Outcome of Implementing Enhanced Recovery Protocol after Laparotomy Surgery

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Abstract:

Background: The postoperative period following laparotomy surgery presents many challenges to patients, clinicians, and nurses. Enhanced Recovery after Surgery (ERAS) Protocol is an evidence-based intervention that aims to advance recovery for surgical patients, even though such protocols introduced across the globe, comprehensive implementation are not common. **Research aimed** to study the effect of implementing enhanced recovery protocol after laboratomy surgery on patients' daily living activities, post-operative functional outcome ability, patient satisfaction & length of hospital stay of the study group compared to the control group. **Methods:** A quasi-experimental research design, with pre-post-test was used. The study was conducted in New Surgery Building, Zagazig University Hospitals on 212 Patients who undergoing laparotomy surgery. The subjects were randomly enrolled at control and study groups. **Tools**: an interviewing questionnaire that included five parts: demographic data, activities of daily living scale, functional abilities scale, patient satisfaction questionnaire, and surgical pain scales. **Results**: The total activities of daily living mean scores of the study group at 12 to 24 hours post-surgery were 10.15±2.75 and 14.32±2.30, while in the control group were 7.68±1.93 and 11.38±3.14, respectively, patients in study group were less suffering from pain & not needs an analgesic compared to controlled group, the total functional outcome abilities of the study group at 8-12 hours and at 24 hours post-surgery mean scores were 7.62±1.77 and 8.19±1.59, while the control group were 6.83±0.97 and 7.90±1.22 respectively, 71.7% of patients in the study group were satisfied at discharge, while only 24.5% of patients in the control group ,a highly positive correlation between activities of daily living, functional outcome abilities, and patient satisfaction mean score of length of stay at the hospital at the control study was 9.71, while the study group was 7.32 . By comparing mean scores of studied groups, a statistically significantly difference were detected related to all study variables ($P<0.05$). **Conclusion:** This study highlighted the application of ERAS protocol is associated with improving daily living activity for patients post laparotomy surgery, decreasing the length of hospital stay as well as needing to pain analgesic and increasing patients' satisfaction. Researchers strengthen that adherence to ERAS protocol guidelines improves postoperative functional outcomes among postoperative patients. **Recommendation:** A standardized ERAS programs should be implemented in future in major surgical specialties & must foster researchers as well as hospitals on this important topic.

Keywords: Outcome; Enhanced recovery protocol; Laparotomy Surgery; Activates of Daily Living; Satisfaction

Introduction:

Approximately 321 million surgical procedures are performed annually worldwide, and the number is expected to rise with advances in technology and improvements in healthcare **(Li & Jensen, 2019).** Persistent pain, gut dysfunction, and immobility often impede postoperative recovery and prolong hospitalization. Actions to support a return to baseline function can be taken without compromising patient safety. The enhanced recovery after surgery (ERAS) protocol have been developed and increasingly studied over the last few decades to improve patient

outcomes and accelerate surgical recovery **(Ismy et. al. 2021).**

The ERAs, is a patient center approach that provides standardized evidence-based components of care to patients undergoing specific types of surgery. To date, ERAs has largely been applied to elective surgery but there is now evidence that high-risk surgical patients such as those undergoing laparotomy, can also benefit significantly from an ERAs approach **(Ore et. al. 2020).** Common causes to laparotomy are intestinal obstruction, perforation, and exploratory laparotomy with or without wound debridement or abscess drainage **(Schwartz et. al. 2019).**

Despite recent improvements, laparotomy remains one of the highest risks surgical procedures with about one in ten patients deceased 30 days after surgery, rising to one in four over the age of 80 years. Complications are common and mortality increases until at least 1 year. Functional outcomes and return to independence can also be poor in survivors **(Lode et. al. 2021).** Activities of daily living (ADLs) are self-care activities that are important for health maintenance and independent living. The ADLs are life-sustaining self-care activities such as feeding, grooming, bathing, dressing, toileting, and ambulation **(Fish, 2011)**

The ERAS programs have transfigured perioperative care in elective surgery, and their positive effects are globally acknowledged **(Quiney,et.al.2016)** .The key components of ERAs includes: preoperative counseling, patient optimization earlier to admission, minimal fasting that optimally includes a carbohydrate drink and at a minimum a clear fluids up until two hours before anesthesia, goal directed fluid therapy, return to normal diet and activities within 24 hours of surgery; and return to home in an accelerated time frame **(Nelson et.al, 2016)** & early mobilization **(Brown, et.al.2018)** . The ERAS leads to significant improvements in patient satisfaction**,(Sibbern, et.al.2017 & Street 2019**) outcomes **(Bisch, et.al. 2018)** & have tremendous clinical values and important implication for health systems in general (**Pramod, et,al.2020)**

