with open surgery, but postoperative recovery remains influenced by pain, opioid-related adverse effects, nausea and vomiting, delayed feeding and ambulation, gastrointestinal dysfunction, catheter-associated morbidity, and institutional discharge practices. These factors can prolong hospitalization despite an uncomplicated operation. Studies of gynecological ERAS implementation have generally reported shorter length of stay, earlier return of function, and reduced opioid exposure without a consistent increase in readmission or major

morbidity (6–13). Benefits have been demonstrated after abdominal hysterectomy, minimally invasive hysterectomy, and broader gynecologic oncology procedures, although intervention content and adherence vary among programmes.

Recent syntheses support an overall benefit of ERAS after hysterectomy, but substantial heterogeneity remains in study designs, surgical routes, outcome definitions, and local discharge thresholds (14). Evidence specific to benign laparoscopic hysterectomy is less extensive than evidence from gynecologic oncology, and findings from high-resource systems may not transfer directly to institutions where conventional fasting, bowel preparation, prolonged catheterization, and delayed feeding remain common. Trials and implementation studies also suggest that the effects observed after pathway introduction reflect a bundle of coordinated interventions rather than a single component (7–10,15–18). Consequently, local evaluation should examine both clinical outcomes and process measures that indicate whether the pathway was actually delivered.

In Pakistan and comparable lower-resource settings, published ERAS evaluations have increased, but locally contextualized data for laparoscopic hysterectomy remain sparse (19,20). A carefully described comparison is relevant because reduced opioid use, earlier mobilization, shorter catheter exposure, and shorter hospitalization may benefit both patients and capacity-constrained services. At the same time, non-randomized comparisons require cautious interpretation because differences in patient selection, clinical practice, and unmeasured perioperative factors may influence outcomes.

This study therefore compared ERAS with conventional perioperative care among women undergoing elective laparoscopic hysterectomy at a tertiary hospital in Lahore. The objective was to determine whether ERAS care was associated with differences in operative duration, blood loss, intravenous-fluid use, protocol delivery, postoperative pain and opioid consumption, recovery milestones, length of stay, and selected postoperative complications.

MATERIALS AND METHODS

A prospective, non-randomized comparative study was conducted at Doctors Hospital and Medical Center, Lahore, Pakistan, a tertiary-care facility providing laparoscopic gynecological surgery. Ethical approval was obtained from the Ethical Review Committee, Faculty of Allied Health Sciences, The University of Lahore, in August 2024. Participants were enrolled and perioperative outcomes were collected during September and October 2024. The report compares two concurrent clinical care pathways and does not imply randomized allocation.

The target population comprised women aged 40–60 years scheduled for elective laparoscopic hysterectomy under general anesthesia. Eligible participants had American Society of Anesthesiologists physical status I or II and provided written informed consent. Women with chronic opioid use, long-term analgesic use, psychiatric disorders, or communication difficulties that could compromise pain assessment were excluded. Non-probability purposive sampling was used. The target sample was 90 participants, with 45 in each pathway, after allowing for incomplete follow-up beyond the minimum planned group size. Participants were classified as ERAS or conventional care according to the perioperative pathway documented in the clinical record.

Data were recorded on a structured proforma. Preoperative assessment included medical, surgical, obstetric, and menstrual history; physical examination; age; body mass index; parity; hemoglobin; serum sodium and potassium; random blood sugar; and albumin. Surgical indication was categorized as fibroids, prolapse, or abnormal uterine bleeding. Intraoperative measures comprised operative duration, administered intravenous fluid, estimated blood loss, maintenance of normothermia, and use of opioid-sparing multimodal analgesia. Standardized ERAS recommendations informed the intervention components (2–5).

Conventional care included fasting from midnight, routine mechanical bowel preparation with laxatives and/or enemas, preoperative antibiotic prophylaxis, general anesthesia, postoperative intravenous followed by oral antibiotics, non-opioid analgesia with opioids for severe pain, and no systematic emphasis on early feeding or mobilization. ERAS care included optimized preoperative fasting, minimal bowel preparation, standardized antibiotic prophylaxis, multimodal analgesia, early oral intake, and early mobilization.

