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Effect of Enhanced Recovery Protocol on Postoperative Recovery Criteria and Functional Outcomes of Women Undergoing Gynecological Oncology Surgery

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ABSTRACT:

Background: Gynecological oncology surgeries are often associated with significant impairment in postoperative recovery, delayed functional recovery and prolonged hospitalization. Enhanced Recovery Protocol (ERP) integrate evidence-based perioperative interventions to avoid unnecessary interventions, and promote faster recovery in women undergoing gynecological oncology surgery.

Aim: This study sought to assess the effect of Enhanced Recovery Protocol on postoperative recovery metrics and functional outcomes in women having gynecological oncology procedures.

Methods: A quasi- experimental (intervention &control group) design was utilized, at the females' oncology surgical wards and operating theater at Oncology Center Mansoura University. On 102 women chosen by purposive sample according to eligibility criteria from the predetermined setting by using structured interview questionnaire sheet which consisted of demographic characteristics, current surgical history of gynecological oncology women, postoperative recovery criteria sheet and women's functional outcomes sheet.

Results: There was a highly statistically significant difference between the studied groups related to postoperative recovery criteria and functional outcomes, in which women in the intervention group showed markedly earlier recovery across most parameters and had full independence on all items of physical activity and exhibiting greater independence in self-care activity than in the control group.

Conclusion and Recommendations: The study concluded that (ERP) improved postoperative recovery criteria and functional outcomes of women undergoing gynecological oncology surgery. Therefore, providing women with clear and simple education about ERP recommendations is important. Encouraging women to participate actively in their own care may improve their adherence to the protocol, support faster recovery, and reduce the burden on healthcare services.

1. INTRODUCTION:

Gynecological oncology is a specialized discipline focused on the prevention, early identification, diagnosis, and holistic treatment of malignancies impacting the female reproductive system. Treatment is personalized according to the cancer type and stage, as well as the patient's overall health. Surgery remains a cornerstone of treatment, often integrated with chemotherapy, radiotherapy, immunotherapy, or targeted therapies. Recent progress in surgical methodologies, perioperative care, and personalized treatment has led to enhanced clinical results and quality of life. (Fagotti et al., 2024).

Also, gynecological oncology remains a major global health challenge, causing substantial illness and mortality among women. In 2022, approximately 1.47 million new cases and more than 680,000 deaths were reported worldwide. Cervical, endometrial, and ovarian cancers account for a significant share of this burden, with marked differences in incidence and mortality across regions. The burden is particularly high in many low- and middle-income countries, highlighting the urgent need to strengthen prevention, screening, early detection, diagnosis, and access to effective treatment. Addressing these disparities is essential to reduce preventable deaths and improve women's health outcomes (Zhu et al., 2024).

Egypt continues to face a considerable burden of gynecological oncology, particularly ovarian, cervical, and uterine cancers. According to GLOBOCAN 2022, approximately 3,070 new cases of ovarian cancer were reported in Egypt, with 1,944 associated deaths, making ovarian cancer the fourth most common cancer among Egyptian women. Cervical cancer accounted for an additional 1,302 new cases and 820 deaths**.** These figures highlight the need for improved awareness, early detection, timely diagnosis, and effective management of gynecological oncology to reduce cancer-related morbidity and mortality among Egyptian women (Bray et al. 2024).

Women undergoing gynecologic oncology surgery may experience pain, limited mobility, delayed bowel recovery, and postoperative complications**.** Enhanced Recovery After Surgery (ERAS) protocols use evidence-informed, collaborative care to minimize surgical strain and facilitate expedited recovery. Reduced hospital stays, fewer problems, and faster recoveries are all possible outcomes of ERAS, according to studies, all without compromising patient safety. (Azad et al., 2026).

In addition, the Enhanced Recovery Protocol (ERP) is an evidence-based, interdisciplinary strategy to lessen the impact of surgery and hasten the healing process. It includes patient education, proper nutrition and fluid management, shorter fasting periods, effective pain control with less opioid use, appropriate anesthesia, early eating, and early mobilization. In women undergoing gynecologic oncology surgery, ERP can help restore bowel and physical function sooner, reduce complications, and shorten hospital stays without increasing readmission or mortality rates (Nelson et al., 2026).

The implementation of ERP enhances the role of nurses in providing coordinated, patient-centered perioperative care. Through patient education, pain management, early mobilization, nutritional support, and discharge preparation, nurses can promote self-care, improve recovery, and increase patients' confidence in early discharge. Evidence from Egypt also supports the effectiveness of nurse-led enhanced recovery programs in improving postoperative recovery and functional outcomes (Aboushady et al. 2026).

Furthermore, ERP play an important role in gynecological oncology by providing evidence-based, multidisciplinary perioperative care that promotes early and safe recovery. These protocols focus on minimizing surgical stress, optimizing pain management and nutrition, encouraging early mobilization, and reducing unnecessary delays in postoperative recovery. Current evidence supports the use of ERAS pathways to improve perioperative outcomes and facilitate more efficient recovery following gynecological cancer surgery (Nelson et al., 2026).

SIGNIFICANCE OF THE STUDY

Enhanced Recovery Protocol (ERP) have significant potential to improve postoperative recovery and functional outcomes of women undergoing gynecological oncology surgery. These multimodal, evidence-based pathways integrate optimized preoperative preparation, effective multimodal analgesia, early mobilization, and early initiation of oral nutrition, with the aim of reducing the physiological stress associated with surgery and promoting faster recovery. Implementation of ERP has been associated with earlier return of bowel and bladder function, reduced opioid requirements, shorter hospital stays, and earlier restoration of normal physical activities (Cao, et al.,2023).