The ERAS approach focuses on reducing perioperative stress and restoring function so that patients recover more quickly after surgery, reduce the risk of complications, hospitalization days, and reduced the health service burden. An ERAS protocol is divided into three phases: Pre-operative, intra-operative, and post-operative. It often begins before the patient's admission to the hospital and continues after discharge. The active participation of patients is required throughout the program **(Amson et. al. 2021).**

The ERAs approach is based on four principles without delivering can't implementing it, these principles includes: the patient must be partner in their own care, in best condition perioperative, has best evidence based management preoperative & experience best care and rehabilitation. Care impact on patient outcomes remains ambiguous and there is still a lack of standardization methods to ascertain outcomes. This uncertainty contributes to partial protocol implementation at hospitals. Higher compliance with the protocol can improve surgical outcomes through decreased morbidity and shortening the length of hospital stay **(Gianotti, et.al.2020 & Małczak et.al. 2020)**.

Significant of the study:

Globally, 26.8% of patients who underwent major surgery had postoperative complications, and 24.3% of those who underwent low abdominal surgery developed complications **(Nelson et al., 2019).** The ERAS protocol is an evidence-based intervention that aims to advance recovery for surgical patients, even though ERAS protocols introduced across the globe, comprehensive implementation is not common. This research aimed to study the effect of implementing enhanced recovery protocol after laboratomy surgery on patients' daily living activities, post-operative functional outcome ability, patient satisfaction & length of hospital stay of the study group compared to the control group.

The aim of the study

The aim of the study was fulfill out through the following objectives:

- Assess effects of implementing enhanced recovery protocol after laboratomy surgery on

patients' daily living activities as a studied group compared to control group

- Evaluate effects of implementing enhanced recovery protocol after laboratomy surgery on post-operative functional outcome ability as a studied group compared to control group

- Determine effects of implementing enhanced recovery protocol after laboratomy surgery on patient satisfaction & length of hospital stay as a studied group compared to control group

Subject & Methods:

Hypothesis:

H: The application of enhanced recovery protocol after laboratomy surgery had a positive effect on patients' daily living activities, post-operative functional outcome ability, patient satisfaction & length of hospital stay of the study group compared to the control group.

Research design

The current study used a quasi-experimental research design with study-control groups and a pre-posttest to achieve research goal.

Setting: The study was conducted in New Surgery Building at Zagazig University Hospitals, it occupied with 650 beds, 250 surgical beds for general surgery for both males and females, and 8-10 major Laparotomy surgeries conducted daily.

Sample Size: Based on Open Epi with 95% confidence interval, type 1 alpha error 0.05, type 2 (1-B error 80%), number of response distribution 50% the estimated sample size was 212 (106 in each group). The control group received routine perioperative care (fasting from midnight, change position as patient tolerate only, administer analgesic within 4hrs from surgery, maintain on iv fluid therapy until defecate or passing gas) after the laparotomy while, the study group received the enhanced recovery protocol as in the **CONSORT diagram**.

Participants: All consecutive patients admitted to previously mentioned setting who undergoing to laparotomy surgery were selected & enrolled at control and study group randomly.

