ORIGINAL ARTICLE

# Enhanced Surgical Recovery Nursing Program: A Multidisciplinary Approach to Optimize Postoperative Patient Recovery

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## Abstract

**Background:** Enhanced recovery is currently considered to be the treatment of various elective major surgeries. Enhanced recovery after surgery (ERAS) includes applying various perioperative measures, strategies, and active participation of patients in the recovery process.

**Materials and methods:** A quasi-experimental study was conducted in the surgical units of a hospital in Karnataka, India. Data were collected from patients undergoing elective abdominal surgery ($n = 142$). Psychological (anxiety) and physiological outcomes (vital capacity, pulse, respiration, and blood pressure) were assessed in experimental and treatment-as-usual groups on preoperative day 1 (2 days before surgery) and preoperative day 2 (1 day before surgery).

**Results:** The results showed a significant decrease in the state-anxiety scores in the experimental group than in the treatment-as-usual group ($p < 0.05$). Physiological outcomes such as pain, pulse, respiration, and blood pressure showed a significant decrease in the experimental group than the treatment-as-usual group ($p < 0.05$). Vital capacity was significantly increased in the experimental group and decreased in the treatment-as-usual group in the postoperative days ($p < 0.05$). A significant decrease in the length of postoperative stay was seen in the experimental group than in the treatment-as-usual group ($p = 0.001$). In the experimental group, there were less postoperative complications than in the treatment-as-usual group.

**Conclusion:** Enhanced recovery is considered to be the treatment for various elective major surgeries. It is an essential responsibility of healthcare professionals to improve postoperative outcomes by reducing complications and length of postoperative hospital stay.

**Keywords:** Abdominal surgery, Enhanced surgical recovery nursing program, Patients, Postoperative outcomes.

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## Highlights

- The highlights of the present study include the uniqueness of the enhanced surgical recovery nursing program developed by the nurse investigator in collaboration with other healthcare teams, including surgeons, anesthetists, physiotherapists, and music therapists to improve the outcomes among patients in India.
- The enhanced surgical recovery nursing program is an evidence-based multifaceted intervention developed based on the ERAS protocol. In addition to ERAS protocol, music was included to improve the psychological well-being of patients.

## Introduction

Enhanced recovery or multimodal rehabilitation programs (MMRH) or enhanced recovery after surgery (ERAS) is a revised traditional care intervention to rationalize perioperative treatment and thus improve postoperative outcomes. Perioperative strategies include patient teaching, practicing deep breathing exercises, early mobilization, and initiating early feeding after the surgery.[1–3]

Anxiety is the response of the human body system to surgical procedures by activating the sympathetic nervous system. Preoperative anxiety affects the outcome of surgical treatment. The incidence of preoperative anxiety ranges from 60 to 80% in adults. Increased anxiety levels can alter physiological variables, such as respiratory rate, pulse rate, pain, and blood pressure. It also affects the wound-healing process and delays the recovery process.[4] Postoperative complications were significantly higher among patients electively admitted to the intensive care unit (ICU).

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Agarwal et al. found that 28% of patients developed postoperative complications during the postoperative phase.[5]

Enhanced recovery after surgery program represents a basic shift in the patient care process by including multiple interventions that attenuate surgical stress, maintain physiological function, and enhance the recovery of patients. Therefore, ERAS pathways are being used for perioperative patient care for various surgical interventions.[1–3] Enhanced recovery after surgery global scenario shows success, but developing countries lie behind in the implementation of such evidence. Enhanced recovery after surgery represents change based on new advances in the field of perioperative nursing care and recovery. Many countries framed ERAS chapters across Europe and USA.[6]

Nursing research in India is lagging behind in generating data on ERAS. However, knowing the different status of the healthcare system in the country with teaching institutes, government hospitals, corporate hospitals, non-teaching hospitals, etc., the recommendations of international societies are difficult to implement. There is a greater need to formulate and develop tailored recommendations for hospitals of various categories in India.[6] Therefore, the present study aimed to evaluate the effectiveness of enhanced surgical recovery nursing program on postoperative outcomes among patients undergoing elective abdominal surgery.

