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Precision Perioperative Nursing under the Enhanced Recovery After Surgery Framework: A Narrative Review of Evidence, Core Interventions and Future Directions

Yumei Liu*

Ningqiang County Hospital of Traditional Chinese Medicine, Hanzhong, Shaanxi, 724400, China
**Corresponding author*

Abstract: *Enhanced Recovery After Surgery (ERAS) has reshaped perioperative care by integrating evidence-based, multidisciplinary interventions to reduce surgical stress, accelerate functional recovery, shorten hospital stay, and improve patient-centered outcomes. Nursing is central to ERAS implementation because many key components, including preoperative education, nutritional screening, pain assessment, early oral intake, early mobilization, tube and drain management, discharge preparation, and post-discharge follow-up, are nurse-sensitive processes. In recent years, ERAS nursing has evolved from standardized pathway implementation toward precision perioperative nursing, in which interventions are tailored according to surgical type, patient frailty, nutritional status, comorbidities, psychological state, functional capacity, and recovery trajectory. Current evidence suggests that ERAS-based nursing programs can reduce postoperative complications, facilitate gastrointestinal recovery, improve early mobility, and enhance patient satisfaction across colorectal, thoracic, orthopedic, gynecologic, hepatobiliary, pancreatic, obstetric, and transplant surgery. However, challenges remain, including variable protocol adherence, insufficient risk stratification, inconsistent outcome measures, limited digital integration, and the need for stronger long-term follow-up. This review summarizes the development of ERAS nursing, core precision interventions, evidence across surgical specialties, implementation challenges, and future research priorities. It also emphasizes that the future value of ERAS nursing depends not only on completing protocol items, but also on identifying patient-specific barriers, supporting shared recovery goals, and extending perioperative care beyond discharge.*

Keywords: *Enhanced recovery after surgery; ERAS; perioperative nursing; precision nursing; postoperative recovery; early mobilization; surgical nursing; patient-centered care*

1. Introduction

Surgery exposes patients to physiological and psychological stress, including tissue injury, inflammation, metabolic disruption, pain, immobilization, nausea, sleep disturbance, and anxiety. Conventional perioperative care often emphasized prolonged fasting, delayed mobilization, delayed feeding, and cautious tube removal. Although these practices were historically intended to protect patients, increasing evidence has shown that excessive restriction and delayed rehabilitation may prolong recovery and increase complications [1]. For many patients, the postoperative period is not only a time of wound healing but also a period of rapid functional decline, uncertainty, dependence on caregivers, and fear of complications. Therefore, perioperative care must be understood as a continuous recovery process rather than a short episode limited to the operating room and ward.

Enhanced Recovery After Surgery was developed as a multimodal, evidence-based strategy to reduce surgical stress and accelerate postoperative recovery [2]. ERAS programs are not single interventions but structured care pathways involving surgeons, anesthesiologists, nurses, dietitians, rehabilitation therapists, pharmacists, and patients. The ERAS Society has published guidelines for multiple surgical populations, including colorectal surgery, liver surgery, pancreatic surgery, lung surgery, cesarean delivery, gynecologic oncology surgery, neonatal intestinal surgery, and liver transplantation. These guidelines share several core principles: reducing unnecessary fasting, maintaining physiological stability, optimizing analgesia, encouraging early feeding and mobilization, preventing avoidable complications, and preparing patients for safe discharge.

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Nursing is fundamental to ERAS because nurses are responsible for translating protocol recommendations into daily bedside care. Nurses assess patient readiness, provide education, monitor complications, evaluate pain, support nutrition, encourage mobilization, manage drains and catheters, coordinate discharge, and communicate with multidisciplinary teams [3]. In many institutions, nurses are also the professionals who spend the longest time with patients and families, which allows them to detect subtle changes in symptoms, motivation, understanding, and self-care ability. In this context, ERAS nursing is increasingly moving toward precision perioperative nursing, which combines standardized evidence-based pathways with individualized risk assessment and tailored interventions [4].

Precision perioperative nursing is particularly important because surgical patients differ widely in baseline reserve and recovery needs. An older adult with sarcopenia, diabetes, low health literacy, and limited family support may require a very different nursing plan from a younger patient undergoing the same procedure. Similarly, a patient with cancer-related malnutrition, preoperative anxiety, or chronic pain may have a slower recovery trajectory than predicted by a standard pathway. Precision nursing therefore aims to preserve the advantages of standardized ERAS protocols while avoiding a one-size-fits-all approach. It requires nurses to identify risks early, set realistic recovery goals, adjust interventions dynamically, and communicate changes to the multidisciplinary team.