Furthermore, enhanced recovery may improve patients' functional capacity, independence, and ability to resume daily activities, while reducing postoperative complications and healthcare resource utilization. For women undergoing gynecological cancer surgery, who may experience substantial physical and psychological challenges during treatment, the adoption of ERP can contribute not only to improved immediate postoperative recovery but also to better overall functional well-being and quality of life (O'Neill et al., 2023).

Consequently, evaluating the effect of ERP on specific postoperative recovery criteria and functional outcomes is important for determining their effectiveness and supporting their integration into routine gynecological oncology practice.

Aim of the study

The current study aimed to evaluate the effect of Enhanced Recovery Protocol on postoperative recovery criteria and functional outcomes of women undergoing gynecological oncology surgery.

Research hypothesis

Women who receive ERP will demonstrate significantly greater improvements in postoperative recovery criteria and functional outcomes compared to women receive routine care.

1.1. Research Design

A quasi-experimental (intervention and control group) research design was utilized. A quasi- experimental design provides valuable information for causal relationships between interventions and outcomes by comparing outcomes between two groups of the study: one group that receives an enhanced recovery protocol and one group that receives routine care.

2.2. Study Setting

The study was conducted at Oncology Center Mansoura University (OCMU), Dakahlia Governorate, Egypt, at surgical wards (8th floor) and operating theater (6th floor), with an annual patient flow of rate about 200 cases per year.

2.3. Sample type: A purposive sample was be utilized to conduct the current study.

Study subjects: One hundred and two women (51 control, 51 intervention) who attend to the previously mentioned setting was be chosen according to the following criteria.

Inclusion criteria:

- Age 30 years and above.
- Individuals referred for elective open gynecological oncologic procedures.
- Individuals with total mental clarity.

Exclusion criteria: Patients who;

- Patients who underwent bowel resection.
- Patients with intestinal injuries.
- Patients diagnosed with advanced gynecological malignancies.
- Patients receiving treatment for chronic pain.
- Patients with coagulation disorders, organ failure, or severe cardiac, renal, pulmonary, or hepatic dysfunction.
- Patients with a history of abdominal oncological surgery.
- Patients requiring postoperative admission to the intensive care unit (ICU).
- Have physical disability.

Sample size Calculation

The sample size for studying" Effect Enhanced recovery after surgery program on women with gynecological tumors**"** was calculated using ClinCalc.com/calculating sample size using averages (software). The length of stay decreased from 3.9 ± 2.6 days to 1.9 ± 3.6 days after application of ERAS program (Fernandez et al., 2023), With alpha error of 5% (significance 95%), B error 20% (study power of 80%); the calculated sample size is 51 patients in each group.

2.4. Data collection tools: Three tools were used:

Tool (I): A structured interview questionnaire: It was consisting of two parts.

Part one: Demographic characteristics of gynecological oncology women, such as age, marital status, degree of education, employment, place of living, and BMI.

Part two: Current surgical history of gynecological oncology women**,** includes (main complain, indication of surgery and the recommended surgical approach).

Tool (II): Gynecological oncology women postoperative recovery criteria sheet.

This tool was adapted from (Heeba et al., 2019 & Ibrahim et al.,2023) and modified by the researcher to assess patient postoperative recovery criteria. It includes nursing intervention for the perioperative 3 stages; pre-operative, intraoperative, and post-operative as well as it includes nursing education about importance of early ambulation as (sitting in bed, ambulation out of bed), initiation of oral fluids after surgery, initiation of feeding after surgery, removal of urinary catheter, removal of abdominal drain after surgery, restore of bowel motility, first passage of flatus and stool, length of hospital stays, and postoperative follow-up (postoperative complications and hospital readmission).

Scoring system: Each item was scored as 2 for achieved, 1 for partially achieved, and 0 for not achieved. The total score was calculated and converted into a percentage. A score of ≥75% indicated good postoperative recovery, 50–<75% indicated moderate recovery, and <50% indicated poor recovery.

Tool (III): Gynecological oncology women functional outcomes sheet:

It was adapted from (Aboushady et al., 2026) and modified by the researcher to assess the patient functional status during first 48 hours after surgery. This tool consists of two parts as follows: patient physical function as (turn in bed, sit in bed, move out of bed, get out of bed, and return to sleep in bed) and self-care activity as (urinate and defecate, eat, shower and change clothes and dress) this tool provides a comprehensive evaluation of the patient functional recovery and independence.

Scoring system: The tool was done as follows: (1) indicating to inability to perform the activity, (2) indicating partial dependence, (3) indicating full independence. The total score ranges from 12 to 36 is appropriate for capturing the range of functional abilities that the patient may experiences during early postoperative period, 12 points (unable to perform), 13–24 points (partially dependent), and 25–36 points (fully independent).

Validity of the study tools

Before being used, a panel of five experts from the Woman's Health and Midwifery Nursing department reviewed and judged the study tools for content validity to make sure the questions were consistently conveyed and carried the anticipated meaning that they were prepared for. Modifications were made, such as simplifying the meaning of some questions, rearranging the sequence of some sentences, and paraphrasing some sentences to make them easier for the women to understand. The final form was then used for data collection.

2.5. Pilot Study

To make sure these tools were clear, feasible, and applicable, a pilot research was carried out on 10% (10 women) of the sample before data was collected. It also helped identify any necessary adjustments before the full-scale study, and to estimate the time required to complete the questionnaire. Based on the findings of the pilot study, necessary modifications were made, as refining the data-collection tools, clarifying patient instructions and adjusting the timing of interventions.