## Materials and Methods

This is a quasi-experimental pretest–posttest control group design study conducted at a 1050-bedded multi-specialty tertiary care hospital in Karnataka, that offers various modalities of treatment facilities in both broad specialty and super specialty services to patients. A purposive sampling technique was used and the samples were assigned to the treatment-as-usual group first and then to the experimental group. Matching of age, gender, and body mass index (BMI) was done to make the group homogenous.

### Sample Size Estimation

At a 5% level of significance, and power of 80%, the sample size was calculated by the independent sample *t*-test formula.

$$n = \frac{2\left(Z_{1-\alpha/2} - Z_{1-\beta}\right)^2\left(\sigma^2\right)}{d^2}$$

The sample size for each group was 64 and the total sample size was 128 in both groups. Taking into consideration the 10% attrition rate, the sample size of 142 was considered for this study.

### Sample Selection Criteria

Patients undergoing elective laparotomy surgery, such as gastrectomy cholecystectomy, colon and small bowel resection, pancreatectomy, splenectomy, and Whipple procedure were included in the study.

The exclusion criteria were considered for patients who were critically ill, those undergoing laparoscopic or robotic surgeries, those on chronic treatment with analgesics, and those who had undergone surgery in the past. The patients undergoing cesarean section, aortic femoral bypass, and abdominal hysterectomy were also considered into exclusion criteria.

Enhanced surgical recovery nursing program is a structured nursing plan that involves preoperative education, listening to music, the practice of deep breathing, lower extremity exercises, and early mobilization for the initiation of early feeding after the surgery. This program emphatically intends to enhance recovery after surgery.

### Routine Care for the Study Groups

The usual preoperative care in the surgical unit includes, performing laboratory tests, administration of prophylactic intravenous antibiotic therapy, skin preparation, and bowel clearance. The treatment during the postoperative phase includes the continuation of antibiotic therapy and the administration of analgesics for pain management.

In addition to the routine care, the experimental group received preoperative education from the investigator using a booklet with information on various aspects of surgery. The protocol was made inclusive of listening to patient-preferred music, practicing deep breathing exercises using an incentive spirometer, lower extremity exercises, initiation of early feeding, and early mobilization after surgery. The protocol for the enhanced surgical recovery nursing program is illustrated in Table 1.

### Data Collection Tools

Data were collected using the demographic proforma, clinical proforma, music preference questionnaire, State-Trait Anxiety Inventory (STAI)-Adults, and numerical pain scale. The investigators

**Table 1:** Protocol for the enhanced surgical recovery nursing program

| *Day* | *Activities* | *Duration and frequency* |
|---|---|---|
| Preoperative day 1 | Preoperative education regarding various aspects of surgery using a booklet, deep breathing exercises using an incentive spirometer, lower extremity exercises, and listening to music. | Morning session for 20 minutes. |
| Preoperative day 2 | Practicing deep breathing exercises using incentive spirometry.<br>Listening to music. | Morning for 15 minutes once a day.<br>Evening for 15 minutes once a day. |
| On the day following surgery | Performance of lower extremity exercises for early mobilization.<br>Early initiation of oral feeding. | Started within 24 hours of surgery.<br>Within 6 hours following surgery or as early as possible, if tolerated by the patient. |
| Postoperative days 1, 2, and 3 | Practicing deep breathing exercises using incentive spirometry.<br>Listening to music. | Morning for 15 minutes once a day.<br>Evening for 15 minutes once a day. |

*Note:* The enhanced surgical recovery nursing program is a protocol developed by the investigators. The components include preoperative education, deep breathing exercises using incentive spirometry, listening to music, lower extremity exercises for early mobilization, and initiation of early oral feeding during the preoperative and postoperative days

