



“Optimizing Surgical Recovery Through Evidence-Based Nutrition Support: A Narrative Review of Nursing Roles, Clinical Strategies, and Best Practices”

Anuradha Patel¹, Dr. Nitin Chicholkar²

¹PhD Research Scholar, ²Research Supervisor

Index Nursing College,

Malwanchal University, Indore M.P

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Abstract: Nutrition is a fundamental determinant of surgical outcomes, influencing wound healing, immune function, recovery, and overall patient prognosis. Malnutrition, both overt and subclinical, remains highly prevalent among surgical patients and is associated with increased postoperative complications, prolonged hospital stay, higher healthcare costs, and mortality. Contemporary surgical care emphasizes early nutritional assessment, individualized nutrition therapy, and multidisciplinary collaboration to optimize perioperative recovery. Nurses play a pivotal role in identifying nutritional risks, implementing nutritional interventions, monitoring patient responses, educating patients and caregivers, and coordinating multidisciplinary care. This narrative review synthesizes current evidence regarding nutrition support in surgical patients with a particular emphasis on nursing roles and evidence-based clinical practices. The review discusses nutritional physiology during surgical stress, methods of nutritional screening and assessment, enteral and parenteral nutrition strategies, enhanced recovery protocols, specialized nutritional supplements, complications of nutrition therapy, patient education, and future innovations in perioperative nutritional care. Evidence consistently demonstrates that structured nutritional interventions led by multidisciplinary teams, with nurses serving as central coordinators, significantly improve postoperative recovery, reduce infections, accelerate wound healing, and enhance patient satisfaction. Continuous nursing education and integration of evidence-based nutritional practices remain essential for improving surgical outcomes worldwide.

Keywords: *Surgical nutrition, perioperative nutrition, enteral nutrition, parenteral nutrition, nursing care, enhanced recovery after surgery, nutritional assessment, malnutrition, wound healing, evidence-based practice.*

Introduction

Surgical intervention induces profound physiological changes that substantially increase metabolic demands. Tissue injury initiates complex inflammatory and neuroendocrine responses characterized by increased secretion of cortisol, catecholamines, glucagon, and inflammatory cytokines including interleukin-6 and tumor necrosis factor-alpha. These mediators accelerate protein catabolism, increase resting energy expenditure, promote insulin resistance, and impair immune function. Without adequate nutritional support, these metabolic alterations contribute to muscle wasting, delayed wound healing, increased susceptibility to infection, prolonged hospitalization, and higher mortality rates (Weimann et al., 2021).

Malnutrition affects approximately 20–50% of hospitalized surgical patients depending on age, disease severity, and type of surgery. Gastrointestinal surgery, oncological procedures, trauma surgery,

and major abdominal operations carry particularly high nutritional risks because of altered digestive function, reduced oral intake, and increased metabolic demands (Cederholm et al., 2019). Numerous studies have demonstrated that nutritional optimization before, during, and after surgery significantly improves recovery and reduces postoperative complications.

Recent advances in perioperative care, particularly Enhanced Recovery After Surgery (ERAS) protocols, recognize nutrition as one of the most important modifiable determinants of surgical outcomes. Evidence now supports minimizing prolonged fasting, encouraging early oral intake, initiating early enteral nutrition whenever feasible, and providing individualized nutritional supplementation according to patient-specific needs (Ljungqvist et al., 2017).

Nurses remain at the forefront of nutritional care throughout the perioperative continuum. Their responsibilities include nutritional



screening, patient assessment, implementation of nutrition therapy, monitoring for complications, patient education, documentation, and interdisciplinary communication. Evidence-based nursing interventions significantly improve adherence to nutritional protocols and contribute to safer, more effective postoperative recovery.

Nutritional Physiology During Surgical Stress

Surgery triggers a coordinated stress response designed to promote survival but simultaneously increases nutritional requirements. Following tissue injury, inflammatory mediators stimulate hepatic production of acute-phase proteins while reducing synthesis of albumin and other transport proteins. Protein catabolism accelerates to supply amino acids for wound repair and immune responses. Skeletal muscle becomes the primary source of amino acids, resulting in rapid muscle wasting if nutritional requirements are not adequately met (Singer et al., 2019).