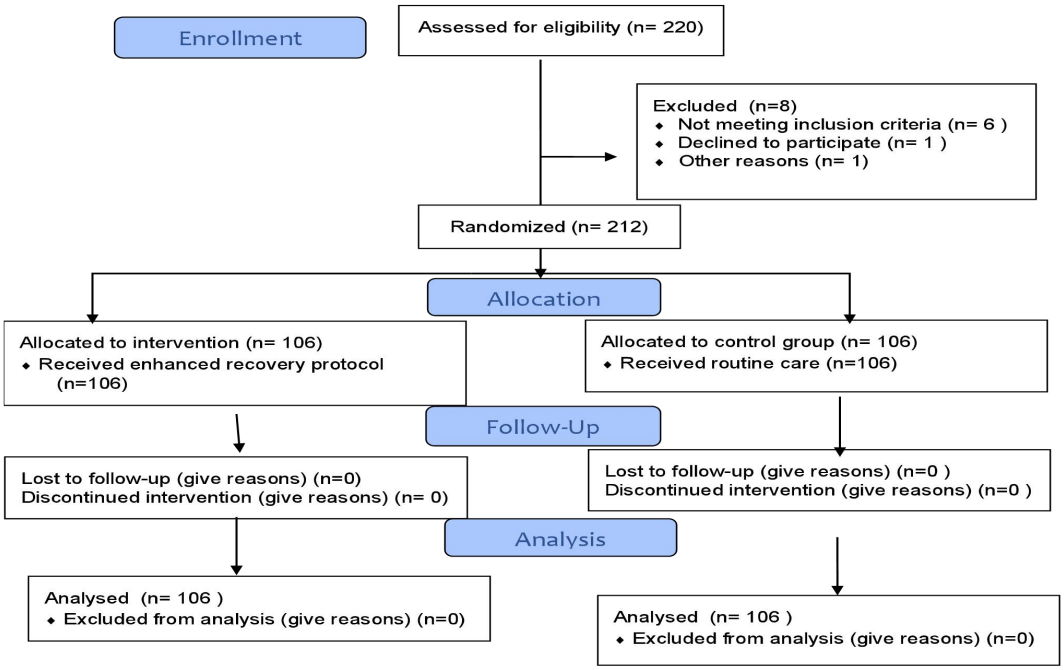


Fig (I) Consort Flow Diagram For the study

Moher, Schulz &Altman. The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomized trials. JAMA 2001;285:1987-91.

Inclusion criteria:

Patients undergoing laparotomy operations, age between 18 and 50 years old & both genders.

Exclusion criteria:

Patient with HBG less than 12g/dl, clinically evident organ dysfunction, current infections or bleeding , body mass index more than 30 and who needed to ICU admission post-surgery.

Randomization: The study group was given 106 odd numbers, while the control group was given 106 even numbers. Participants were assigned a number, which was written on a small chit kept in a box.

Tools of data collection:

An Arabic interviewing questionnaire tool including main five parts

- **Demographic Characteristics** of studied patient's that included seven questions covered age, gender, education level, co morbidity, exercise, length of stay at the hospital and body mass index.
- **Bristol Activities of Daily Living Scale** intended to measure the daily living activity of studied patients. The original form includes 20 item questions, researchers was modified it to be suitable for surgical patient (select only six slandered of ADL), items rated on a four point scale and Scores ranged from 0: independent – 3: dependent and 4: not applicable. Maximum score was 24, 0 = totally independent 24 = totally dependent (**BUCKS et al., 1996**).
- **Functional Abilities:** It was included nine items sitting, standing, walking, returning bowel sound, withdrawal of Intravenous fluids (IV), Nasogastric tubes (NG) & Foley's catheter withdrawal, initiating sips of oral fluids, and needs to pain analgesic. Each function scored yes (scored 1), no (scored 0). The total score was nine scores (**Corniola & Meling, 2021**).

Patient satisfaction questionnaire short form (PSQ-18) , it contained 18 items of five-point Likert scales ranging from 5=strongly agree to 1= strongly disagree, taping each seven dimension of satisfaction with medical care: general satisfaction(items 3&17), technical quality(items 2,4,6&14), interpersonal manner(items 10&11), communication(items 1&13), Accessibility & convenience(items 8,9,16&18) . Time spent with doctor & financial aspects were ignored from the scale it not relevant for research objectives, it is intend to assess studied group for implementing ERAS protocol & traditional nursing care to control group, (**Marshall, & Hays 1994**). All items were scored; where a high scored reflect satisfaction. Scale scores represent the average for all items that answered. Items 1,2,3,5,6,11,15 & 1 scored value ranged from 5 to 1 , while items 4, 7, 9, 12, 13, 14,16,&17 were scored value from 1 to 5.

- **Surgical Pain Scales (SPS)** that consisted of four visual analog scales that measured pain at rest pain during normal activities pain during exercise and pain unpleasantness was used to assess studied patient response to pain post operatively (**Myles, et.al. 2017**).

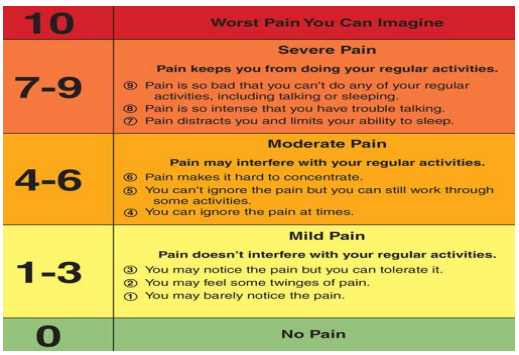


Figure II. Allina health's patient education department, surgery: what you need to know, surg-ah-21686

A pilot study was conducted on a group of 22 patients (10%). It was conducted prior-to data collection to assess the feasibility and

duration of data collection, modification was carried out, accordingly. Pilot sample were excluded from the study.