Reliability of the study tools

The purpose of the reliability test was to evaluate the measuring tool's consistency—that is, if an instrument measures the same thing every time when used on the same people under the same conditions. The reliability test was validated by administrating the questionnaire to 10 women who used test-retest. Cronbach's alpha reliability coefficient for the women postoperative recovery criteria and functional outcomes were (0.95 and 0.88) which indicated high internal consistency.

2.6. Ethical Considerations

The Mansoura University Faculty of Nursing Research Ethics Committee gave its stamp of approval (No. 766). All participants were made aware that they may leave from the research whenever they wanted without facing any penalties, and participation was entirely voluntary. After thoroughly explaining the goals of the research, all participants were asked to sign an informed consent form. All participants were given the reassurance that their privacy would be protected and that the data that was obtained would be kept secret. They were also told that the results may be used for educational and publishing reasons in the future and would count toward a PhD degree.

2.7. Data collection process

The process was divided into three phases; Preparation, Implementation & Follow up.

I. PREPARATORY PHASE

– The researcher officially acquired authorization from the study setting director during this step. The Arabic version of the data gathering tools was originally created in English, drawing on pertinent national and international literature. The tools' usefulness and clarity were tested in a pilot study.

– The researcher met with the director of the gynecological department and the healthcare team, including surgeons, anesthetists, and nurses, to explain the study aim and the components of the Enhanced Recovery Protocol (ERP) that differed from routine perioperative care according to hospital policy. All potential participants were screened according to the inclusion and exclusion criteria.

– Data were collected over an eight-month period, from beginning of May 2025, to end of December 2025, with data collection conducted three days per week. A total of 102 women who met the study inclusion criteria were recruited from the selected study settings.

– Before initiating data collection, the researcher welcomed each woman, explained the purpose and procedures of the study, introduced the educational booklet, and obtained written informed consent. Confidentiality and privacy were maintained throughout the study, and the data were collected using the pre-developed study tools.

Educational Booklet

– The researcher wrote the teaching pamphlet for the Enhanced Recovery Protocol (ERP) in easy Arabic and backed it up with colorful, informative pictures. The study's administrators and an expert jury looked it over and made some changes. The booklet covered: definition and types of gynecological oncology, hysterectomy approaches and types, possible complications of hysterectomy, definition and goals of ERP, main components of ERP and important postoperative discharge education.

– The intervention group and the control group were each given to eligible women separately using a rigorous alternating allocation approach. During the recruiting phase, participants who met the eligibility criteria were sequentially allocated to either the control or intervention groups; this process would continue until the necessary sample size was reached in both groups. The researcher provided ERP to the intervention group, whereas the control group got standard treatment.

II- Implementation phase.

– At the beginning of the study, the researcher introduced herself to the participants. Baseline data were then collected, each woman was interviewed separately for about 25 minutes by use of a standardized interview questionnaire.

– A period of thirty minutes was allotted to evaluate the demographics and medical background of women with gynecological oncology. If any of the women being interviewed were unable to read or write, the researcher would read aloud each question on the questionnaire and explain its significance before taking her answers.

For the control group (receiving routine care):

- Initially, 51 eligible women were recruited into the control group to obtain baseline data on the routine perioperative care provided to women undergoing surgery. These data were used to identify existing practices and needs and to inform the development of the educational intervention program. The control group was recruited during the first study period (May–

August), before recruitment of the intervention group during the subsequent period (September–December). This sequential recruitment approach was adopted to minimize the potential for contamination between the control and intervention groups.

- Before surgery, the researcher met with each participant and collected data regarding her personal characteristics and current gynecological history. During the control phase, the researcher acted as an observer and recorded the routine perioperative care provided to participants according to the hospital's established policies and procedures. The researcher did not introduce the educational intervention during this phase. Subsequently, the intervention group received the educational intervention (ERP) developed by the researcher.

Routine hospital care was included:

- **Preoperative care** (fasting the night of surgery from 12 am, routine mechanical bowel preparation such as enema and laxative medication. In the morning the patient asked to wear a well-fitting compression stocking before admitting to the operating room).

- **Intraoperative care** In the operating room, the patient underwent general anesthesia with the following medications: 2 to 3 mcg/kg of IV fentanyl, 1.5 to 2.0 mg/kg of propofol, and 0.5 mg/kg of atracurium. The patient was not required to maintain normothermia during the surgery, and the surgeon prescribed intravenous antibiotics.

- **Postoperative care** (Surgeon-prescribed intravenous fluids were maintained until intestinal motility was restored, and women were given a single NSAIDS painkiller, such as 50 mg of diclofenac or 10 mg of perfelgan). Ketorolac 30 mg once every 12 hours or 30 mg all at once was given to the patient in cases of extreme discomfort. There will be no forced rallying. The intestinal motility had returned, and the oral nourishment and evacuation of the abdominal drain were performed.

For the intervention group (applying enhanced recovery protocol)

- The researcher met patients before the surgery to explain the details of ERP to make sure that they were be aware by the protocol that was implemented perioperative. Women were provided face to face instruction and Booklet contain all items of ERP.
- For each patient ERP was implemented immediately, preoperative care within admission at 1st day before surgery, intraoperative care during surgery and postoperative care in the recovery and patient ward at the day of surgery, and 2nd days after surgery. Then the patient was followed up for two weeks from discharge.
- This process was repeated until the sample size was completed.

Preoperative care

– **Patient counseling and education:** The counseling process was initiated by the researcher during the first preoperative visit. It continued with counseling and education prior to admission, which covered anesthesia procedures, nursing care plan details, rehabilitation evaluations (both physical and mental), and impairment identification. Using the ERP booklet as a guide, the researcher explained the program, the patient's hospital stay, and how to start the early release planning process. The study's author explains to women how they may take an active part in their own healthcare.

