ORIGINAL ARTICLE

THE EFFECTIVENESS OF ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOLS IN BREAST CANCER SURGERY AT A TERTIARY CARE HOSPITAL IN KHYBER PAKHTUNKHWA PAKISTAN

Anum Wahid, Irum Sabir Ali✉, Usama Umar, Mah Muneer Khan

Department of Surgery, Khyber Medical College Peshawar-Pakistan

Background: Breast cancer treatment outcomes have markedly improved over the years with advancements in knowledge and treatment options. Enhanced recovery after surgery (ERAS) has been introduced recently to enhance post-operative patient wellbeing, attain enhanced recovery for patients who undergo major surgery, and therefore facilitate a drop in hospital length of stay (LOS). These may also furnish an additional advantage of decreasing health care costs while refining the standard of care and patient contentedness. **Methods:** A quasi-experimental study was conducted in the breast unit of Khyber Teaching Hospital, with a sample size of 30 in each group with a 95% confidence interval and a 5% margin of error. A consecutive non-probability sampling technique was used and the study was conducted in 6 months after taking ethical approval from the ethical review committee MTI, KTH. Comparison was done between both groups for effectiveness, noted with regard to hospital stay, post-op pain and complication rate. **Results:** The mean age of the patients in the ERAS group was 56.30±5.615 years while the mean age in the non-ERAS group was 56.07±6.11 years. The wound infection was observed in 11 patients with ERAS (36.7%) as compared to 12 (40.0%) without ERAS. Hospital stay was longer in non-ERAS as compared to ERAS with a mean difference of 1.833 and *p*-value of 0.000 while the post-op VAS mean difference was 1.267 with *p* value of 0.001. **Conclusion:** Evidence supports the effectiveness, affordability, and safety of ERAS protocols as it leads to a noticeable decrease in hospitalization duration, resulting in reduced resource consumption and financial burdens. Nonetheless, achieving the mentioned benefits may necessitate strict adherence to the protocol, which could be challenging due to professional, institutional, and personal resistance.

Keywords: Breast cancer; Enhanced Recovery Program after Surgery (ERAS); Effectiveness; POD (Post-operative day)

Citation: Wahid A, Umar U, Ali IS, Khan MM. The effectiveness of enhanced recovery after surgery (eras) protocols in breast cancer surgery at a tertiary care hospital in Khyber Pakhtunkhwa Pakistan. J Ayub Med Coll Abbottabad 2024;36(4 Suppl 1):905–9.

DOI: 10.55519/JAMC-S4-13153

INTRODUCTION

The treatment of Breast cancer has been rapidly revolutionized over the years markedly improving outcomes. Likewise, a lot of attention is being paid to Non-ERAS pathways that are being modernized to make the Non-ERAS experience an efficient and swift one for the patients with a quick resumption to normal life.[1] One of such recently researched and applied protocol is known as enhanced recovery after surgery (ERAS). These have been introduced recently to enhance post-operative patient wellbeing, achieve early recovery for patients undergoing major surgery, and thus facilitating a decrease in hospital length of stay (LOS).[2] ERAS protocols represent a shift in the standard of inpatient care, encompassing a comprehensive approach to postoperative recovery and therefore achieved wide approval in many Non-ERAS disciplines.[3] These may also furnish an additional advantage of decreasing health care costs while refining the standard of care and patient contentedness.[4]

Enhanced Recovery Program after Surgery represent a unified, standardized, and evidence-driven multiple disciplinary protocol that emphasizes on patient and family involvement in care. Its central aim is to deliver consistent, evidence-based bundled care with the primary objective of minimizing the length of hospital stay.[5] In today's healthcare landscape, hospitals face the challenge of balancing cost containment with the provision of top-notch care. Through the utilization of evidence-based frameworks, healthcare practitioners have effectively implemented ERAS protocols. These protocols ensure the delivery of holistic perioperative care that prioritizes patients, streamlines processes, and minimizes disparities in outcomes such as length of stay.[6–8] In a study by Mui and colleagues, 74.4% were discharged within 24 h compared to 23.1% in the pre-ERAS group. Length of stay was reduced from 2.26 to

1.42 days.[9] In another study by Dumestre and colleagues, 71% versus 19% patients had a shorter hospital stay in ERAS and non-ERAS group respectively.[10]

There is scarcity of knowledge regarding the effectiveness of ERAS protocol after breast surgery in our local population which is why there is resistance to put the protocol into practice when it comes to real world experience.