2. Conceptual Development of ERAS Nursing

The early ERAS model focused primarily on reducing surgical stress through standardized perioperative protocols. Over time, ERAS has expanded from colorectal surgery to a wide range of surgical specialties [5]. As ERAS programs matured, it became clear that protocol success depends heavily on nursing execution, patient adherence, and interdisciplinary coordination. A protocol may be well designed, but its clinical effect will be weakened if patients do not understand why early mobilization matters, if pain assessment is not linked to functional goals, or if tube removal decisions are delayed because different team members apply different standards.

ERAS nursing may be understood through four dimensions. The first is standardization: evidence-based care elements are embedded into protocols to reduce unnecessary variation. Standardization helps ensure that essential interventions are not omitted because of habit, workload, or local preference. The second is continuity: nursing interventions begin before surgery, continue during hospitalization, and extend after discharge. This continuity is important because many recovery behaviors, such as breathing exercises, nutritional intake, wound observation, and activity progression, depend on patient participation outside direct clinician supervision. The third is patient participation: patients are educated as active partners in recovery rather than passive recipients of care. The fourth is precision: nursing interventions are adjusted according to individual risk factors, recovery speed, symptom burden, and functional goals.

Precision perioperative nursing does not reject standard ERAS pathways. Instead, it improves them by asking which patient needs which intervention, at what intensity, and at what time point. For example, two patients undergoing the same colorectal surgery may require different mobilization plans if one is elderly, malnourished, anxious, and frail, while the other is younger and physically active. Therefore, precision ERAS nursing emphasizes both pathway adherence and individualized adaptation. This approach also supports clinical safety, because precision does not mean accelerating every patient at the same speed; rather, it means promoting recovery while respecting physiological tolerance, surgical risk, and patient preference.

3. Core Components of Precision ERAS Nursing

3.1. Preoperative Education and Shared Recovery Goals

Preoperative education is a cornerstone of ERAS nursing. It helps patients understand the surgical process, expected postoperative symptoms, pain control methods, mobilization targets, diet progression, tube removal, discharge criteria, and warning signs after discharge. Education can reduce uncertainty, improve cooperation, and enhance adherence to recovery behaviors. In the ERAS framework, education should be delivered before surgery because patients are usually more receptive and less affected by pain, anesthesia, fatigue, or postoperative anxiety at that time. Early education also allows patients and families to prepare the home environment, arrange caregivers, and clarify practical concerns.

In precision ERAS nursing, education should be individualized according to health literacy, language, cultural background, anxiety level, previous surgical experience, and support system. Some patients need

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detailed written instructions, while others benefit more from visual materials, demonstrations, short videos, or repeated bedside coaching. For patients with a new stoma, preoperative stoma education is particularly important because it can improve postoperative self-care ability, body image adaptation, and confidence in discharge preparation [6]. Education should not simply provide information; it should confirm understanding through teach-back, demonstration, and goal setting. Nurses can ask patients to explain the mobilization plan in their own words, demonstrate breathing exercises, or identify when they should contact the care team after discharge.

Shared recovery goals are another important element of precision education. Instead of giving patients general advice such as "walk early" or "eat as tolerated," nurses can set measurable goals, such as sitting out of bed for a defined period, walking a specific distance, completing breathing exercises several times daily, or reaching a staged oral intake target. These goals should be realistic and adjusted according to age, baseline function, surgical type, and postoperative condition. When patients understand the purpose of each goal, they are more likely to participate actively. In this way, education becomes a recovery intervention rather than a simple information transfer.

3.2. Nutritional Screening and Perioperative Nutritional Support

Malnutrition is associated with impaired wound healing, infection, delayed recovery, and longer hospitalization. ERAS pathways emphasize nutritional assessment, avoidance of unnecessary prolonged fasting, carbohydrate loading when appropriate, and early postoperative feeding. Surgical nutrition guidelines also support early nutritional intervention for high-risk patients [7]. From a nursing perspective, nutrition is not limited to diet orders. It includes screening, observation, encouragement, symptom management, documentation of intake, and coordination with dietitians and physicians.