– **Patient Diet and Preoperative Fasting:** One day before to surgery, all of the ladies were admitted to the hospital. The patients were told to adhere to the hospital's preoperative fasting procedure, which allowed them to eat normally up until the time for solid meals was over and to drink only clear fluids up until two hours before surgery. The researcher followed the preoperative procedure and told the women in the enhanced recovery program (ERP) group to drink 400 mL of a transparent carbohydrate-containing beverage before surgery. This intervention was intended to reduce prolonged fasting and potentially attenuate postoperative insulin resistance and the metabolic stress response to surgery.

– **Mechanical Bowel Preparation:** Routine rectal enemas and mechanical bowel preparation were avoided in the ERP group. This approach was intended to reduce the risk of dehydration and electrolyte disturbances associated with mechanical bowel preparation and to improve patient comfort and satisfaction.

Intraoperative care

The intra-operative Enhanced Recovery Protocol (ERP) focused on maintaining patient safety, preventing complications, and promoting early postoperative recovery. The following components were implemented:

– **Venous thromboembolism (VTE) prophylaxis:** Leg compression was applied, and prescribed anticoagulant prophylaxis, such as heparin or unfractionated heparin, was administered as indicated.

– **Surgical site infection prevention:** Infection-control measures were implemented, including the administration of prophylactic antimicrobial therapy according to the hospital protocol.

– **Minimization of surgical drains:** The use of surgical drains was minimized whenever clinically appropriate.

– **Prevention of hypothermia:** Intraoperative body temperature was maintained using forced-air warming devices and bair hugger air blanket warming system. Additionally, intravenous fluids were warmed before infusion during operation to maintain normal body temperature.

– **Fluid management:** Prescribed intravenous fluids were administered appropriately to maintain adequate tissue perfusion and fluid balance.

– **Opioid-sparing analgesia:** A multimodal postoperative pain-management approach was implemented for women in the enhanced recovery program (ERP) group, with the aim of minimizing opioid exposure and providing effective postoperative pain relief. The analgesic plan was developed in consultation with the gynecological surgeon and anesthesiologist. According to the agreed clinical plan, opioids and non-steroidal anti-inflammatory drugs (NSAIDs) were avoided, and regional anesthesia was administered to each patient as part of the perioperative pain-management strategy.

Postoperative care

– **Postoperative fluid management:** During the first twenty-four hours after surgery, a crystalloids fluid 500 mL was given for fluid control.

– **Postoperative nutrition:** Patients were instructed to begin oral rehydration with warm liquids, progress to semisolid foods like yogurt and overcooked veggies like broccoli and carrots, and finally solid foods two hours later.

– **Pain control:** It was recommended that patients begin their oral feeding regimen early and gradually, starting with liquids like hot beverages two hours after starting the procedure. Then, they should transition to a semisolid diet consisting of yogurt, overcooked carrots and broccoli, and finally, solid meals.

– **Drains and tubes:** When patients were able to go to the bathroom within two to four hours following surgery, it was recommended that they remove all tubes, drains, and the urine catheter as soon as possible.

– **Postoperative mobilization:** Early progressive ambulation was encouraged for patients for the first two hours following surgery. This entails passive leg exercises, changing positions, sitting in bed, sitting in a wheelchair, walking with assistance, and finally walking without assistance four to six times daily. Antithrombotic prophylaxis with LMWH was started after surgery, at least six hours later, and continued as directed.

Assessment of discharge criteria: The ERP group was allowed to leave the hospital once they met all of the strict requirements for discharge, which included: being able to eat enough to feel well, having their pain and discomfort managed with oral analgesics, being able to move around well without help, showing no signs of postoperative complications in the lab or clinical settings, and having enough supervision at home. The intervention group's researchers were given the ERP booklet and given verbal instructions on how to care for themselves at home following surgery before the patients were released from the hospital.

III- Follow up and Evaluation phase:

- This phase began right after the operation was finished, and it involved evaluating the effects of ERP on the intervention group and routine care on the control group in relation to post-operative recovery criteria. These criteria included mobility, tolerance of food and drink, hospital discharge, bowel motility, compliance after surgery, and length of hospital stay.
- Before discharge, women in the intervention group received individualized verbal education regarding postoperative home care and were provided with an illustrated educational booklet designed to accommodate different educational levels.
- Following discharge, the researcher conducted telephone follow-up to evaluate postoperative recovery criteria and document any long-term complications, hospital readmissions, or subsequent need for reoperation.

Statistical analysis

The data that was gathered was then saved, classified, moved into custom-made formats, and subjected to statistical analysis.

We used SPSS for Windows 20.0 (SPSS, Chicago, IL) to conduct all of our statistical analyses. Mean ± and Standard Deviation (SD) were used to represent continuous data that followed a normal distribution. Both numerical and percentage forms of categorical data were used. When comparing variables with categorical data, a chi-square test (or fisher's exact test, if available) was used. To check whether there were any relationships between two variables that included continuous data, the correlation coefficient test was used. All of the surveys that were part of the research had their reliability (or internal consistency) tested. $P<0.05$ was used as the level of statistical significance.

RESULTS

Table (1) demonstrates that 60.78% of women were aged between 51 and 65 years old.70.59% and 54.90% of control &intervention groups, respectively were married. 31.37% and 41.18% of control &intervention groups, respectively had basic education. (86.27% and 78.43%) of control &intervention groups, respectively resided in rural areas. and 50.98% and 56.86% of control &intervention groups, respectively reported having sufficient income. Additionally, 70.59% and 68.63% of control &intervention groups, respectively were housewives.