Postoperative assessments included time to first mobilization, oral-fluid intake, normal diet, urination, bowel sounds, flatus, and stool; timing of urinary-catheter removal; pain scores at 6, 24, and 48 hours; total opioid consumption expressed as morphine equivalents; length of hospital stay from surgery to discharge; and nausea/vomiting, surgical-site infection, urinary-tract infection, and fever. Pain was measured on a 0–10 visual analogue scale, with higher scores indicating greater pain. The 48-hour pain score was the prespecified primary outcome. Using the same proforma and fixed assessment times across groups reduced measurement variation. Group definitions, denominators, ranges, and table totals were cross-checked before analysis.

Data were analysed using IBM SPSS Statistics version 26.0. Normality was assessed with the Shapiro–Wilk test. Normally distributed continuous variables are reported as mean $\pm$ standard deviation and were compared using independent-samples *t* tests; mean differences and 95% confidence intervals were derived where both group means and standard deviations were available. Non-normally distributed continuous variables are reported as median (interquartile range) and were compared using the Mann–Whitney *U* test. Categorical variables are reported as *n* (%) and were compared using Pearson chi-square tests, with continuity correction for two-by-two tables and exact testing when expected cell counts were small. Relative risks with 95% confidence intervals were calculated for binary complications from complete group totals. Analyses were complete-case and unadjusted. Two-sided $p < 0.05$ was considered statistically significant. Written informed consent was obtained from all participants, confidentiality was maintained. Approval was obtained from the Ethical Review Committee of the Faculty of Allied Health Sciences, The University of Lahore (Ref. No.: DRC/DHPT021/05/24) and the study followed the Declaration of Helsinki.

RESULTS

Ninety participants were analyzed, 45 in each care pathway. Group denominators were complete for the reported outcomes. Baseline distributions were generally similar, although mean hemoglobin was 0.41 g/dL lower in the ERAS group (95% CI -0.77 to -0.05 ; $p = 0.025$), indicating a small baseline imbalance.

Table 1. Demographic and baseline laboratory characteristics

Variable	Conventional ERAS care		Difference, 95% CI	p value
Age, years	45.0 (7.0)	47.0 (9.0)	—	0.376
BMI, kg/m ²	26.2 (3.4)	26.5 (4.2)	—	0.897
Parity	3.0 (4.0)	4.0 (4.0)	—	0.932
Haemoglobin, g/dL	11.42 $\pm$ 0.88	11.01 $\pm$ 0.84	-0.41 (-0.77 to 0.025 -0.05)	0.025
Sodium, mEq/L	138.7 (3.1)	139.1 (3.6)	—	0.716
Potassium, mEq/L	3.8 (0.6)	4.0 (0.5)	—	0.056
Random blood sugar, mg/dL	112.76 $\pm$ 15.56	115.64 $\pm$ 13.87	2.88 (-3.30 to 9.06)	0.355
Albumin, g/dL	3.6 (0.6)	3.6 (0.3)	—	0.058

The distributions of surgical indications did not differ significantly between groups ($p = 0.088$). Prolapse was more frequent in the ERAS group, whereas abnormal uterine bleeding was more frequent under conventional care, but these category-level differences were descriptive.

Table 2. Surgical indications

Indication	Conventional care	ERAS	p value
Fibroids	15 (33.3)	17 (37.8)	0.088
Prolapse	13 (28.9)	20 (44.4)	
Abnormal uterine bleeding	17 (37.8)	8 (17.8)	

Intraoperatively, ERAS was associated with a 14.58-minute shorter mean operative duration and 376.6-mL lower mean intravenous-fluid use. Median blood loss was 68 mL lower. Normothermia and multimodal analgesia were delivered to almost all ERAS patients but were less frequent under conventional care.