Precision nursing requires early identification of patients with nutritional risk, including older adults, cancer patients, patients with gastrointestinal obstruction, liver disease, pancreatic disease, chronic inflammation, or recent weight loss. Nurses can screen for nutritional risk, monitor oral intake, coordinate dietitian consultation, encourage protein intake, and observe gastrointestinal tolerance after surgery. In thoracic surgery, combined exercise and nutrition management under an ERAS model has shown potential to enhance postoperative recovery. For patients with low appetite, nausea, pain, fatigue, or fear of eating after abdominal surgery, nurses should provide reassurance, explain the rationale for early intake, and report intolerance promptly.

The precision approach also requires recognizing that early feeding does not mean identical feeding for all patients. Some patients may progress rapidly from liquids to solid food, while others need slower advancement because of nausea, ileus, dysphagia, aspiration risk, or complex gastrointestinal reconstruction. Nurses are often the first to notice abdominal distension, vomiting, poor intake, or anxiety about eating. Accurate nursing assessment can prevent both harmful delay and unsafe acceleration. Nutritional support should also continue after discharge, especially for patients with cancer, frailty, stomas, or major abdominal surgery, because inadequate intake at home may undermine the gains achieved during hospitalization.

3.3. Pain Assessment and Multimodal Analgesia Support

Effective pain control is essential for coughing, deep breathing, mobilization, sleep, and psychological comfort. ERAS pathways advocate multimodal analgesia to reduce opioid-related adverse effects while maintaining adequate pain reliefPerioperative nutritional support is particularly critical in hepatobiliary surgery, where metabolic demands are high and recovery can be protracted [8]. Nurses play a key role in dynamic pain assessment, evaluation of analgesic effectiveness, monitoring adverse reactions, and patient education on pain reporting. Pain should not be evaluated only at rest, because patients may report tolerable pain while lying in bed but severe pain during coughing, turning, or walking. Functional pain assessment is therefore more consistent with ERAS goals.

Precision pain nursing requires attention to surgical type, pain history, anxiety, age, cognitive status, opioid tolerance, and patient expectations. Inadequate pain control may delay mobilization and increase pulmonary complications, while excessive sedation may increase fall risk, delirium, and respiratory depression. Therefore, pain management should be balanced, dynamic, and closely linked to functional goals such as breathing exercise and walking distance. Nurses can help patients understand that the goal is not always complete absence of pain, but pain control sufficient to breathe deeply, sleep, move safely, and participate in recovery.

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3.4. Early Oral Intake and Gastrointestinal Recovery

Early oral intake is a key ERAS component, especially in abdominal surgery. Compared with traditional delayed feeding, early feeding may support gut barrier function, reduce catabolism, and accelerate gastrointestinal recovery. ERAS nursing in gastrointestinal surgery often includes staged diet progression, nausea and vomiting assessment, abdominal distension monitoring, bowel function observation, and patient reassurance. Because many patients have been taught that eating too early after surgery is dangerous, nurses must explain why early intake is encouraged and what symptoms should be reported.

Precision feeding requires individualized assessment. Patients with high aspiration risk, severe ileus, major gastrointestinal reconstruction, or poor consciousness may require more cautious progression. Conversely, unnecessary delay in feeding may worsen weakness and malnutrition. Nurses are therefore responsible for observing tolerance and communicating timely with the surgical team. Observation should include appetite, swallowing ability, nausea, vomiting, abdominal pain, distension, bowel sounds, flatus, stool passage, and patient comfort. These details help the team decide whether to continue, pause, or adjust diet progression.

Gastrointestinal recovery is also connected with mobilization, analgesia, fluid balance, and emotional state. Excessive opioid use may worsen ileus; immobility may slow bowel activity; anxiety may reduce appetite; and poor sleep may increase nausea perception. Therefore, precision nursing should integrate feeding support with other ERAS components rather than treating it as an isolated task. For patients discharged early, nurses should provide practical dietary advice, warning signs, and contact pathways. This is especially important for colorectal surgery patients, patients with stomas, and patients after pancreatic or hepatobiliary surgery, whose nutritional needs and gastrointestinal symptoms may persist after discharge.

3.5. Early Mobilization and Functional Recovery

Early mobilization is one of the most nurse-sensitive ERAS components. It can reduce risks of venous thromboembolism, pulmonary complications, muscle loss, insulin resistance, ileus, and functional decline [9]. However, early mobilization should not be interpreted as simply asking patients to get out of bed. It requires structured assessment, individualized goals, safety precautions, pain control, tube management, and progressive activity planning. Nurses are central to this process because they evaluate readiness, coordinate assistance, remove barriers, and encourage patients during repeated daily activities.