Therefore, I planned to determine the effectiveness of ERAS protocol in breast surgery in our local population. Result of this study could potentially lead to putting ERAS protocol into practice while surgically managing patients with breast cancer.

MATERIAL AND METHODS

It was a Quasi Experimental Trial conducted in the Department of Surgery of MTI Khyber Teaching Hospital Peshawar from 13th June 2023 till 12th December 2023. Calculation for sample size was done using WHO sample size formula taking the presuming anticipated frequency of lower hospital stay in ERAS Group = 71% while that of lower hospital stay in non-ERAS to be Group = 19%[10]. The power of test was taken as 80%, confidence level, 95% with a sample size of 60 (30 patients in ERAS group = Group-A, 30 patients in non-ERAS group = Group-B). The Sampling technique used was Consecutive, non-probability sampling technique with the inclusion criteria being patients age 30–70 years undergoing modified radical Mastectomy and axillary dissection. Locally advanced disease such as ulcerating or fungating tumours and patients with co-morbid conditions such as uncontrolled DM status, hypertensive, or on conditions requiring any steroids or any other form of immune suppressive therapy less than 3 weeks from surgery were excluded from the study.

ERAS is a multidisciplinary, multimodal, and evidence-based approach to perioperative management. Pre-operatively counselling was done regarding what to anticipate, clear liquids allowed till 2 hours pre-operatively and 1g paracetamol was given. During surgery normovolemia and euthermia was maintained, antiemetic was given before induction and flaps were infiltrated with bupivacaine. Post-operatively unrestricted diet was allowed once fully awake, early ambulation and shoulder exercises were encouraged and ibuprofen was given every 8 hours. Patient would be discharged after 24-48 hours with drain and reviewed in OPD on 7th POD, 14th POD and then on 21st POD.

In non-ERAS group, informed consent was taken, were nil by mouth from midnight 12am. Intra operatively, bupivacaine was not used, no excessive measures were taken to control blood pressure or IV fluids. Post-operatively patients were nil by mouth for 6 hours and NSAIDs were given for pain relief.

Effectiveness: was in terms length of stay, post-operative pain and complication rates. The length of stay was defined as the 24-h period starting from midnight on the day of surgery; The post-operative pain was measured on post-op day 1, using VAS scale ranging from 0 to 10 whereas 0= no pain, and 10 = maximum pain. The complications included wound infection defined as presence of erythema of greater than 1cm from wound margin, tenderness on palpation and presence of sero-sanguinous or purulent discharge on physical examination. All patients meeting the inclusion criteria were enrolled from indoor department of surgery of the hospital. Informed consent was taken from all study participants. Baseline information including age, BMI, laterality of the breast and stage of the disease was noted.

Patients were randomly allocated to two groups using random number generator. Patients in group A were managed as per ERAS protocol while patients in group proceeded as non-ERAS/traditional recovery protocol. Post-operatively patients was observed for pain, length of stay and complications as per operational definitions. Both groups were compared for pain, length of stay and complications. Data was recorded by the researcher himself on especially designed *proforma*.

The collected data was entered and analyzed using statistical analysis program SPSS version 24. Percentages would be determined for all the categorical variables including laterality of the breast, disease stage and post-op complications whereas mean±standard deviation was computed for quantitative variables like age, BMI, disease duration, post-op duration of hospital stay and pain. Comparison was done between both groups for complication rate, pain and length of hospital stay. Hospital stay, post-op pain score and complication rate were stratified with age, BMI, laterality of the breast and disease stage. At 5% level of significance, chi square test was applied post categorization, p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total number of 60 patients meeting the inclusion criteria were registered in the study and were randomly assigned to Group-A or Group-B. Group-A was ERAS group and Group-B was conventional Non-ERAS group. The age of the patients spanned from 30 to 70 years. The mean age of the patients in ERAS group was 56.30±5.615 years while the mean age in non-ERAS group was 56.07±6.11 years. The mean BMI was 22.093±1.23 in ERAS group and 21.90±1.09 kg/m^2 years in Non-ERAS group. The mean duration of hospital Stay was 1.90±0.885 in ERAS group and 3.73± 1.80 days in Non-ERAS group.