Table 3. Intraoperative outcomes

Outcome	Conventional care	ERAS	Difference, 95% CI	p value
Operative duration, min	108.56 ± 7.67	93.98 ± 9.73	-14.58 18.25 to - 10.91)	(<0.001
Intravenous fluid, mL	2190.7 ± 163.3	1814.1 183.2	± -376.6 449.3 to - 303.9)	(<0.001
Estimated blood loss, mL	371.0 (53.0)	303.0 (45.0)	-68.0	<0.001
Normothermia maintained, n (%)	18 (40.0)	45 (100.0)	+60.0 percentage points	<0.001
Multimodal analgesia, n (%)	6 (13.3)	44 (97.8)	+84.5 percentage points	<0.001

All ERAS patients mobilized on the day of surgery, 93.3% started oral fluids within 6 hours, and 97.8% resumed a normal diet on postoperative day 1. Median time to bowel sounds, flatus, stool, and first urination was shorter with ERAS. Pain-score differences ranged from -2.2 to -2.3 points over 48 hours, total opioid consumption was 73.4 mg morphine equivalent lower, and median length of stay was 2.9 days shorter (all $p<0.001$).

Table 4. Postoperative recovery, pain, and resource outcomes

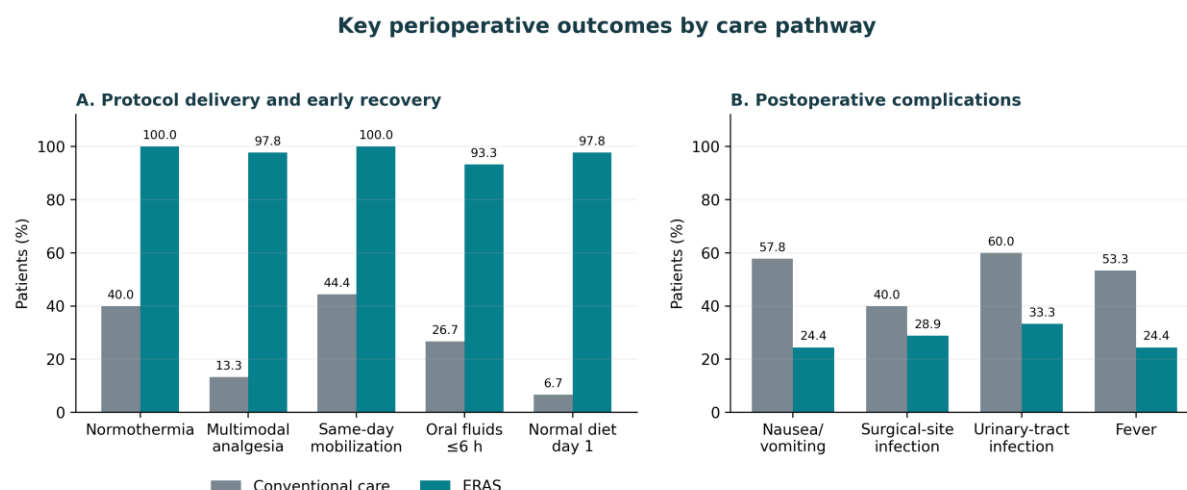
Outcome	Conventional care	ERAS	Difference, 95% CI	p value
Mobilization on day of surgery, n (%)	20 (44.4)	45 (100.0)	+55.6 percentage points	<0.001
Oral fluids within 6 h, n (%)	12 (26.7)	42 (93.3)	+66.6 percentage points	<0.001
Normal diet on day 1, n (%)	3 (6.7)	44 (97.8)	+91.1 percentage points	<0.001
First urination, h	27.0 (6.0)	20.0 (5.0)	-7.0	<0.001
First bowel sounds, h	30.0 (7.0)	19.0 (6.0)	-11.0	<0.001
First flatus, h	35.0 (6.0)	23.0 (6.0)	-12.0	<0.001
First stool, h	53.0 (10.0)	41.0 (9.0)	-12.0	<0.001
Catheter removed same day, n (%)	0 (0.0)	45 (100.0)	+100.0 percentage points	<0.001
Pain score at 6 h	8.6	6.4	-2.2	<0.001
Pain score at 24 h	7.6	5.4	-2.2	<0.001
Pain score at 48 h	6.0	3.7	-2.3	<0.001
Total opioid consumption, mg MEq	109.7	36.3	-73.4	<0.001
Length of stay, days	5.7 (1.1)	2.8 (0.7)	-2.9	<0.001

Nausea/vomiting, urinary-tract infection, and fever were less frequent with ERAS. The relative risks were 0.42, 0.56, and 0.46, respectively, with confidence intervals excluding 1.00. The reduction in surgical-site infection was smaller and statistically imprecise (RR 0.72, 95% CI 0.40–1.30; $p=0.375$).