Figure (1,2&3) demonstrate that there was no statistically significant difference among the control and intervention group regarding to current surgical history $P > 0.05$. In which 86.27% of the control group and 92.16% of the intervention group, respectively complained of abnormal uterine bleeding. Also 92.16% of control group compared to 90.20% of intervention group had endometrial carcinoma which indicated for surgery. Morevere 68.63% of control group compared to 82.35% of intervention group had radical hysterectomy as recommended surgical approach.

Table (2) demonstrated a highly statistically significant difference between the intervention and control groups regarding postoperative recovery criteria ($P \leq 0.001$). Women in the intervention group showed markedly earlier recovery across most parameters. Within 3 hours after surgery, 52.94% of women in the intervention group were able to sit in bed compared with only 7.85% of the control group. Similarly, 74.51% of the intervention group ambulated out of bed within 6 hours, compared with 3.92% of the control group.

Early oral intake was also significantly improved, with 74.51% of the intervention group starting oral fluids within 3 hours and 86.27% beginning oral feeding within 12 hours, compared with 9.08% and 5.88%**,** respectively, in the control group. Urinary catheter removal within 12 hours was achieved in 98.04% of the intervention group versus 11.77% of the control group, while abdominal drains were removed within one day in 96.08% versus 7.84%**,** respectively.

Furthermore, 98.04% of women in the intervention group passed flatus and stool within 20 hours, compared with 47.06% and 29.41%**,** respectively, in the control group. Notably, 90.20% of women in the intervention group experienced a shorter hospital stay, compared with only 9.80% in the control group. However, no statistically significant difference was observed between the two groups regarding hospital readmission rates.

Table (3) demonstrate postoperative physical activity which revealed a highly statistically significant difference between the intervention and control groups across all physical activity domains ($P \leq 0.001$). Women in the intervention group demonstrated substantially greater functional independence after surgery. Full independence in turning in bed, sitting on the bed, getting out of bed, moving around, rising from a sitting position, and returning to sleep was achieved by 82.35%, 80.39%, 68.63%, 72.55%, 70.59%, and 80.39%, respectively, compared with only 3.92%, 7.84%, 5.88%, 5.88%, 7.84%, and 7.84% in the control group. These findings indicate that the intervention was highly effective in promoting early mobility, functional independence, and overall postoperative recovery among women.

Table (4) demonstrated a highly statistically significant improvement in self-care activities among women in the intervention group compared with the control group ($P < 0.001$). Greater independence was observed in urination, defecation, showering, and dressing, with 90.20%, 86.27%, 82.35%, and 88.24% of women in the intervention group achieving independence, respectively, compared with 19.61%, 27.45%, 19.61%, and 27.45% in the control group. However, no statistically significant difference was found between the groups regarding the ability to eat ($P = 0.20$). Overall, these findings suggest that the intervention enhanced women's self-care abilities and promoted greater postoperative independence.

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Table 1: Distribution of studied women according to their demographic characteristics.

General Characteristics		Control group (No.=51)		Intervention group (No. =51)		Significant test
		No	(%)	No	(%)	
Age (years)	30-50	10	19.61	8	15.69	X2= 0.40 P = 0.82
	51-65	31	60.78	31	60.78	
	> 65	10	19.61	12	23.53	
	Mean ± SD	57.92 ± 8.02		59.02 ± 10.45		
Marital Status	Single	2	3.92	1	1.96	X2= 3.76 P = 0.29
	Married	36	70.59	28	54.90	
	Widow	10	19.61	18	35.30	
	Divorced	3	5.88	4	7.84	
Educational level	Not read&write	10	19.61	16	31.37	X2= 5.39 P = 0.25
	Read and write	14	27.45	7	13.73	
	Basic education	16	31.37	21	41.18	
	Secondary education	10	19.61	6	11.76	
	University education & above	1	1.96	1	1.96	
Residence	Rural	44	86.27	40	78.43	X2= 1.08 P = 0.30
	Urban	7	13.73	11	21.57	
Income level	Not Enough	26	50.98	29	56.86	X2= 0.36 P = 0.55
	Enough	25	49.02	22	43.14	
Occupation	Housewife	36	70.59	35	68.63	X2= 0.05 P = 0.83
	Worker	15	29.41	16	31.37	

Figure 1: Distribution of studied women according to their main complain.