Carbohydrate metabolism also changes substantially after surgery. Insulin resistance develops rapidly, leading to hyperglycemia despite elevated insulin concentrations. Hyperglycemia impairs neutrophil function, delays collagen synthesis, and increases infection risk. Lipid metabolism shifts toward increased lipolysis and utilization of fatty acids as an energy source. Overall energy expenditure may increase by 20–50% depending on surgical severity.

The gastrointestinal tract itself undergoes functional alterations. Gastric emptying may slow temporarily, intestinal motility decreases immediately after surgery, and gut permeability may increase, predisposing patients to bacterial translocation. Maintaining adequate enteral stimulation helps preserve intestinal mucosal integrity and supports immune function.

Understanding these metabolic adaptations enables nurses to appreciate the importance of early nutritional intervention and individualized nutritional planning throughout surgical recovery.

Burden of Malnutrition in Surgical Patients

Malnutrition remains one of the most underdiagnosed complications among hospitalized surgical patients. Contributing factors include reduced appetite, chronic disease, malignancy, gastrointestinal obstruction, dysphagia, prolonged fasting, psychological distress, and socioeconomic barriers to adequate nutrition.

Preoperative malnutrition significantly increases postoperative morbidity. Malnourished patients experience higher rates of wound infection, anastomotic leakage, pneumonia, sepsis, pressure

injuries, delayed mobilization, prolonged intensive care admission, and mortality (Cederholm et al., 2019).

Older adults are particularly vulnerable because aging is associated with reduced muscle mass, diminished physiological reserves, chronic illness, polypharmacy, and decreased nutritional intake. Cancer patients frequently experience cachexia characterized by severe muscle wasting despite adequate caloric intake. Obesity also presents unique nutritional challenges because obese patients may simultaneously exhibit micronutrient deficiencies and protein malnutrition.

Hospital-related factors including prolonged fasting, delayed postoperative feeding, inadequate nutritional monitoring, and insufficient dietary support further contribute to nutritional deterioration during hospitalization.

Early identification and correction of malnutrition are therefore considered essential components of perioperative quality care.

Nutritional Screening and Assessment

Comprehensive nutritional assessment begins with systematic screening of every surgical patient upon admission. International guidelines recommend validated screening instruments including the Malnutrition Universal Screening Tool (MUST), Nutritional Risk Screening-2002 (NRS-2002), Mini Nutritional Assessment (MNA), and Subjective Global Assessment (SGA) (Weimann et al., 2021). Screening evaluates recent weight loss, body mass index, reduced dietary intake, disease severity, gastrointestinal symptoms, muscle wasting, and functional status. Positive screening results require comprehensive nutritional assessment by the multidisciplinary team.

Anthropometric measurements including body weight, height, body mass index, mid-upper arm circumference, calf circumference, and handgrip strength provide objective indicators of nutritional status. Biochemical investigations such as serum albumin, prealbumin, C-reactive protein, hemoglobin, electrolyte profile, renal function, liver function, and micronutrient levels complement clinical evaluation, although inflammatory states may limit interpretation of certain biomarkers.

Dietary assessment includes usual food intake, swallowing ability, food preferences, allergies, gastrointestinal tolerance, cultural practices, and previous nutritional supplementation. Functional assessment evaluates muscle strength, mobility, independence in activities of daily living, and frailty.

Nurses play a leading role in conducting initial nutritional screening, documenting findings, identifying patients requiring referral, and initiating appropriate nutritional interventions.



Principles of Perioperative Nutrition Support

Modern perioperative nutrition aims to prevent catabolism, preserve lean body mass, maintain immune competence, promote wound healing, reduce complications, and facilitate early functional recovery.

Preoperative nutritional optimization is recommended whenever surgery can be safely delayed, particularly in severely malnourished patients. Nutritional supplementation for 7–14 days before major surgery has demonstrated reductions in postoperative infectious complications.