A precision approach considers baseline mobility, frailty, balance, orthostatic hypotension, anemia, pain, surgical restrictions, and patient motivation. For orthopedic patients, early mobilization and rehabilitation are directly linked to functional outcomes after hip and knee arthroplasty. For abdominal and thoracic surgery patients, early walking supports respiratory function and bowel recovery. Nurses should document activity level, barriers to mobility, and daily progress. Documentation should be more specific than “mobilized”; it should record whether the patient sat, stood, walked, the distance achieved, assistance needed, symptoms during activity, and reasons for not reaching the target.

Safety is a major concern in early mobilization. Patients may have dizziness, hypotension, drains, catheters, oxygen therapy, epidural analgesia, wounds, or fear of falling. Precision ERAS nursing requires planning before mobilization, including checking vital signs, assessing pain, securing lines and tubes, using appropriate footwear or walking aids, and involving rehabilitation therapists when necessary. For frail or elderly patients, even short, repeated episodes of sitting and standing may be meaningful early goals. For highly motivated patients, nurses should still prevent overexertion and ensure that mobilization remains safe. The goal is progressive functional recovery, not simply rapid discharge.

3.6. Tube, Drain, and Catheter Management

ERAS pathways encourage avoiding unnecessary tubes and removing catheters, drains, and lines as early as clinically appropriate [10]. Prolonged tube use may restrict mobility, increase infection risk, and reduce patient comfort. Nurses contribute by monitoring drainage characteristics, urinary function, wound status, pain, and signs of complications. Tube management is closely related to early mobilization because patients with multiple lines often feel afraid to move or require more assistance. Therefore, timely removal of unnecessary devices can improve both comfort and recovery behavior.

Precision nursing is needed because premature removal may be unsafe in selected high-risk patients.

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For example, patients after complex pancreatic, liver, thoracic, or pelvic surgery may require careful monitoring of drain output and clinical condition before removal [11]. Nurses should follow protocol criteria while also recognizing abnormal findings such as sudden changes in drainage amount, color, odor, air leak, fever, abdominal pain, urinary retention, or wound leakage. When abnormalities occur, early communication may prevent delayed diagnosis of complications.

3.7. Discharge Preparation and Post-Discharge Follow-Up

Shorter hospital stay is one expected result of ERAS, but earlier discharge must be supported by adequate education, self-care ability, warning-sign recognition, and follow-up access [12]. Nurses should assess whether patients can manage wounds, medications, diet, activity, drains, stomas, and appointments. Discharge readiness should not be judged only by stable vital signs or surgical approval. It should also include patient confidence, caregiver availability, ability to understand instructions, and access to help if symptoms worsen.

Post-discharge follow-up through telephone, mobile platforms, or digital symptom reporting may help identify complications early and reduce anxiety. Follow-up is especially important because ERAS may shift part of recovery from hospital to home. Patients may experience fever, wound changes, pain, nausea, poor intake, constipation, diarrhea, fatigue, or emotional distress after discharge. A precision follow-up plan should stratify patients according to risk. Low-risk patients may need standard education and routine contact, while high-risk patients may need earlier follow-up, digital symptom monitoring, home nursing support, or closer coordination with outpatient services [13].

Family caregivers should also be included in discharge preparation [14]. In many settings, families assist with diet, wound care, mobility, medication, and transportation. If caregivers do not understand the recovery plan, patients may become overly restricted at home or may delay seeking help. Nurses should therefore teach both patients and caregivers, confirm understanding, and provide written or digital instructions. Effective discharge preparation turns early discharge from a system goal into a safe patient-centered transition.

4. Evidence across Surgical Specialties

4.1. Colorectal and Gastrointestinal Surgery

Colorectal surgery is one of the earliest and most mature fields for ERAS application. ERAS Society recommendations for elective colorectal surgery provide comprehensive guidance on preoperative counseling, bowel preparation, fasting, analgesia, fluid therapy, nutrition, mobilization, and discharge criteria. Systematic reviews suggest that ERAS protocols in colorectal and gastrointestinal surgery can reduce length of stay, accelerate bowel function recovery, and decrease postoperative complications [15]. The nursing contribution is particularly visible because gastrointestinal recovery depends heavily on feeding support, nausea management, ambulation, catheter removal, and patient education.