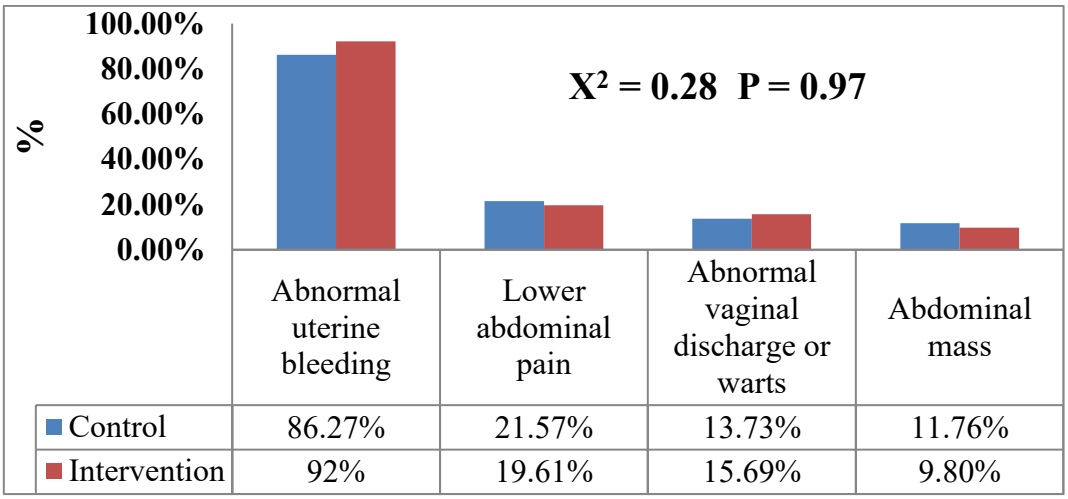
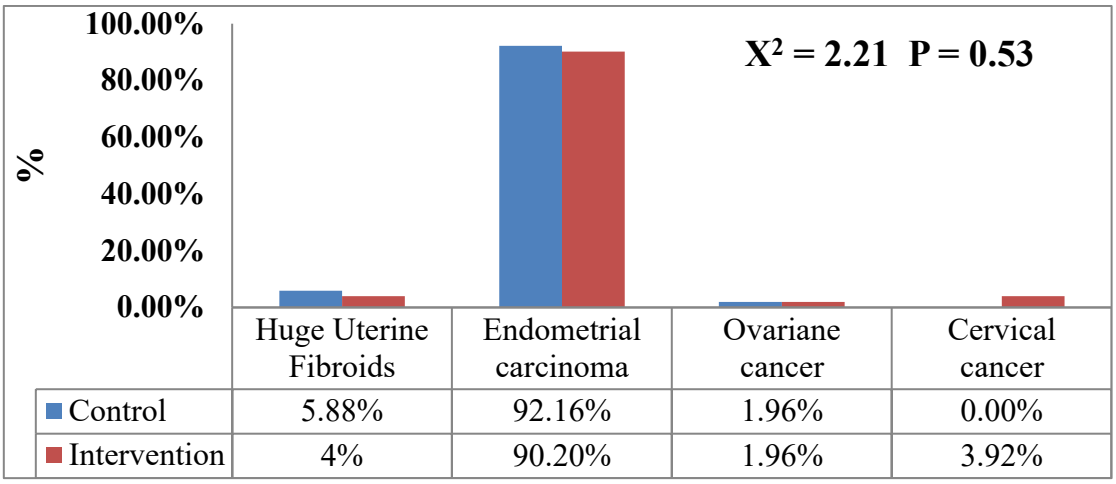
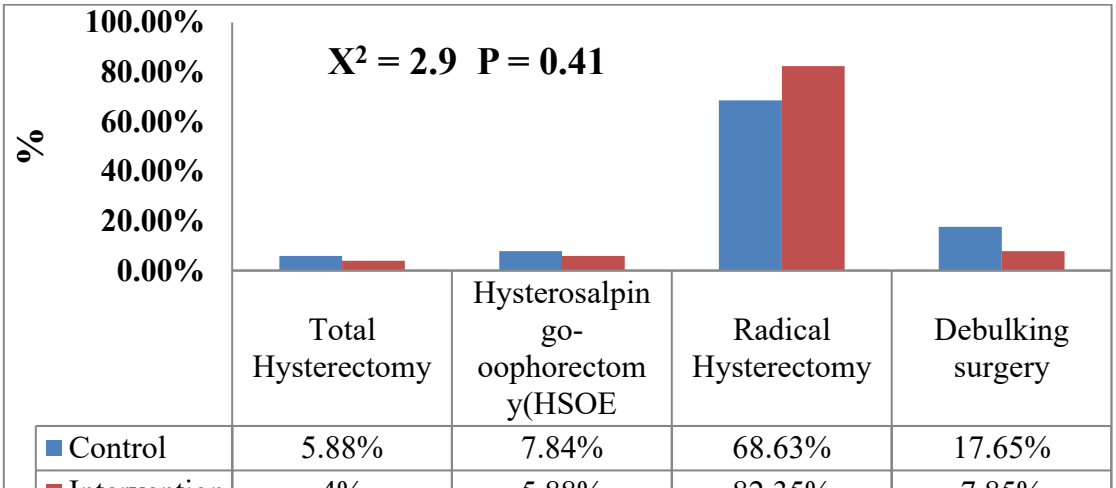


Figure 2: Distribution of studied women according to their indication of the surgery.



	Huge Uterine Fibroids	Endometrial carcinoma	Ovariane cancer	Cervical cancer
Control	5.88%	92.16%	1.96%	0.00%
Intervention	4%	90.20%	1.96%	3.92%

Figure 3: Distribution of studied women according to their recommended surgical approach.



	Total Hysterectomy	Hysterosalpingo-oophorectomy(HSOE	Radical Hysterectomy	Debulking surgery
Control	5.88%	7.84%	68.63%	17.65%
Intervention	4%	5.88%	82.35%	7.85%

Table 2: Distribution of studied women according to their postoperative recovery criteria.

Postoperative recovery criteria	Control group (No.=51)	Intervention group (No.=51)	Significant test
	Mean ± SD	Mean ± SD	
Sitting in bed after surgery (per hours)	6.08 ± 1.94	2.49 ± 0.98	T = 11.80 P < 0.001**
Ambulation out of bed (per hours)	12.20 ± 3.11	4.39 ± 2.92	T= 13.07 P < 0.001**
Initiation of oral fluids after surgery (per hours)	8.57 ± 3.50	2.35 ± 1.25	T= 11.95 P < 0.001**

Initiation of feeding after surgery (per hours)	27.47 ± 7.91	6.88 ± 4.55	T= 16.11 P < 0.001**
Removal of urinary catheter after surgery (per hours)	14.67 ± 6.52	2.70 ± 2.05	T = 12.51 P < 0.001**
Removal of abdominal drain after surgery (per days)	2.12 ± 0.55	1.04 ± 0.20	T= 13.18 P < 0.001**
Bowel motility (first passage of flatus per hours)	21.88 ± 2.54	12.47 ± 2.18	T= 20.08 P < 0.001**
Bowel motility (first passage of stool per hours)	44.23 ± 6.11	22.98 ± 4.16	T= 20.53 P < 0.001**
Hospital length of stay (per days)	5.23 ± 1.02	3.24 ± 0.79	T= 11.02 P < 0.001**

** Highly statistically significant (p<0.001)

Table 3: Distribution of studied women according to their postoperative physical activity.