Table 5. Postoperative complications

Complication	Conventional care	ERAS	Risk ratio (95% CI)	p value
Nausea/vomiting	26 (57.8)	11 (24.4)	0.42 (0.24–0.75)	0.003
Surgical-site infection	18 (40.0)	13 (28.9)	0.72 (0.40–1.29)	0.375
Urinary-tract infection	27 (60.0)	15 (33.3)	0.56 (0.34–0.90)	0.020
Fever	24 (53.3)	11 (24.4)	0.46 (0.26–0.82)	0.010

Figure 1. Protocol delivery, early recovery, and postoperative complications by care pathway.



ERAS produced absolute gains of 55.6–91.1 percentage points in same-day mobilization, oral fluids within 6 hours, and normal diet on day 1, alongside 60.0- and 84.5-point gains in normothermia and multimodal analgesia. Complication rates were lower by 11.1–33.4 percentage points; reductions were statistically supported for nausea/vomiting, urinary-tract infection, and fever, but not for surgical-site infection.

DISCUSSION

This study found that an ERAS pathway was associated with faster perioperative recovery after elective laparoscopic hysterectomy. The largest differences involved processes targeted directly by the pathway—normothermia, multimodal analgesia, mobilization, oral intake, diet, and catheter removal—together with shorter operative duration, less administered fluid and estimated blood loss, lower pain and opioid consumption, earlier gastrointestinal recovery, and shorter hospitalization. Nausea/vomiting, urinary-tract infection, and fever were less frequent, whereas the estimate for surgical-site infection remained compatible with both benefit and no important difference. Because care was not randomized and analyses were unadjusted, these results support association rather than causal effectiveness.

The 2.9-day median reduction in length of stay is directionally consistent with hysterectomy and gynecological ERAS studies, which have commonly reported earlier discharge after pathway implementation (6–9,13–18,21,22). The magnitude in the present study is comparatively large. This may partly reflect a conventional pathway in which early feeding and mobilization were not routinely emphasized and catheters remained until postoperative day 1, creating greater scope for improvement. Length of stay is also influenced by institutional discharge criteria, bed-use practices, and patient expectations; therefore, the absolute difference should not be generalized without accounting for local practice.

Lower pain scores and markedly lower opioid consumption accord with the central ERAS principle of multimodal, opioid-sparing analgesia. Similar reductions in opioid use after minimally invasive gynecological surgery have been reported by Weston et al. and in broader quality-improvement programmes (10,16). Multimodal analgesia can facilitate mobilization and oral intake while reducing nausea, sedation, and gastrointestinal dysmotility (1–5,10). These mechanisms plausibly connect the process measures with the observed pain and recovery outcomes, although this study cannot isolate the independent contribution of each pathway component.

Earlier oral intake, mobilization, and gastrointestinal recovery are also consistent with prospective gynecological studies and randomized evaluations (7–9,15,17). Avoiding prolonged fasting and unnecessary bowel preparation, limiting opioid exposure, using rational fluid therapy, and promoting movement may preserve gastrointestinal function and reduce postoperative deconditioning. The absolute differences in day-of-surgery mobilization and day-1 diet were especially pronounced. These results indicate strong separation between the pathways, but they may also reflect differences in clinical documentation or discharge culture because blinding was not feasible.

The mean reductions in intravenous-fluid administration and operative duration were statistically precise. Goal-directed or restrictive euvolemic fluid strategies are included in ERAS guidance because both fluid excess and hypovolemia can impair recovery (3–5). However, shorter operative time and lower estimated blood loss are not necessarily caused by ERAS alone; surgeon experience, case complexity, uterine size, adhesions, and intraoperative decision-making were not available for adjustment. The baseline hemoglobin difference and the differing descriptive distribution of surgical indications further reinforce the need for cautious interpretation.

The relative risk estimates suggested clinically important reductions in nausea/vomiting, urinary-tract infection, and fever. Reduced opioid exposure offers a plausible explanation for less nausea and vomiting, while same-day catheter removal could reduce catheter-associated urinary morbidity. Variation in diagnostic thresholds and surveillance intensity may have affected the recorded rates, and the absolute UTI and surgical-site infection frequencies were high relative to many contemporary minimally invasive series. These outcomes merit local audit using prespecified definitions, microbiological confirmation where appropriate, and post-discharge follow-up. The non-significant surgical-site infection estimate was imprecise, so absence of statistical significance should not be interpreted as equivalence.