For gastrointestinal surgery patients, nursing adherence is essential because many ERAS elements depend on daily bedside implementation. These include encouraging oral intake, assessing nausea, removing catheters, supporting ambulation, and preparing discharge. Patients with colorectal cancer and new stomas require additional education and psychosocial support. Stoma education should begin before surgery when possible and continue after surgery with hands-on practice, body image support, dietary guidance, and follow-up planning. Precision nursing is also needed for patients with malnutrition, bowel obstruction, advanced cancer, or poor family support, because these factors may affect both inpatient recovery and home adaptation.

4.2. Thoracic Surgery

Thoracic surgery patients are vulnerable to pain, atelectasis, pneumonia, impaired cough, and reduced exercise tolerance. ERAS guidelines for lung surgery emphasize preoperative smoking cessation, pulmonary optimization, minimally invasive approaches, multimodal analgesia, chest drain management, early feeding, and early mobilization. ERAS-based exercise-nutrition management has been explored in thoracoscopic radical resection of lung cancer, suggesting benefits for postoperative recovery [16]. Nursing responsibilities include respiratory exercise instruction, sputum clearance, pain assessment, chest tube observation, and progressive mobilization.

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Precision ERAS nursing in thoracic surgery should focus on the interaction between pain, breathing, and mobility. If pain is uncontrolled, patients may avoid deep breathing and coughing, increasing pulmonary risk. If chest tubes are uncomfortable or not well managed, mobility may be delayed. Nurses should teach incentive breathing or deep-breathing exercises, assist with effective coughing, monitor oxygenation, encourage early walking, and report drainage or air leak concerns. For patients with lung cancer, anxiety about diagnosis and prognosis may also influence recovery participation. Psychological support and clear explanations can improve cooperation and confidence.

4.3. Orthopedic Surgery

Total hip and knee arthroplasty are highly suitable for ERAS because functional recovery is a primary outcome. ERAS Society recommendations for hip and knee replacement emphasize patient education, blood management, analgesia, early mobilization, and discharge planning [17]. Recent reviews report that enhanced recovery pathways improve early outcomes after arthroplasty [18]. Orthopedic ERAS nursing should focus on pain control, fall prevention, thrombosis prevention, mobility training, assistive device education, and home rehabilitation planning.

Precision nursing is necessary because orthopedic patients differ in age, baseline mobility, bone health, comorbidities, obesity, fear of movement, and home environment. A patient living alone in a house with stairs may face different discharge barriers from a patient with strong family support. Nurses should assess home safety, ability to use walkers or crutches, understanding of precautions, and adherence to rehabilitation exercises. Early mobilization should be coordinated with analgesia timing so that patients can participate effectively. For elderly patients, fall prevention and delirium prevention should be integrated into the ERAS plan.

4.4. Obstetric and Gynecologic Surgery

ERAS principles have been applied to cesarean delivery and gynecologic oncology surgery. Cesarean ERAS emphasizes preoperative education, optimized fasting, multimodal analgesia, early oral intake, early urinary catheter removal, early mobilization, breastfeeding support, and maternal-infant bonding [19]. In obstetric settings, nursing care must balance maternal recovery with newborn care, breastfeeding, emotional support, and family involvement. Pain control should enable mothers to move, care for the infant, and rest, while minimizing adverse effects.

Gynecologic oncology patients often face complex surgery, cancer-related distress, malnutrition, and postoperative functional decline, requiring integrated ERAS, oncology nursing, and psychosocial care [20]. These patients may need individualized counseling about fertility, body image, sexual health, lymphedema prevention, wound care, and adjuvant therapy planning. Precision ERAS nursing should therefore connect surgical recovery with longer cancer-care pathways. Education, nutrition, mobilization, and discharge planning should be aligned with the patient's oncology treatment plan and emotional needs.

4.5. Hepatobiliary, Pancreatic, and Transplant Surgery

Liver and pancreatic surgeries are complex and associated with high complication risk. ERAS guidelines for liver surgery and pancreatoduodenectomy support standardized perioperative pathways while acknowledging the need for individualized risk management [21,22]. Nursing care in these patients requires close observation of pain, bleeding, infection, nutrition, gastrointestinal recovery, drain output, blood glucose, and functional status. Because complications may be serious and recovery may be variable, precision assessment is particularly important.

Liver transplantation ERAS recommendations further highlight the importance of multidisciplinary coordination, early extubation, early mobilization, nutrition, and complication surveillance [23]. Transplant recipients may have long preoperative illness, muscle wasting, immunosuppression, infection risk, and complex medication regimens. Nurses must support early recovery while teaching medication adherence, infection prevention, nutrition, activity progression, and warning signs. In this field, ERAS nursing extends from acute perioperative care to long-term self-management, making continuity and patient education essential.