Validity: A group of three experts in medical-surgical nursing, faculty of nursing Zagazig University and one specialized abdominal surgeon (faculty of medicine Zagazig University) ascertained the ERAS protocol content's validity; their opinions were elicited regarding the format, layout, consistency, accuracy, and relevancy of the tools.

Reliability: The adapted tools were tested for their reliability by using Cronbach's alpha coefficient test in SPSS program version 24 by a statistician. The Internal consistency reliability (Cronbach's α) for activity daily living was 0.912; function activity was 0.845, and patient satisfaction was 0.903

Study filed work:

This study was carried out through a period of six months from the beginning of June (2021) to December (2021).The researchers visited the hospital three times per week. The time needed for every patient in the studied group was difficult to estimate as it was different from one patient to another according to tolerance to ambulatory and ERAS intervention but it ranged from 1-2 hrs. The time needed for every patient in the controlled group was 30 minutes for filling questionnaires. The researchers assessed the participants' daily living activity & their post-operative functional outcome ability and pain suffering even three times, or two times post-surgery for both groups & finally assess their satisfaction at discharge and calculate time spent at hospital.

Enhanced Recovery Protocol:

I. Preparatory Phase:

Researchers were extensively reviewing the current related literature to design the ERAS protocol (**Jan, 2016, Pearsall, et.al.2107 & NICE. 2020**). Meeting with each patient one day before surgery and explaining the aims of research and get verbal consent. Collect demographic data. Take vital signs, height and weight to calculate body mass index. Check patient file for complete blood count, coagulation profile, fasting blood sugar to ascertain that patients past medical history.

II. Implementing Phase:

Preoperative intervention

General brief health assessment was done, patient & family counseling regarding surgery (aim, benefit, time per hrs. &possible discomfort), encourage the patient to ask questions and be active participant in care decisions, preoperative fasting (light meal up to 6 hours) and only two hrs. for liquid before surgery the only liquid provided was apple juice or clear fluid, oxygen was administered, thromboembolic prophylaxis (elastic stocking with LLE), scheduled antibiotics as well as nausea and vomiting prophylaxis, avoidance of enema, teach breathing & coughing exercise & emotional and psychological support.

Intra-operative intervention

Keeping warm temperature in operating room (accommodate humidifier) to suitable temp (25 °C), no tourniquet was used during the operation, anesthetic agents same based on hospital protocols & IV fluid management to maintain normo-volemia.

Postoperative intervention (patient in studied group)

Head of bed put at 30°, removal of Nasogastric tube within six hrs. , encourage to dangle on the side of their bed, mobilized early from first day (sitting, move lower limbs, standing & walking4 times a day), siting up in a chair while awake, sipping of warm water within four hrs. 30ml/h for four, early postoperative ingestion of clear fluids for six hrs., encouraging to take semi-liquid diet on 2nd day of surgery, analgesic agent was the same for both studied groups, breathing & coughing exercise , providing the patient with written pamphlets, handouts and web resources

for seek assistance, discussing discharge planning including medication, nutrition, wound care & follow up time.

Ethical Consideration:

The research was approved from research ethics committee in the faculty of nursing Zagazig University then researcher were met the hospital administrative for explaining the research goals and steps to gain agreement for application as well as explaining to participant individually pre collect data , verbal consent was gained & given an opportunity to refuse participation.

Statistical Analysis

The collected data were coded and entered into the statistical package for social sciences (SPSS) (SPSS Inc; version 24; IBM Corp., Armonk, NY, USA). After completing the entry, the data was explored to detect any errors. Then, it was analyzed by the same program for presenting frequency tables with percentages. Qualitative data was presented as a number and percent. Furthermore, quantitative data was described as mean or standard deviation, as appropriate. In multiple linear regressions, numerous explanatory variables are used to predict the outcome of a response variable. The Chi-square probability distribution is particularly useful in analyzing categorical variables. An inferential statistic t-test was used to determine if there was a significant difference between the means of the two groups. Pearson Correlation coefficients used to measure the strength of the linear relationship between two variables. The results were considered statistically significant at $P \leq 0.05$ and highly significant at $P < 0.01$.

Results:

Table (1) reveals that the mean age score of the study group was 38.98 ± 4.39 and the control was 39.50 ± 5.62 years. 56.6% and 52.8% of the study and control group were females. Also, there was no significant difference between the study and control groups related to education level and morbidity variables at p-value >0.05. In addition, 83.9% of patients in the study group irregularly did exercise, while 85.8% of patients in the control group irregularly did the exercise with no significant difference at p-value >0.05.