**Table 2:** Demographic profile of patients ($n = 71 + 71$)

| | | *Study groups f (%)* | | |
|---|---|---|---|---|
| *Sl. No.* | *Demographic variables* | *Experimental* | *Treatment-as-usual* | *p-value* |
| 1 | Age in years | | | |
| | 20–40 | 27 (38.0) | 26 (36.6) | 0.86 |
| | 41–60 | 44 (62.0) | 45 (63.4) | |
| 2 | Gender | | | |
| | Male | 43 (60.6) | 42 (59.2) | 0.86 |
| | Female | 28 (39.4) | 29 (40.8) | |
| 3 | Educational status | | | |
| | No formal education | 06 (08.5) | 01 (01.4) | 0.12 |
| | Primary | 13 (18.3) | 13 (18.3) | |
| | Higher secondary | 11 (15.5) | 14 (19.7) | |
| | PUC | 25 (35.2) | 27 (38.0) | |
| | Diploma | 09 (12.7) | 15 (21.1) | |
| | Graduation | 06 (08.5) | 01 (01.4) | |
| | Post graduation | 01 (01.4) | – | |
| 4 | Occupation | | | |
| | Self-employed | 25 (35.2) | 24 (33.8) | 0.70 |
| | Professional | 06 (08.5) | 04 (05.6) | |
| | Business | 14 (19.7) | 21 (29.6) | |
| | Homemaker | 19 (26.8) | 16 (22.5) | |
| | Others (student) | 07 (09.9) | 06 (08.5) | |
| 5 | Marital status | | | |
| | Single | 13 (18.3) | 17 (23.9) | 0.28 |
| | Married | 45 (63.4) | 47 (66.2) | |
| | Widow/widower | 13 (18.3) | 07 (09.9) | |
| 6 | Type of family | | | |
| | Nuclear | 38 (53.5) | 38 (53.5) | 0.51 |
| | Joint | 33 (46.5) | 33 (46.5) | |

*Note:* The data represented is frequency (f) with percentage (%) in parenthesis of the distribution of participants based on their demographic characteristics. Study groups (i) Experimental group with enhanced surgical recovery nursing program, (ii) Treatment-as-usual group with routine treatment. Statistical test used: Chi-square test/Fisher exact test. Level of significance: $p < 0.05$ significant, $p > 0.05$ was considered non-significant

developed a checklist for monitoring immediate postoperative complications and the length of hospital stay. Incentive spirometry to assess vital capacity and Omron digital blood pressure apparatus to monitor blood pressure were used in this study.

### Validation of Intervention and Tool

Validation of the tool was done by seven subject experts in the field of nursing. Interventions were validated by experts in the fields of nursing, music therapy, surgery, and anesthesia. Item-CVI (content validity index) and Scale -CVI of the tool were calculated. CVI >0.83 was considered as acceptable. Based on these findings, the suggestions from subject experts were incorporated.

### Protection of Study Participants

The approval for conducting the study was obtained from the scientific review board (SRB) of the institution and the Ethics Committee (YEC-I/2019/221). This study was prospectively registered in the Clinical Trial Registry, India (CTRI/2021/04/032621). Data collection was carried out upon obtaining permission from the unit heads and administrative authority of the hospital. The participants were given information regarding the study protocol, and informed consent was taken before the data collection process.

## Results

### Demographic Characteristics of Study Participants

Table 2 presents the demographic characteristics of study participants in the experimental and treatment-as-usual groups. The mean age in the experimental group was 45 years and the treatment-as-usual group was 44 years. The majority of the study participants in the experimental (60.6%) and treatment-as-usual groups (57.7%) had normal BMI.

### Effectiveness of Enhanced Surgical Recovery Nursing Program on Psychological Outcome

Description of state-anxiety scores in the experimental and treatment-as-usual group: Estimated marginal means of state-anxiety scores are depicted in a profile plot (Fig. 1) which is the

output of the two-way repeated measures of analysis of variance (ANOVA). It is a line plot in which each point indicates the estimated marginal means of state-anxiety at one level of a factor (timepoint/observation).