4.6. Special Populations and Resource-Limited Settings

ERAS implementation has also been discussed for neonatal intestinal surgery and abdominal/pelvic

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surgery in low- and middle-income countries [24]. These areas remind clinicians that ERAS is not a fixed package but a context-sensitive framework. In resource-limited settings, nursing leadership may be particularly important for adapting feasible elements, improving patient education, standardizing postoperative mobilization, and reducing avoidable complications. Even when advanced digital systems or specialized teams are unavailable, basic ERAS principles such as early education, appropriate nutrition, pain assessment, early mobilization, and discharge preparation can still improve care.

Special populations also include older adults, frail patients, patients with cognitive impairment, rural patients, and patients with limited social support. These groups may not benefit from a standard pathway unless barriers are identified early. Precision nursing can adapt education methods, mobilization goals, follow-up intensity, and caregiver involvement. For neonatal or pediatric surgical populations, family education and developmental considerations are central. For patients in low-resource hospitals, simplified checklists, staff training, and locally feasible protocols may be more useful than complex pathways that cannot be consistently implemented [25].

5. Digital Health and ERAS Nursing

Digital health interventions are increasingly relevant to perioperative care. Mobile applications, online education, digital checklists, wearable activity monitors, and remote symptom reporting can support ERAS adherence before and after hospitalization [26]. Digital tools may improve preparation, track recovery, monitor pain, prompt mobilization, and support early detection of complications after discharge. For example, patients may receive reminders for breathing exercises, diet progression, medication use, or activity goals. Nurses may also use digital dashboards to identify patients whose symptoms require follow-up.

However, digital perioperative nursing should be integrated into workflow rather than added as an extra burden. Nurses need clear dashboards, response protocols, and escalation criteria. Digital systems should also be designed for patients with different ages, languages, and digital literacy levels. A platform that is difficult for older adults to use or that produces too many alerts may reduce rather than improve care quality. Privacy, data accuracy, staffing capacity, and response responsibility must also be considered. Digital tools should support clinical judgment, not replace bedside assessment or human communication.

6. Implementation Challenges

Despite strong conceptual support, ERAS nursing implementation remains difficult. First, protocol adherence varies across institutions and professionals [27]. A pathway may exist on paper but fail in practice if nurses lack training, physicians do not align orders, or patients do not understand recovery goals. Second, ERAS requires multidisciplinary collaboration. Nursing efforts may be limited if nutrition, anesthesia, surgery, rehabilitation, and pharmacy are not coordinated. Third, some patients cannot follow standard pathways because of frailty, complications, severe comorbidity, or social barriers.

Fourth, outcome measurement is inconsistent. Many studies focus on length of stay, but nursing-sensitive outcomes such as functional independence, self-care ability, symptom burden, sleep, anxiety, satisfaction, and post-discharge recovery are equally important [28]. Fifth, shortened hospital stay may shift care responsibilities to patients and families, making discharge education and follow-up essential. If patients leave hospital before they feel prepared, early discharge may increase anxiety and create hidden caregiver burden. Therefore, discharge readiness must be measured from both clinical and patient perspectives.

7. Future Directions

Future ERAS nursing research should prioritize precision implementation. Risk stratification tools can identify patients who need enhanced education, prehabilitation, nutritional support, delirium prevention, intensive mobilization support, or post-discharge monitoring. Nursing pathways should include both universal ERAS components and individualized modules. For example, all patients may receive standard education and early mobilization guidance, while high-risk patients may receive additional nutritional counseling, psychological support, caregiver training, or digital follow-up [29].

Second, future trials should evaluate long-term outcomes, including functional recovery, quality of

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life, symptom burden, patient-reported experience, caregiver burden, and cost-effectiveness [30]. These outcomes are important because the success of ERAS should not be defined only by fewer inpatient days. Third, digital ERAS platforms should be tested through pragmatic trials that assess feasibility and workflow integration. Fourth, nursing education should include ERAS principles, motivational communication, risk assessment, and interdisciplinary coordination. Finally, ERAS research should include diverse populations, including older adults, frail patients, rural patients, and patients in resource-limited hospitals.