Table (2) detects that the mean score of patients' mobility of lower limbs and moving from side to another at 6 hours post-surgery was 2.01 ± 0.20 in the study group, while 1.69 ± 0.25 at control with a significant difference at p-value <0.05. According to patients' ability to drink at 10 hours post-surgery mean score in the study group was 2.59 ± 0.23, while the control was 2.07 ± 0.16 at p-value <0.05. According, to toileting at six- and eight-hours post-surgery there was a slightly significant difference between the study and control group at p-value <0.05. Furthermore, related to hygiene and dressing there was a significant difference between the study and control groups at six & eight hours post-surgery at p-value >0.05. Finally, according to total activities of daily living mean scores of the study group at 12 to 24 hours post-surgery were 10.15±2.75 and 14.32±2.30, while the control group were 7.68±1.93 and 11.38±3.14, respectively with a significant difference between the two groups at p-value <0.05.

Table (3) summarizes the functional abilities outcome of the patients in studied groups. It showed that the mean score of sitting function at four hours post-surgery was 0.88 ± 0.09 in the study group, while 0.74 ± 0.12 in the control one with a significant difference at p-value <0.05. According to standing function at six hours post-intervention mean score at study group was 0.85 ± 0.07, while in the control one was 0.69±0.05 at p-value <0.05. According to Walking at eight hours post-surgery mean score in the study group was 0.81±0.06 compared to 0.60±0.05 in the control one. Regarding withdrawal of NG tubes at two hours and Withdrawal of IV fluids at 24 hours post-surgery there was a slightly significant difference between the study and control groups at p-value <0.05. Furthermore, related Initiating sips of oral fluids at 4 hours post-intervention mean score at study group was 0.92±0.012 while control was 0.83±0.032 at p-value <0.05. Also, the table showed that the patients in study group were less suffering from

pain & not needs an analgesic compared to controlled group with significantly difference. Finally, according to total Functional Abilities mean scores of the study group at 8-12 hours and at 24 hours post-surgery were 7.62±1.77 and 8.19±1.59, while the control group was 6.83±0.97 and 7.90±1.22 respectively with a significant difference between the two groups at p-value <0.05.

Table (4) indicates that the mean score of general satisfaction about ERAS and technical quality in the study group were 4.08±1.34 and 4.12±1.65, while in the control group were 2.90±0.98 and 2.98±0.76, respectively with a significant difference at p-value <0.05. Besides, the mean score of accessibility & convenience, and interpersonal manner at study group were 3.95±0.64 and 4.10±1.09, while the control group was 2.76±0.43 and 3.00±0.99, respectively with a significant difference at p-value <0.05. Moreover, there was a significant difference among study and control groups related to time spent with them and communication with a significant difference at p-value <0.05.

Figure (1) illustrates that the mean score of Length of hospital stay at the control study was 9.71, while the study group was 7.32, with a significant difference at p-value <0. 05

Figure(2).detects that 71.7% of patients in the study group were satisfied at discharge, while only 24.5% of patients in the control group were satisfied with a highly significant difference at p-value <0.01.

Table (5) portrays that there was a highly positive correlation between activities of daily living, functional abilities, and patient satisfaction at discharge with a p-value <0.01

Table (1): Distribution of studied patients according to their characteristics

Items	Study group N=106		Control group N=106		Chi-square P-value
Age:					T-test
Mean SD	38.98±4.39		39.50±5.62		1.245
					>0.05
Gender:					
Male	46	43.4	50	47.2	2.087
Female	60	56.6	56	52.8	>0.05
Educational level:					
Not Read and write	7	6.6	9	8.5	
Read and write	23	21.7	21	19.8	1.990
Preparatory school	35	33	40	37.7	>0.05
Secondary school	24	22.6	21	19.8	
University	17	16.1	15	14.2	
Exercise					
Irregular exercise	89	83.9	91	85.8	0.978
Regular of exercise	17	16.1	15	14.2	>0.05
Morbidity Variables					
Diabetes mellitus	8	7.5	7	6.6	
Hypertension	7	6.6	6	5.6	1.011
Cardiac illness	4	3.8	5	4.7	>0.05
Respiratory illness	5	4.7	4	3.8	
Renal illness	3	2.8	2	1.9	
None	79	74.5	82	77.4	

Figure (1) Distribution of the studied groups regarding mean score of hospital length stay