Post op complications were monitored in patients of each group in terms of hematoma, wound

infection, seroma formation and wound dehiscence. The complication rate was 36.6% (11 patients) in ERAS group while in Non-ERAS group it was 40% (12 patients). Among 11 of ERAS patients having complications, five had seroma, one had hematoma and five patients developed wound infection. In the non-ERAS group, 4 had seroma, one developed hematoma and 7 developed wound infections; among these one was admitted for wound debridement under general anaesthesia. After applying all the pre-operative, intra-operative and post-operative components of ERAS group, duration of stay was noted to be significantly less in ERAS group than in non-ERAS group. The mean length of stay was 3.73 days in Non-ERAS group while it was 1.9 days in ERAS group with a mean difference of 1.82 with a *p*-value of 0.000.

Post-operatively the Visual Analog Scale for pain was used to measure the difference between both groups. Mean was 3.7 in Non-ERAS group while it was 2.43 in ERAS group with a mean difference of 1.26 and *p*-value of 0.001.

Table-1: Mean±Standard Deviation According to Age, BMI, disease duration, duration of hospital stay and VAS

Baseline Characteristics	Mean ± Standard Deviation	
	ERAS Group	NON-ERAS Group
Age (years)	56.30±5.615	56.07±6.11
BMI (Kg/m^2)	22.093±1.23	21.90±1.09
Disease duration (weeks)	4.07±2.050	3.73±1.799
Hospital Stay (days)	1.90±0.885	3.73±1.80
Post-op VAS	2.43±1.357	3.70±1.393

N = 60 (ERAS group = 30, Non-ERAS Group = 30)

Table-2: Frequency and percentage of patients according to complication rate (ERAS vs. Non-ERAS Group)

Complication rate	ERAS Group		NON-ERAS Group		*p*-value
	Frequency	Percent	Frequency	Percent	
Yes	11	36.7	12	40.0	0.790
No	19	63.3	18	60.0	
Total	30	100.0	30	100.0	

N = 60 (ERAS Group = 30, Non-ERAS Group = 30)

Table-3: Comparison of patient with respect to duration of hospital stay (ERAS vs. Non-ERAS Group)

	Groups	Mean	Std. Deviation	Mean Difference	*t* value	*p*-value
Length of stay (days)	NON-ERAS	3.73	1.799	1.833	5.009	0.000
	ERAS	1.90	.885			

N = 60 (ERAS Group = 30, Non-ERAS Group = 30)

Table-4: Comparison of patient with respect to VAS (ERAS vs. Non-ERAS Group)

	Groups	Mean	Std. Deviation	Mean Difference	*t* value	*p*-value
VAS	NON-ERAS	3.70	1.39	1.267	3.568	0.001
	ERAS	2.43	1.35			

N = 60 (ERAS Group = 30, Non-ERAS Group = 30)

DISCUSSION

Enhanced recovery after surgery focuses on multidisciplinary teamwork resulting in better experience, better pain control and decrease in length of hospital stay.[11] Its implementation has been shown to decrease the occurrence of surgery-related complications, thereby speeding up the recovery process. These improvements indirectly alleviate the strain on healthcare resources and expenses.[12] Key components encompass thorough patient education, personalized dietary plans, optimized pain management, suitable fluids administration, and the encouragement of early oral consumption and mobility.[13]

Concept of ERAS in breast cancer surgery was started after its role was established in reconstruction procedures with main goal to reduce length of hospital stay and also to determine its effect on post-operative complications and patient satisfaction.[14] MS *et al*l in their study also showed that patients who had surgery while using ERAS protocol resulted in decreased post-operative nausea and shorter length of stay[15] which correlates with our study. In our study, the mean length of hospital stay was 1.90±0.885 in ERAS group while it was 3.73±1.80 in non-ERAS group without a big difference in complication rates. Similarly, Tan and colleagues conducted a meta-analysis with a pool of 1838 patients, concluding a decreased length of stay in ERAS group vs non-ERAS group.[16]

In our study, the mean of VAS for pain was 2.43 in ERAS group while it was 3.70 in non-ERAS group. The ERAS group patients were infiltrated with bupivacaine at the start of surgery and consequently resulting in decrease use of analgesics in immediate post-operative period which resulted in early mobilization of the patients. Chui and colleagues in their study stated that perioperative opioid use in ERAS group was notably lower than non-ERAS

group. The mean pain score in ERAS group was 4 while it was 6 in the other group. They also noted a difference in PONV; 28% vs 50%. However, the length of stay in both groups was almost the same with no big difference.[17]