Future work should also strengthen the theoretical foundation of precision perioperative nursing. Nursing models can clarify how assessment, education, symptom management, behavior support, and continuity of care interact to produce recovery outcomes. Implementation science can help explain why some ERAS programs succeed while others remain superficial. Mixed-method studies may be useful because patient interviews and nurse feedback can reveal barriers that quantitative indicators miss. As ERAS continues to expand, nursing should not be viewed only as protocol execution, but as a discipline that shapes recovery experience, patient safety, and individualized care quality [31].

8. Conclusion

ERAS has transformed perioperative care from a passive, restriction-based model to an active, evidence-based recovery model. Nursing is essential to ERAS success because nurses operationalize education, nutrition, pain control, early feeding, mobilization, tube management, discharge preparation, and follow-up. Current evidence supports the positive role of ERAS-based nursing across multiple surgical specialties. The future of ERAS nursing lies in precision perioperative care, where standardized pathways are combined with individualized risk assessment, patient participation, digital support, and multidisciplinary collaboration.

Precision perioperative nursing can help ensure that ERAS remains both evidence-based and patient-centered. It allows nurses to identify who needs additional support, which barriers delay recovery, and how interventions should be adjusted across the perioperative continuum. By linking standardized protocols with individualized assessment, ERAS nursing can improve not only early postoperative outcomes but also patient confidence, functional recovery, and safe transition from hospital to home. Continued research, nurse training, digital innovation, and multidisciplinary cooperation will be necessary to move ERAS nursing from pathway compliance toward truly personalized surgical recovery.

References

[1] Ljungqvist O, Scott M, Fearon KC. Enhanced Recovery After Surgery: A Review[J]. JAMA Surg. 2017, 152(3):292.
[2] Mehdiratta L, Mishra SK, Vinayagam S, et al. Enhanced recovery after surgery (ERAS): still a distant speck on the horizon! [J]. Indian J Anaesth. 2021; 65(2):93-96.
[3] Achrekar MS. Enhanced recovery after surgery (ERAS) nursing programme[J]. Asia Pac J Oncol Nurs. 2022; 9(7):100041.
[4] Althans AR, Holder-Murray J, Tessler RA. The Future of Enhanced Recovery After Surgery—Precision vs Protocol[J]. JAMA Netw Open. 2024; 7(6):e2418968.
[5] Gustafsson UO, Scott MJ, Hubner M, et al. Guidelines for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations: 2018[J]. World J Surg. 2019;43(3):659-695.
[6] Shi V, McKechnie T, Anant S, et al. The impact of preoperative stoma education on postoperative outcomes for patients with new stomas after colorectal surgery: a systematic review and meta-analysis[J]. Tech Coloproctol. 2025;29(1):183.
[7] Weimann A, Braga M, Carli F, et al. ESPEN guideline: Clinical nutrition in surgery[J]. Clin Nutr. 2017, 36(3):623-634.
[8] Batchelor TJP, Rasburn NJ, Abdelnour-Berchtold E, et al. Guidelines for enhanced recovery after lung surgery: recommendations of the Enhanced Recovery After Surgery (ERAS®) Society and the European Society of Thoracic Surgeons (ESTS) [J]. Eur J Cardiothorac Surg. 2019;55(1):91-115.
[9] Tazreean R, Nelson G, Twomey R. Early mobilization in enhanced recovery after surgerypathways: current evidence and recent advancements[J]. J Comp Eff Res. 2022, 11(2):121-129.
[10] Schreiber A, Aydil E, Walschus U, et al. Early removal of urinary drainage in patients receiving epidural analgesia after colorectal surgery within an ERAS protocol is feasible[J]. Langenbecks Arch Surg. 2019;404(7):853-863.