Physical activity: - woman are able to		Control group (No.=51)		Intervention group (No.=51)		Significant test
		No	(%)	No	(%)	
Turning on the bed	Inability to perform	19	37.26	0	0.00	X2= 66.67 P < 0.001**
	Partial dependence	30	58.82	9	17.65	
	Full independence	2	3.92	42	82.35	
Sitting on the bed after surgery	Inability to perform	9	17.65	0	0.00	X2= 55.76 P < 0.001**
	Partial dependence	38	74.51	10	19.61	
	Full independence	4	7.84	41	80.39	
Getting out of the bed	Inability to perform	21	41.18	2	3.92	X2= 46.77 P < 0.001**
	Partial dependence	27	52.94	14	27.45	
	Full independence	3	5.88	35	68.63	
Moving out the bed	Inability to perform	7	13.73	1	1.96	X2= 47.92 P < 0.001**
	Partial dependence	41	80.39	13	25.49	
	Full independence	3	5.88	37	72.55	
Get up from sitting position	Inability to perform	9	17.65	1	1.96	X2= 47.92 P < 0.001**
	Partial dependence	38	74.51	14	27.45	
	Full independence	4	7.84	36	70.59	
Return to sleep in the bed	Inability to perform	9	17.65	1	1.96	X2= 54.72 P < 0.001**
	Partial dependence	38	74.51	9	17.65	
	Full independence	4	7.84	41	80.39	

Table 4: Distribution of studied women according to their postoperative self-care activity.

Self-care activity		Control group (No.=51)		Intervention group (No.=51)		Significant test
		No	(%)	No	(%)	
Ability to urinate	Inability to perform	5	9.80	0	0.00	X2= 51.58 P < 0.001**
	Partial dependence	36	70.59	5	9.80	
	Full independence	10	19.61	46	90.20	
Ability to defecate	Inability to perform	2	3.92	0	0.00	X2= 36.18 P < 0.001**
	Partial dependence	35	68.63	7	13.73	
	Full independence	14	27.45	44	86.27	
Ability to eat	Inability to perform	2	3.92	0	0.00	X2= 3.25 P = 0.20
	Partial dependence	12	23.53	8	15.69	
	Full independence	37	72.55	43	84.31	
Ability to take shower	Inability to perform	4	7.84	1	1.96	X2= 40.18 P < 0.001**
	Partial dependence	37	72.55	8	15.69	
	Full independence	10	19.61	42	82.35	
Ability to Dress up	Inability to perform	4	7.84	0	0.00	X2= 38.98 P < 0.001**
	Partial dependence	33	64.71	6	11.76	
	Full independence	14	27.45	45	88.24	

4. DISCUSSION

The present study aimed to evaluate the effect of an enhanced recovery protocol (ERP) on postoperative recovery criteria and functional outcomes among women undergoing gynecological oncology surgery. The findings demonstrated that women who received care according to the ERP achieved significantly better postoperative recovery and functional outcomes than those who received conventional perioperative care. These findings support the study hypothesis that implementing an ERP can improve postoperative recovery and functional outcomes in women undergoing gynecological oncology surgery.

The current investigation found that the control and intervention groups were quite similar across all elements of the individuals' general characteristics and current surgery history. Statistical analysis revealed no significant differences between the two groups for most of the factors that were considered. Baseline comparability lends credence to the study's internal validity and lends credence to the idea that any discrepancies in postoperative outcomes were likely due to the ERP's implementation rather than participants' inherent differences.

Regarding presenting complaints, the present study results show that abnormal uterine bleeding was the most frequently reported symptom in both groups, followed by lower abdominal pain, abnormal vaginal discharge or warts, and abdominal mass. This finding was consistent with Ferghali et al. (2020) who reported that abnormal uterine bleeding was the most common presenting symptom among women with advanced endometrial cancer, followed by abdominal or pelvic pain.

The predominance of abnormal uterine bleeding in the present study was expected, as most women were diagnosed with endometrial carcinoma. This finding agreed with How et al. (2024) that abnormal uterine bleeding was well established as the most common presenting symptom of endometrial cancer, often occurring early in the disease course and prompting women to seek medical evaluation. Other symptoms, including pelvic or lower abdominal pain and abnormal vaginal discharge, may occur particularly with more advanced disease. The comparable distribution of presenting symptoms between the intervention and control groups suggests that both groups had similar clinical characteristics and symptom burden before surgery, thereby supporting the comparability of the two groups at baseline.

Concerning surgical indications, endometrial carcinoma constituted the overwhelming majority of cases in both groups, whereas ovarian cancer, cervical cancer, and large uterine fibroids represented a smaller proportion of surgical indications. This finding

was consistent with Wahba et al. (2024), who reported that endometrial carcinoma was the most common malignancy of the female genital tract in their study of Egyptian women. The predominance of endometrial carcinoma in the present study may therefore reflect its important contribution to the gynecological cancer burden in Egypt. The absence of a significant difference in surgical diagnoses between the two groups further suggests that the women were comparable regarding their underlying oncological diagnoses at baseline.

The present study demonstrated that women in the intervention group achieved significantly faster and better postoperative recovery than those in the control group. They showed earlier mobilization, oral intake, removal of urinary catheters and abdominal drains, faster return of bowel function, and shorter hospital stays, while hospital readmission rates remained comparable between groups. These findings indicate that the intervention effectively promoted early functional recovery and reduced postoperative hospitalization.