This study contributes context-specific evidence from a Pakistani tertiary-care setting and reports multiple patient-relevant recovery outcomes using equal group sizes and consistent assessment times. The study also documents pathway delivery rather than reporting length of stay alone. Its principal limitations are the single-center non-randomized design, purposive sampling, modest sample size, absence of adjustment for baseline and procedural confounding, lack of blinding, and no reported post-discharge readmission or longer-term functional outcome. Some continuous outcomes were available only as medians without dispersion estimates for pain and opioid consumption, limiting interval estimation. The six-month project period included preparation and analysis, whereas participant data collection occurred over two months, which should be distinguished in future protocols and reports.

Taken together, the findings support structured implementation and prospective evaluation of ERAS for laparoscopic hysterectomy in similar settings. Future multicenter studies should use protocol outcome definitions, measure adherence to each ERAS component, prespecify discharge criteria, include readmission and patient-reported recovery, and apply adjusted or randomized comparisons where feasible. Such work would clarify which elements provide the greatest benefit and whether the large local reductions in length of stay and complications are reproducible.

CONCLUSION

Among women undergoing elective laparoscopic hysterectomy at one tertiary hospital, ERAS care was associated with lower perioperative resource use, less postoperative pain and opioid consumption, faster functional and gastrointestinal recovery, shorter hospitalization, and fewer selected complications than conventional care. These findings support structured ERAS implementation with local monitoring, while the non-randomized design and unadjusted analyses require cautious interpretation and confirmation in larger controlled studies.

REFERENCES

1. Ljungqvist O, Scott M, Fearon KC. Enhanced recovery after surgery: a review. *JAMA Surg.* 2017;152(3):292–298. doi:10.1001/jamasurg.2016.4952.
2. American College of Obstetricians and Gynecologists. Perioperative pathways: enhanced recovery after surgery. ACOG Committee Opinion No. 750. *Obstet Gynecol.* 2018;132(3):e120–e130. doi:10.1097/AOG.0000000000002818.
3. Nelson G, Bakkum-Gamez J, Kalogera E, Glaser G, Altman A, Meyer LA, et al. Guidelines for perioperative care in gynecologic/oncology: Enhanced Recovery After Surgery (ERAS) Society recommendations—2019 update. *Int J Gynecol Cancer.* 2019;29(4):651–668. doi:10.1136/ijgc-2019-000356.