Mauchly's test of sphericity was significant ($p < 0.001$), which suggests that there is a significant difference between every observation at different time intervals within each study group. This reveals that there is a significant difference ($p < 0.001$) in the means of the state-anxiety scores at every observation over 5 days, starting from preoperative day 1 (48 hours before surgery) to postoperative day 3. A significant difference in state-anxiety scores was observed between experimental and treatment-as-usual groups computed by two-way repeated measures ANOVA (Table 3).

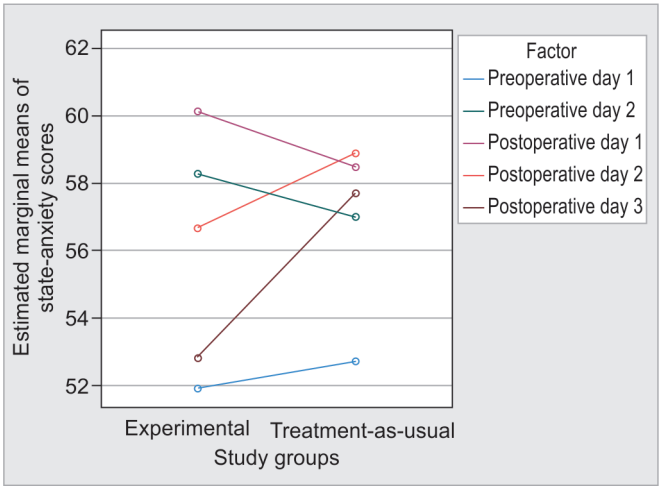


**Fig. 1:** Effectiveness of the enhanced surgical recovery nursing program on the state-anxiety scores of the study groups at different time intervals ($n = 71 + 71$)

Data represented is the estimated marginal means of the state-anxiety scores (Y-axis) among the study groups (X-axis). The study groups: Experimental group ($n = 71$) and Treatment-as-usual group ($n = 71$). The observations were carried out over 5 days. The state-anxiety scores of the Experimental and Treatment-as-usual groups of each day are connected with a colored line. Five colored lines, with different slopes, depict the anxiety scores of the five days of observation shown as a factor in the figure. The figure is an output of the two-way repeated measures of ANOVA using SPSS version 21

### Effectiveness of Enhanced Surgical Recovery Nursing Program on Physiological Outcomes

A significant decrease ($p < 0.05$) in the study groups at different time points of observation was observed in the physiological outcomes (pain, pulse, respiration, and blood pressure). The vital capacity was increased significantly in the experimental group and decreased in the treatment-as-usual group in the postoperative days. The length of postoperative hospital stays and immediate complications were decreased in the experimental group after the implementation of the enhanced surgical recovery nursing program.

## Discussion

The postoperative recovery is the essential outcome of surgical intervention. Postoperative recovery studies were conducted following various surgical procedures. Several researchers have generally studied short-term recovery in terms of the length of hospitalization, return to routine life, and experience of clinical symptoms such as pain, bleeding, constipation, nausea, and vomiting.[7,8]

In the present study, majority of the study participants in the experimental (62.0%) and treatment-as-usual groups (63.4%) were in the age category of 41–60 years. Similarly, Dhaigude et al. selected patients aged 18–65 years to identify the incidence of postoperative wound complications following abdominal surgery. The average mean age of patients was 40 years.[9] One of the factors that have an impact on mortality rates in the care of surgical patients is their age. Advanced age and physiological changes in aging contribute to the occurrence of postoperative complications and delay in the recovery process.

Patient education is of primary importance for the nurses working in surgical wards. The results of the current study were consistent with the findings reported by Mubita et al.[10] A study by Xu et al. showed that preoperative nursing visits decreased anxiety among patients undergoing laparoscopic cholecystectomy.[11] Earlier studies have demonstrated that the preoperative education programs[10,12,13] and music intervention[14–17] were effective in reducing anxiety among patients.