Rojas and colleagues compared the effect of multimodal analgesia vs opioid use in mastectomy patients and stated that ERAS group received 2.4 (mean) opioids while usual care group were given 13.7 (p=0.002).[18]

Our study showed no difference in complications rate between two groups. Hematomas and seromas occurred at same rate in both groups, with wound infection there was one patient in non-ERAS group who required admission for wound debridement and care. The results are confounding with other studies which also show no difference in complication rates in both groups. Dumestre *et all* stated no change in rate of hematoma (1.4% ERAS vs 0.8%), infection requiring outpatient IV antibiotics (1.4% ERAS vs 2.4%) and infection requiring IV antibiotics and re-admission (2.1% ERAS vs 1.7%) among the two groups. 22% of ERAS group had minor complications while 23% of non-ERAS group had minor complications.[19]

The major concern in ERAS protocol is increasing complexity due to increasing number of components which leads to decrease in compliance causing disparity in results. Similarly, owing to many components involved, there is difficulty in identifying which component/s are producing the positive results. But generally best outcomes are seen when all protocols of ERAS are followed.[16] The stringency of ERAS protocol requirements often results in decreased adherence, sparking debate. Pearsall EA *et al.* explored healthcare workers' perspectives on ERAS implementation, highlighting challenges such as resource and manpower shortages, communication gaps, teamwork obstacles, and resistance to change.[19] Ljungqvist O's single-center study revealed that ERAS compliance rates between 50–90% correlated with a 20% reduction in total complication rates and a four-day decrease in hospital stays.[20]

Pędziwiatr M *et al*. emphasized that at least 80% of ERAS protocols should be applied to witness benefits in terms of hospitalization duration and complication reduction, suggesting a minimum application period of six months with minimum 30 surgical cases.[21]

The successful implementation of an ERAS protocol for breast surgery demands a collaborative effort involving both the surgical and anaesthesia departments.[22–25] Adherence to the protocols is crucial throughout all phases of perioperative surgical management, necessitating improvements in various aspects of patient care, encompassing nutrition, fluid balance, early mobilization, and effective non-opioid pain management. Achieving optimal outcomes requires dedicated support staff, seamless communication among healthcare providers, and the utilization of a practical checklist to facilitate ERAS execution.

CONCLUSIONS

Evidence supports the effectiveness, affordability, and safety of ERAS protocols as it leads to a noticeable decrease in hospitalization duration, resulting in reduced resource consumption and financial burdens. Nonetheless, achieving the mentioned benefits may necessitate thorough following of the protocol, which could be challenging due to professional, institutional, and personal resistance. Substantial efforts are required to make these protocols more appealing and feasible for implementation, thereby promoting the transition to this management approach.

AUTHORS' CONTRIBUTION

AW: Writing the manuscript. ISA: Data Analysis, Literature review, conceptualisation. UU: Data Collection. MMK; Overall supervision, initial review of manuscript.

REFERENCES

1. Hanahan D, Weinberg RA. The Hallmarks of Cancer. Cell 2000;100(1):57–70.
2. Sung H, Ferlay J, Siegel R.L, Laversanne M, Soerjomataram I, Jemal A, *et al*. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J. Clin 2021;71(3):209–49.
3. Duggan C, Dvaladze A, Rositch AF, Ginsburg O, Yip C, Horton S, *et al*. The Breast Health Global Initiative 2018 Global Summit on Improving Breast Healthcare Through Resource-Stratified Phased Implementation: Methods and overview. Cancer 2020;126(Suppl 10):2339–52.
4. WHO. Global Health Estimates 2016: Disease Burden by Cause, Age, Sex, by Country and by Region, 2000–2016. World Health Organization; Geneva, Switzerland: 2018.
5. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, *et al*. Global Cancer Obser-Vatory: Cancer Today. International Agency for Research on Cancer; Lyon, France: 2020.
6. DeSantis CE, Fedewa SA, Sauer AG, Kramer JL, Smith RA, Jemal A. Breast cancer statistics, 2015: Convergence of incidence rates between black and white women. CA A Cancer J Clin 2015;66(1):31–42.
7. Sharma R. Global, regional, national burden of breast cancer in 185 countries: Evidence from GLOBOCAN 2018. Breast Cancer Res Treat 2021;187(2):557–67.
8. Ginsburg O, Bray F, Coleman M, Vanderpuye V, Eniu A, Kotha SR, *et al*. The global burden of women's cancers: A grand challenge in global health. Lancet 2017;389(10071):847–60.
9. Mui J, Cheng E, Salindera S. Enhanced recovery after surgery for oncological breast cancer surgery reduces length of stay in a resource limiting setting. ANZ J Surg 2024;94(6):1096–1101.
10. Sankaranarayanan R, Swaminathan R, Brenner H, Chen K, Chia KS, Chen JG, *et al*. Cancer survival in Africa, Asia, and Central America: A population-based study. Lancet Oncol 2010;11(2):165–173.