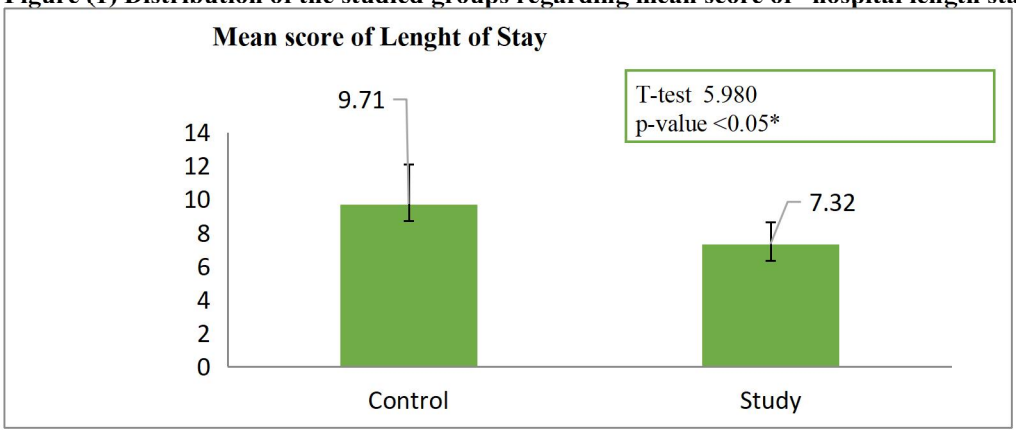


Table (2) Comparison of Daily Living Activities between Studied Groups

Daily Living Activities		Study group N=106 Mean SD	Control group N=106 Mean SD	T-test	P-value
Mobility	4hours post-surgery	1.32±0.25	1.27±0.19	1.087	>0.05
	6 hours post-surgery	2.01 ±0.20	1.69±0.25	5.807	<0.05*
	8 hours post-surgery	2.64 ±0.17	2.10 ±0.18	5.984	<0.05*
Drinking	6 hours post-surgery	1.11±0.07	1.09±0.08	1.067	>0.05
	8 hours post-surgery	1.98 ±0.14	1.34±0.20	4.961	<0.05*
	10 hours post-surgery	2.59 ±0.23	2.07 ±0.16	5.113	<0.05*
Toilet	6 hours post-surgery	1.80 ±0.12	1.29±0.11	3.998	<0.05*
	8 hours post-surgery	2.61 ±0.19	2.09 ±0.24	4.361	<0.05*
Hygiene	6 hours post-surgery	1.73 ±0.09	1.17±0.13	4.001	<0.05*
	8 hours post-surgery	2.58 ±0.10	2.01 ±0.12	4.500	<0.05*
Dressing	6 hours post-surgery	1.42 ±0.11	1.10±0.07	3.780	<0.05*
	8 hours post-surgery	2.11 ±0.18	1.71 ±0.09	3.901	<0.05*
Soften diet	12 hours post-surgery	1.21 ±0.03	1.09±0.02	3.516	<0.05*
	>12 hours post-surgery	1.79 ±0.12	1.40 ±0.09	3.711	<0.05*
Total activities of daily living	8 hours post-surgery	6.43 ± 1.79	6.36 ± 1.68	1.878	>0.05
	12 hours post-surgery	10.15 ± 2.75	7.68 ± 1.93	5.187	<0.05*
	24 hours post-surgery	14.32 ± 2.30	11.38 ± 3.14	5.006	<0.05*

Table (3) Comparison of Post-Operative Functional Abilities Outcome between Studied Groups