4. Nelson G, Altman AD, Nick A, Meyer LA, Ramirez PT, Achtari C, et al. Guidelines for pre- and intra-operative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations—Part I. *Gynecol Oncol.* 2016;140(2):313–322. doi:10.1016/j.ygyno.2015.11.015.
5. Nelson G, Altman AD, Nick A, Meyer LA, Ramirez PT, Achtari C, et al. Guidelines for postoperative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations—Part II. *Gynecol Oncol.* 2016;140(2):323–332. doi:10.1016/j.ygyno.2015.12.019.
6. Wijk L, Franzen K, Ljungqvist O, Nilsson K. Implementing a structured enhanced recovery after surgery (ERAS) protocol reduces length of stay after abdominal hysterectomy. *Acta Obstet Gynecol Scand.* 2014;93(8):749–756. doi:10.1111/aogs.12423.
7. Inania M, Sharma P, Parikh M. Role of enhanced recovery after surgery in total laparoscopic hysterectomy. *J Minim Access Surg.* 2022;18(2):186–190. doi:10.4103/jmas.JMAS_86_21.
8. Jimenez JCV, Serrano B, Muñoz E, Pérez B, Jimenez Lopez JS, de la Torre J, et al. New surgical realities: implementation of an enhanced recovery after surgery protocol for gynecological laparoscopy—a prospective study. *Perioper Med (Lond).* 2021;10(1):52. doi:10.1186/s13741-021-00221-4.
9. Martin F, Vautrin N, Elnar AA, Goetz C, Bécrot A. Evaluation of the impact of an enhanced recovery after surgery programme on the quality of recovery in patients undergoing a scheduled hysterectomy. *BMJ Open.* 2022;12(4):e055822. doi:10.1136/bmjopen-2021-055822.
10. Geng Z, Bi H, Zhang D, Xiao C, Song H, Feng Y, et al. The impact of multimodal analgesia based enhanced recovery protocol on quality of recovery after laparoscopic gynecological surgery. *BMC Anesthesiol.* 2021;21(1):179. doi:10.1186/s12871-021-01383-7.
11. Weston E, Noel M, Douglas K, Terrones K, Grumbine F, Stone R, et al. The impact of an enhanced recovery after minimally invasive surgery program on opioid use in gynecologic oncology patients undergoing hysterectomy. *Gynecol Oncol.* 2020;157(2):469–475. doi:10.1016/j.ygyno.2020.02.025.
12. Kilpiö O, Härkki P, Mentula M, Pakarinen P. Health-related quality of life after laparoscopic hysterectomy following enhanced recovery after surgery protocol or a conventional recovery protocol. *J Minim Invasive Gynecol.* 2021;28(9):1650–1655. doi:10.1016/j.jmig.2021.02.008.
13. Bisch SP, Nelson G. Outcomes of enhanced recovery after surgery (ERAS) in gynecologic oncology: a review. *Curr Oncol.* 2022;29(2):631–640. doi:10.3390/currncol29020057.
14. Nian J, Li Z, Chen P, Ye P, Liu C. Enhanced recovery after surgery versus conventional postoperative care in patients undergoing hysterectomy: a systematic review and meta-analysis. *Arch Gynecol Obstet.* 2024;310(1):515–524. doi:10.1007/s00404-024-07475-5.
15. Abdelrazik AN, Sanad AS. Implementation of enhanced recovery after surgery in gynecological operations: a randomized controlled trial. *Ain-Shams J Anesthesiol.* 2020;12:70. doi:10.1186/s42077-020-00116-4.
16. Ackert K, Bauerle W, Pellegrino A, Stoltzfus J, Pateman S, Graves D, et al. Implementation of an enhanced recovery after surgery protocol for total abdominal hysterectomies in gynecologic oncology: a network-wide quality improvement initiative. *J Osteopath Med.* 2023;123(10):493–498. doi:10.1515/jom-2022-0204.
17. Agusti N, Vaca A, Segarra-Vidal B, Iniesta M, Mena G, Pareja R, et al. Outcomes of open radical hysterectomy following implementation of an enhanced recovery after surgery program. *Int J Gynecol Cancer.* 2022;32(4):480–485. doi:10.1136/ijgc-2021-003073.
18. Chiewhatpong P, Charoenkwan K, Smithiseth K, Lapisatepun W, Lapisatepun P, Phimphilai M, et al. Effectiveness of enhanced recovery after surgery protocol in open gynecologic oncology surgery: a randomized controlled trial. *Int J Gynaecol Obstet.* 2022;159(2):568–576. doi:10.1002/ijgo.14164.

19. Sauro KM, Smith C, Ibadin S, Thomas A, Ganshorn H, Bakunda L, et al. Enhanced recovery after surgery guidelines and hospital length of stay, readmission, complications, and mortality: a meta-analysis of randomized clinical trials. *JAMA Netw Open*. 2024;7(6):e2417310. doi:10.1001/jamanetworkopen.2024.17310.
20. Iqbal A, ur Rehman H, Ahmad I, Bibi S, Safdar H, Ali L, et al. Optimizing postoperative outcomes: assessing the effect of enhanced recovery after surgery protocols in general surgical patients. *J Ayub Med Coll Abbottabad*. 2024;36(2):359–363. doi:10.55519/JAMC-02-13470.
21. Sami A, Rafiq K, Ahmed Z, Khan M, Noor D, Khan M. Unveiling the impact of enhanced recovery after surgery programs on post-operative morbidity and mortality. *Pak J Health Sci*. 2024;5(9):237–244. doi:10.54393/pjhs.v5i09.1881.
22. Slavchev S, Yordanov A. Enhanced recovery after surgery protocol in minimally invasive gynecological surgery: a review of the literature. *Pol Przegl Chir*. 2023;95(3):34–44. doi:10.5604/01.3001.0015.8700.