ISSN 2706-6819 Vol.8, Issue 2: 116-124, DOI: 10.25236/IJFM.2026.080214

[11] Goldaracena N, Bhangui P, Yoon YI, et al. Early removal of drains and lines after liver transplantation to reduce the length of hospital stay and enhance recovery–A systematic review of the literature and expert panel recommendations[J]. Clinical Transplantation. 2022;36(10):e14687.
[12] Nelson G, Bakkum-Gamez J, Kalogera E, et al. Guidelines for perioperative care in gynecologic/oncology: Enhanced Recovery After Surgery (ERAS) Society recommendations-2019 update[J]. Int J Gynecol Cancer. 2019;29(4):651-668.
[13] Rappold D, Stättner S, Nöhammer E. Patient-Reported Outcome and Experience Measures (PROM/PREM) in Patients Undergoing Liver Surgery with Enhanced Recovery after Surgery (ERAS®): An Exploratory Study[J]. Healthcare (Basel). 2024;12(6):629.
[14] Wainwright TW, Jakobsen DH, Kehlet H. The current and future role of nurses within enhanced recovery after surgery pathways[J]. Br J Nurs. 2022;31(12):656-659.
[15] Kannan V, Ullah N, Geddada S, et al. Impact of "Enhanced Recovery After Surgery" (ERAS) protocols vs. traditional perioperative care on patient outcomes after colorectal surgery: a systematic review[J]. Patient Saf Surg. 2025; 19(1):4.
[16] Huang L, Hu Y, Chen J. Effectiveness of an ERAS-based exercise-nutrition management model in enhancing postoperative recovery for thoracoscopic radical resection of lung cancer: A randomized controlled trial[J]. Medicine. 2024; 103(15):e37667.
[17] Wainwright TW, Gill M, McDonald DA, et al. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations[J]. Acta Orthop. 2020; 91(1):3-19.
[18] Sattler L, Puze E, Sands K, et al. Enhanced recovery pathways improve early outcomes and reduce length of stay in primary hip and knee arthroplasty: A systematic review of randomized controlled trials[J]. Int J Orthop Trauma Nurs. 2025; 57: 101186.
[19] Sultan P, Monks DT, Sharawi N, et al. Guidelines for postoperative care in cesarean delivery: Enhanced Recovery After Surgery Society recommendations (part 3)-2025 update[J]. Am J Obstet Gynecol. 2025;233(6):S184-S198.
[20] Nelson G, Fotopoulou C, Taylor J, et al. Enhanced recovery after surgery (ERAS®) society guidelines for gynecologic oncology: Addressing implementation challenges - 2023 update[J]. Gynecol Oncol. 2023;173:58-67.
[21] Joliat GR, Kobayashi K, Hasegawa K, et al. Guidelines for Perioperative Care for Liver Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations 2022[J]. World J Surg. 2023;47(1):11-34.
[22] Lassen K, Coolsen MM, Slim K, et al. Guidelines for perioperative care for pancreaticoduodenectomy: Enhanced Recovery After Surgery (ERAS®) Society recommendations[J]. Clin Nutr. 2012;31(6):817-830.
[23] Brustia R, Monsel A, Skurzak S, et al. Guidelines for Perioperative Care for Liver Transplantation: Enhanced Recovery After Surgery (ERAS) Recommendations[J]. Transplantation. 2022;106(3):552-561.
[24] Pilkington M, Nelson G, Pentz B, et al. Enhanced Recovery After Surgery (ERAS) Society Recommendations for Neonatal Perioperative Care[J]. JAMA Surg. 2024;159(9):1071–1078.
[25] Oodit R, Biccard BM, Panieri E, et al. Guidelines for Perioperative Care in Elective Abdominal and Pelvic Surgery at Primary and Secondary Hospitals in Low-Middle-Income Countries (LMIC's): Enhanced Recovery After Surgery (ERAS) Society Recommendation[J]. World J Surg. 2022;46(8):1826-1843.
[26] Ahmed A, Ho CW, Grant Y, et al. Acceptability of digital health interventions in perioperative care: a systematic review and narrative synthesis of clinician perspectives[J]. BMJ Open. 2025;15(3):e086412.
[27] Tyagi N. Nurse-led Enhanced Recovery after Surgery Programs: Potential Solution to Shorten Postoperative Recovery[J]. Indian J Crit Care Med. 2025;29(1):3-5.
[28] Zhang D, Zhong M, Jin L, et al. Effects of enhanced recovery after surgery nursing on patients undergoing laparoscopic colectomy: a systematic review and meta-analysis[J]. BMC Gastroenterology. 2025, 25;788.
[29] Zain Z, Almadhoun MKIK, Alsadoun L, et al. Leveraging Artificial Intelligence and Machine Learning to Optimize Enhanced Recovery After Surgery (ERAS) Protocols[J]. Cureus. 2024;16(3):e56668.
[30] Abosheisha M, Nasr E, Abdellatif M, et al. The Future of Enhanced Recovery After Surgery in General Surgery: Integrating Artificial Intelligence, Personalized Care, and Technological Advances[J]. Cureus. 2025;17(9):e91528.
[31] Ortiz Vazquez EF, Londoño Victoria JC, Castillo López GA, et al. Minimally Invasive Gynecologic Surgery and Enhanced Recovery and Outcomes: A Literature Review[J]. Cureus. 2025;17(5):e84814.