Functional abilities Outcome items		Study group N=106 Mean SD	Control group N=106 Mean SD	T-test	P-value
Sitting	2-hour post-surgery	0.23 ±0.01	0.15 ±0.02	3.001	<0.05*
	4-hour post-surgery	0.88 ±0.09	0.74 ±0.12	3.807	<0.05*
Standing	4-hours post-surgery	0.19 ±0.01	0.17 ±0.02	1.0	>0.05
	6-hour post-surgery	0.85 ±0.07	0.69 ±0.05	4.121	<0.05*
Walking	6-hours post-surgery	0.14 ±0.01	0.12 ±0.01	1.0	>0.05
	8-hour post-surgery	0.81 ±0.06	0.60 ±0.05	3.015	<0.05*
Bowel sound return	6-8-hours post-surgery	0.37 ±0.03	0.21 ±0.04	3.141	<0.05*
	> 8 hours post-surgery	1.0±0.00	1.0±0.00	-----	------
Withdrawal of IV fluids	12-hours post-surgery	0.03 ±0.001	0.021 ±0.007	0.461	>0.05
	24-hours post-surgery	0.87 ±0.13	0.73 ±0.09	3.008	<0.05*
	48-hours post-surgery	1.0 ±0.00	0.91 ± 0.07	2.897	<0.05*
Withdrawal of NG tubes if used	2-hours post-surgery	0.91±0.07	0.76 ±0.04	2.990	<0.05*
	>2 hours post-surgery	**1. 0 ±0.00**	**1. 0 ±0.00**	**-----**	**------**
Withdrawal of Foleys catheter	8-hours post-surgery	0.96±0.001	0.89 ±0.002	2.913	<0.05*
	>8 hours post-surgery	1.0±0.00	1.0±0.00	-----	------
Initiating sips of oral fluids	4-hours post-surgery	0.92±0.012	0.83 ±0.032	2.888	<0.05*
	> 4 hours post-surgery	1.0±0.00	1.0±0.00	------	-------
Needs to Pain analgesic	6-hours post-surgery	0.59 ±0.14	0.42±0.120	3.406	<0.05*
	12-hours post-surgery	0.28 ±0.009	0.19 ± 0.01	2.978	<0.05*
Total outcome ability	4-6-hours post-surgery	1.96 ±0.34	1.67 ±0.28	1.777	>0.05
	8-12-hours post-surgery	7.62 ± 1.77	6.83 ± 0.97	4.002	<0.05*
	24 hours post-surgery	8.19±1.59	7.90 ± 1.22	3.990	<0.05*

*: Statistically significant at $p \leq 0.05$; IV: (Intra-Venous); NG: (Naso-Gastric).

Table (4) Comparison between Studied Groups Satisfaction Pre-discharge

Satisfaction items	Study group N=106 Mean SD	Control group N=106 Mean SD	T-test	P-value
General satisfaction	4.08 ± 1.34	2.90 ± 0.98	4.098	<0.05*
Technical quality	4.12 ± 1.65	2.98 ± 0.76	3.902	<0.05*
Time spent with them--	4.35 ± 0.96	3.05 ± 0.63	5.012	<0.05*
Communication	4.14 ± 0.70	3.20 ± 0.64	2.807	<0.05*
Accessibility & convenience	3.95 ± 0.64	2.76 ± 0.43	3.335	<0.05*
Interpersonal manner	4.10 ± 1.09	3.00 ± 0.99	4.087	<0.05*

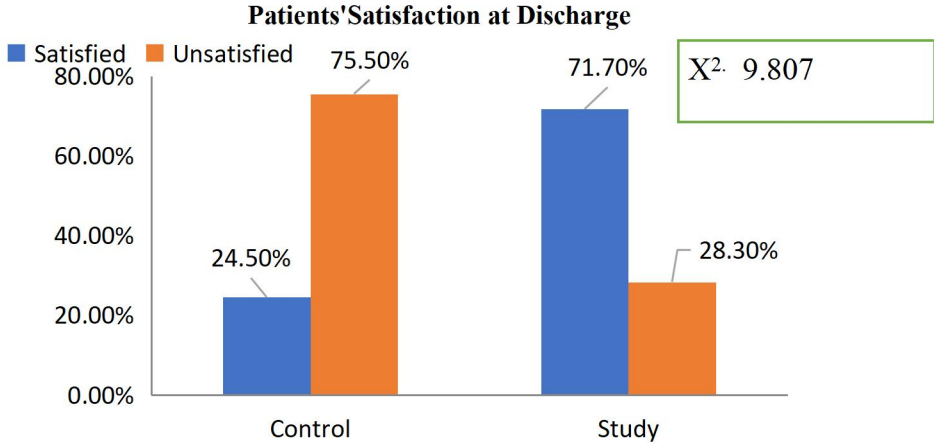
*: Statistically significant at $p \leq 0.05$.

Table (5) Correlations Matrix between studied variables at study groups

		Activities of Daily Living	Outcome functional ability	Total satisfaction
Daily Living Activities	**R.**		0.566	0.601
	P		<0.01**	<0.01**
Outcome functional ability items	**R.**	0.566		0.498
	P	<0.01**		<0.01**
Total satisfaction	**R.**	0.601	0.498	
	P	<0.01**	<0.01**	

: Significant <0.05 high significant if p-value <0.01**

Figure (2) Distribution of studied groups regarding Total satisfaction



Discussion:

Researchers were keen to select the sample that met the predetermined criteria, and the current results revealed that there was no statistically significant difference between the study and control groups in age, gender, exercise, and comorbidity (p >0.05). Therefore, the two study groups were similar.