11. Porter P. Westernizing Women's Risks? Breast Cancer in Lower-Income Countries. N Engl J Med 2008;358(3):213–16.
12. Key TJ, Appleby PN, Reeves GK, Travis RC, Alberg AJ, Barricarte A, *et al*. Sex hormones and risk of breast cancer in premenopausal women: A collaborative reanalysis of individual participant data from seven prospective studies. Lancet Oncol 2013;14(10):1009–19.
13. Folkerd E, Dowsett M. Sex hormones and breast cancer risk and prognosis. Breast 2013;22(Suppl 2):S38–43.
14. Pintault C, Pondovan A, Lebechec A, Jugan AI, Coudrio u C, Berti De M, *et al*. Implementation of enhanced recover after surgery pathways for patients undergoing mastectomy. J Gynecol Obstet Hum Reprod 2023;52(6):102600.
15. Tan Y, Lu X, Luo J, Huang Z, Deng Q, Shen XF, *et al*. Enhanced recovery after surgery for breast reconstruction: Pooled meta analysis of 10 observational studies involving 1838 Patients. Front Oncol 2019;9:675.
16. Chiu C, Aleshi P, Esserman L, Inglis-Arkell C, Yap E, Whitlock EL, *et al*. Improved analgesia and reduced post-operative nausea vomiting after implementation of an enhanced recovery after surgery (ERAS) pathway for total mastectomy. BMC Anesthesiol 2018;18(1):41.
17. Rojas K, Fortes T, Flom P, Manasseh D, Andaz C, Borgen PI. Mastectomy is no longer an indication for postoperative opiod prescription at discharge. Am J Surg 2019;218(4):700–5.
18. Dumestre D, Redwood J, Webb C, Temple-Oberle C. enhanced recovery after surgery protocol enables Safe same-day discharge after Alloplastic breast reconstruction. Plast Surg (Oakv) 2017;25(4):249–54.
19. Sulejmani P, Lunt L, Mazur M, Coogan A, Steuer A, O' Donoghue, *et al*. Enhanced recovery after surgery and length of stay in Mastectomy patients with reconstruction. J Surg Res 2023;289:158–63.
20. Tippireddy S, Ghatol D. Anesthetic management of Enhanced Recovery after surgery (ERAS). National library of Medicien. StatPearls Publishing 2023.
21. Benz CC. Impact of aging on the biology of breast cancer. Crit Rev Oncol 2008;66(1):65–74.
22. Siegel R, Ma J, Zou Z, Jemal A. Cancer statistics, 2014. CA Cancer J Clin 2014;64(1):9–29.
23. McGuire A, Brown JAL, Malone C, McLaughlin R, Kerin MJ. Effects of Age on the Detection and Management of Breast Cancer. Cancers 2015;7(2):908–29.
24. Stat Bite: Lifetime Probability among Females of Dying of Cancer. J Natl Cancer Inst 2004;96(11):1311–21.
25. Collaborative Group on Hormonal Factors in Breast Cancer. Familial breast cancer: Collaborative reanalysis of individual data from 52 epidemiological studies including 58,209 women with breast cancer and 101,986 women without the disease. Lancet 2001;358(9291):1389–99.

Submitted: March 25, 2024	*Revised: August 19, 2024*	*Accepted: December 2, 2024*

Address for Correspondence:

Dr. Irum Sabir Ali, Department of Surgery, Khyber Medical College, Peshawar-Pakistan
Email: irum1@hotmail.com