Early mobilization was an essential component of enhanced postoperative recovery, as it helps restore functional independence and reduce the adverse effects of prolonged immobilization. In the present study, women in the intervention group achieved significantly earlier mobilization than those in the control group. This finding was consistent with Tong and Qin (2025), who reported that ERAS-based perioperative nursing significantly increased the proportion of women who ambulated within 24 hours after gynecological cancer surgery, while also improving overall functional recovery and reducing postoperative complications. The present study showed that women receiving the ERP were able to sit in bed, ambulate, and initiate oral fluids earlier after surgery, with highly statistically significant differences between the groups. These findings were consistent with Bourazani et al. (2025), who reported that women undergoing gynecological oncology surgery under an ERP achieved significantly earlier mobilization and oral feeding compared with those receiving conventional care. The researcher concluded that ERP promotes faster functional and gastrointestinal recovery through coordinated early mobilization and enteral intake.

Similarly, Kim et al. (2024) found that patients managed according to ERP experienced greater postoperative physical activity and improved patient comfort, resumed ambulation and tolerated oral intake significantly earlier than those compared with those receiving conventional care. These findings support the present study and suggest that early mobilization and oral intake are important components of enhanced postoperative care that can facilitate faster recovery and improve patients' postoperative experience. Also, the intervention group demonstrated significantly earlier removal of urinary catheters and abdominal drains. Early removal of these devices can reduce discomfort, facilitate mobilization, and decrease the risk of device-related complications. This finding was consistent with Mac Curtain et al. (2023), who reported that ERP were associated with earlier removal of drains and urinary catheters, as well as shorter hospital stays. Therefore, the significantly earlier removal of urinary catheters and abdominal drains observed in the intervention group may reflect the effectiveness of the enhanced recovery approach in minimizing unnecessary invasive devices, facilitating early ambulation, reducing device-related discomfort and complications, and promoting a faster overall postoperative recovery.

Recovery of bowel function, indicated by the first passage of flatus and stool, occurred significantly earlier in the intervention group. Early oral intake and other ERAS components may enhance gastrointestinal motility and reduce postoperative ileus, resulting in faster bowel recovery and shorter hospitalization. This finding was consistent with Charoenkwan et al. (2024), who reported that early feeding after major gynecological surgery may accelerate bowel function recovery and shorten hospital stay.

One of the most clinically important findings of the present study was the significant reduction in hospital length of stay. Most patients in the intervention group were discharged within 2–3 days, whereas the majority of those in the control group remained hospitalized for more than four days. These findings add to the growing body of evidence supporting the effectiveness of Enhanced Recovery Protocol (ERP) principles in reducing hospitalization while maintaining patient safety.

The current results corroborated those of a previous study by Sauro et al. (2024) that found ERPs to be safe and effective. A 2024 meta-analysis of 74 randomized clinical studies comprising 9,076 patients indicated that ERP decreased hospital length of stay by roughly 1.9 days without substantially changing 30-day readmission rates. The results of the current research, which found that ERP led to quicker hospital release without affecting readmission, are supported by these findings.

The present study demonstrated better achievement of postoperative physical activity among patients receiving (ERP), supporting the role of early mobilization as a key component of enhanced recovery. This finding was consistent with Aboushady et al. (2026) who reported a markedly higher proportion of women in the intervention group achieving full independence in

turning in bed, sitting, getting out of bed, moving around, rising from a sitting position, and returning to bed. These findings indicate improved postoperative functional recovery among women receiving ERP.

The findings of the present study indicate that the ERP intervention was associated with substantially greater independence in postoperative self-care activities**,** particularly urination, defecation, showering, and dressing. The only activity that did not demonstrate a statistically significant difference was eating. These results were broadly consistent with the ERAS literature demonstrating that early mobilization, early nutrition, appropriate pain management, and reduction of unnecessary tubes and drains can accelerate postoperative functional recovery

The present study was supported by Tsui et al. (2025), who conducted a randomized clinical trial among women undergoing major gynecologic oncology surgery. The researchers found that women managed with an ERAS protocol achieved significantly earlier mobilization, feeding, bowel recovery, and removal of urinary catheters and drains than those receiving conventional care. These improvements in postoperative recovery milestones may explain the higher levels of independence in urination, defecation, showering, and dressing observed among women in the intervention group in the present study.

CONCLUSION AND RECOMMENDATIONS

Based on the present study results and research hypothesis, it concluded that implementation of Enhanced Recovery Protocol (ERP) in women undergoing gynecological oncology surgery was associated with significant improvements in postoperative recovery criteria and functional outcomes compared with conventional perioperative care.

In light of the study findings, the following recommendations are suggested:

- Enhanced Recovery Protocols (ERP) should be incorporated into routine perioperative care for women undergoing gynecological oncology surgery to improve post-operative recovery criteria and functional outcomes.

- Healthcare institutions should provide structured education and training programs for multidisciplinary healthcare teams regarding the implementation of evidence-based enhanced recovery protocols.

- Standardized perioperative care pathways should be developed and adopted to facilitate early mobilization, optimized pain management, early enteral nutrition, and promotion of patient self-care activities.

FUTURE RECOMMENDATIONS

- Future multicenter studies with larger sample sizes are recommended to validate the present findings and enhance their generalizability.

- Investigate the long-term effects of ERP on quality of life, readmission rates, healthcare costs, and oncological outcomes.

- Evaluate the effectiveness of individual ERP components to identify the most influential interventions contributing to improved postoperative recovery.

- Continuous monitoring and quality-improvement programs should be established to assess adherence to ERP and ensure sustainable implementation in gynecological oncology settings.

2. Declaration of Conflicting Interests

The authors declared that this work has no conflicts of interest.

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