After analyzing and interpreting the collected data, our study found that there was a significant improvement in daily living activities in the form of mobility, drinking,

toilet, hygiene, and dressing among patients enrolled in the study group after implementing the enhanced recovery protocol compared to patients in the control group who received routine care following laparotomy surgery, with significant differences at p-value <0.05. These findings could be attributed to early post-operative walking, which reduces constipation and gas pain. Furthermore, ambulation boosts the patient's sense of independence, mood, and self-esteem. These findings contradict the **Herbert et.al. 2019** study, which found that early nutrition did not affect patients' quality of life following lower gastrointestinal surgery. Current findings are consistent, **Havey et.al. (2013)** reported that encouraging early mobility is one example of an evidence-based strategy for improving patient outcomes. Furthermore,**Schwab et.al. 2020** conducted a randomized controlled trial with two parallel study groups and found early mobilization that improved patient outcomes (physical and nutritional).

Our study revealed that the study group improved significantly more than the control group in the functional abilities' outcomes post-surgery in the form of sitting, standing, walking, early return bowel sound, withdrawal of (IV lines, NG tube, urethral Foley catheter), initiating of oral fluids, and need for pain analgesia. Furthermore, after 24 hours post-surgery, the study group's mean Functional Abilities score was higher than the control group's mean score with a significant difference between the two groups (p<0.05). These findings could be attributed to the use of muscle strength, deep breathing exercises, and relaxation techniques that aid in post-surgery recovery. Similarly, **Wahyuni et. al. 2019** discovered a difference in intestinal peristaltic activity between the control and intervention groups before and after the early ambulatory intervention. (P <0. 05). Also, **Stethen et. al. 2018** reported that early recovery post abdominal surgery because optimizing pain control, minimizing narcotics, and ensuring adequate ambulation resources also contribute to decreased length of hospital stay. Likewise, **Yilmaz et. al. 2018** conducted a prospective, randomized controlled trial with 62 patients and discovered that intravenous fluids administered pre-post-operatively were significantly lower in the early recovery after surgery group (p 0.001 for both). The ERAS group had a significantly shorter time to first flatus (p=0.001), time to first defecation (p=0.001), and time to eating solid food (p = 0.001). According to **Wainwright and Burgess, 2020,** recovering a patient's physical fitness during the postoperative period is critical to reducing the likelihood of poor functional outcomes.

Regarding patients' satisfaction toward ERP at discharge, the results detected that more than two-thirds of patients in the study group were satisfied at discharge, while only one-quarter of the patient in the control group were satisfied with a highly significant difference at p-value <0.01. These results supported by the study of **Fortina et. al. 2015** stated that postoperative exercise program was effective in improving patient satisfaction and early recovery of physical function after surgery. **Sruthikamal et. al. 2021** detected that early ambulation is very effective in reducing postoperative anxiety; thereby the patient was very cooperative for care. Therefore, nurses can teach the importance of early ambulation to patients with laparotomy surgeries. Similarly, **Savikko et. al. 2021**reported Enhanced recovery protocols improved patients' satisfaction after lower laparotomy surgery.

Furthermore, the related length of hospital stay in the control group mean was longer than in the study group with a significant difference at p-value <0.05. **Lode et al., 2021** did a meta-analysis through retrospective cohort studies including 453 patients and stated the use of Enhanced recovery after surgery in patients undergoing abdominal wall resection was found to significantly reduce the length of hospital stay without increasing the readmission rate. Also, **Jensen et al., 2019** performed a cohort study on a total of 190 patients undergoing abdominal wall reconstruction and stated that enhanced recovery after surgery was feasible after abdominal wall reconstruction, leading to reduced length of stay.

Our analysis found a positive correlation between DLAs, functional abilities, and patient satisfaction at discharge with a p-value <0.01.

These results are supported by **Suen et. al. 2021** who stated that twenty-two patients participated in the program and concluded that improving the functional capacity of patients' post-surgery improved their satisfaction at discharge.

Conclusion:

This study highlights the application of ERAS protocol was significantly associated with improving DLAs for patients post laparotomy surgery decreases the length of hospital stay, as well as patients suffering from pain & needing to pain analgesic and increases patients' satisfaction. Researchers strengthen that adherence to ERAS protocol guidelines had statistically significant positive improving postoperative outcomes.

Recommendation:

A standardized ERAS programs should be implemented in future in major surgical specialties & must foster researchers as well as hospitals on this important topic.

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