**Table 3:** Intergroup comparison of state-anxiety scores between experimental and treatment-as-usual groups at different time points ($n = 71 + 71$)

| | | | *Statistical value* | |
|---|---|---|---|---|
| *Observation time points* | *Study groups* | *State-anxiety scores* | *Pillai's trace* | *p* |
| Preoperative day 1 | Experimental | 51.91 ± 05.44 | 01.63 | <0.001* |
| | Treatment-as-usual | 52.71 ± 04.80 | | |
| Preoperative day 2 | Experimental | 58.28 ± 04.95 | | |
| | Treatment-as-usual | 57.00 ± 05.13 | | |
| Postoperative day 1 | Experimental | 60.12 ± 04.56 | | |
| | Treatment-as-usual | 58.49 ± 04.87 | | |
| Postoperative day 2 | Experimental | 56.66 ± 05.16 | | |
| | Treatment-as-usual | 58.90 ± 05.05 | | |
| Postoperative day 3 | Experimental | 52.81 ± 05.19 | | |
| | Treatment-as-usual | 57.70 ± 05.60 | | |

*Note:* The data presented is the mean ± SD of state-anxiety scores. Study groups: Experimental group had intervention with enhanced surgical recovery nursing program, Treatment-as-usual group with routine treatment. Tool used: Stat-Trait Anxiety Inventory-Adults developed by Charles D. Spielberger (1968). The statistical test used: Two-way repeated measures ANOVA. Pillai's trace is a test statistic produced by a Multivariate analysis of variance (MANOVA). Level of significance: *Significant $p < 0.05$, $p > 0.05$ was considered non-significant

Despite the advances in the field of surgery, anesthesia, and perioperative nursing, abdominal surgery is still continuously associated with undesirable sequels and complications.[18–20] A study by Alaparthi et al. also showed that although pulmonary functions decreased significantly on the first postoperative day, it was found to be better on the second postoperative day.[18]

Enhanced recovery after surgery is now established as a global postoperative quality improvement strategy that results in clinical improvements, enhances recovery, impacts the length of stay, and thus reduces the burden on the health care system. Abdikarim et al. reported ERAS program is associated with a shorter hospital stay in gastric cancer patients undergoing laparoscopic radical gastrectomy.[21]

Nutritional status is an important predictor of postoperative outcomes. Unfortunately, several factors, such as multiple comorbid conditions, long operating hours, and complex surgical procedures, can affect the nutritional status. Prolonged fasting before and after surgery may not benefit the patient but results in complications in many cases.[22,23] In the present study, the participants in the experimental group who received an enhanced surgical recovery nursing program reported less immediate postoperative complications than in the treatment-as-usual group.

One of the most important elements of the ERAS protocol is the ERAS multidisciplinary team. It is an interdisciplinary team consisting of healthcare professionals from diverse fields who work in collaboration to share expertise and skills for the implementation of ERAS protocol. Consideration of a single setting of a geographical area is the limitation of the study, as the results cannot be generalized to other populations. Furthermore, the investigators could not incorporate every element of the ERAS protocol in the study.

Safety and evidence of compliance for indwelling catheters, nasogastric tubes, and pain control measures are the challenges in perioperative care. Further studies are needed to encourage early removal or no use of catheters and drains in postoperative patients. Subsequently, early recovery programs can be extended in oncological surgeries to develop and implement cancer-specific ERAS-based nursing approaches.

## Conclusion

Enhanced recovery is considered to be the treatment of various elective major surgeries. It is an essential responsibility of healthcare professionals to improve postoperative outcomes by reducing complications and length of postoperative hospital stay. Enhanced surgical recovery nursing program with its multiple interventions is helpful for better outcomes in surgical patients.

### CTRI Registration

This study was prospectively registered in the Clinical Trial Registry-India (CTRI/2021/04/032621).

### IEC Clearance

Ethical clearance was obtained from the Institutional Ethics Committee (YEC-I/2019/221).

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