Current evidence discourages prolonged fasting before surgery. Patients may safely consume solid foods until six hours before anesthesia and clear carbohydrate-rich fluids until two hours before elective surgery. Preoperative carbohydrate loading reduces insulin resistance, improves patient comfort, and accelerates postoperative recovery (Ljungqvist et al., 2017).

Following surgery, oral feeding should resume as early as clinically feasible. If oral intake remains inadequate, enteral nutrition is preferred over parenteral nutrition because it preserves intestinal integrity, supports gut-associated immune function, and reduces infectious complications.

Nutrition prescriptions should be individualized based on surgical procedure, metabolic demands, organ function, age, and comorbid conditions.

Enteral Nutrition

Enteral nutrition involves delivery of nutrients directly into the gastrointestinal tract through oral nutritional supplements or feeding tubes. Whenever the gastrointestinal tract is functional, enteral nutrition remains the preferred method of nutritional support because it is more physiological, less expensive, and associated with fewer complications than parenteral nutrition (Singer et al., 2019).

Common routes include nasogastric tubes, nasojejunal tubes, gastrostomy tubes, and jejunostomy tubes. Selection depends on anticipated duration of feeding, gastrointestinal anatomy, aspiration risk, and surgical procedure.

Early enteral nutrition initiated within 24–48 hours after major surgery has consistently demonstrated reductions in infectious complications, shorter hospital stay, improved wound healing, preservation of intestinal mucosal integrity, and reduced mortality in high-risk patients.

Nurses have critical responsibilities during enteral nutrition. These include verifying tube placement, maintaining tube patency,

monitoring feeding tolerance, preventing aspiration, assessing abdominal distension, recording gastric residual volumes where appropriate, maintaining head elevation, administering prescribed medications safely, monitoring fluid balance, documenting intake, and educating patients regarding feeding procedures.

Common complications include aspiration pneumonia, diarrhea, constipation, tube obstruction, nausea, vomiting, electrolyte imbalance, and tube displacement. Prompt nursing recognition and intervention reduce associated morbidity.

Parenteral Nutrition

Parenteral nutrition provides nutrients intravenously when the gastrointestinal tract cannot be safely utilized. Indications include intestinal obstruction, severe ileus, bowel ischemia, high-output fistula, severe pancreatitis with intolerance to enteral feeding, and extensive bowel resection.

Parenteral nutrition solutions contain amino acids, glucose, lipid emulsions, electrolytes, vitamins, trace elements, and water tailored to individual metabolic requirements. Central venous administration is preferred for long-term therapy because of higher osmolality.

Although lifesaving in selected patients, parenteral nutrition carries significant risks including catheter-related bloodstream infection, metabolic complications, liver dysfunction, hyperglycemia, electrolyte disturbances, and thrombosis.

Nurses play indispensable roles by maintaining strict aseptic technique during catheter care, monitoring infusion rates, preventing catheter infections, assessing insertion sites, monitoring blood glucose, evaluating laboratory values, recognizing signs of sepsis, documenting fluid balance, and collaborating with pharmacists and physicians to optimize therapy.

Specialized Nutritional Support

Emerging evidence supports specialized nutritional formulations in selected surgical populations. Immunonutrition formulas enriched with arginine, glutamine, omega-3 fatty acids, and nucleotides enhance immune function and reduce infectious complications among patients undergoing major gastrointestinal and oncological surgery (Weimann et al., 2021).

Protein requirements increase substantially after surgery, generally ranging from 1.2 to 2.0 g/kg/day depending on disease severity. Adequate protein intake supports collagen synthesis, muscle preservation, immune function, and wound healing.

Micronutrients including vitamin C, vitamin A, vitamin D, zinc, selenium, iron, and copper play essential roles in tissue repair,



antioxidant defense, and immune regulation. Deficiencies should be corrected promptly.

Fluid and electrolyte management also constitute integral components of nutritional support. Balanced fluid therapy prevents dehydration, electrolyte imbalance, and renal dysfunction while avoiding fluid overload.

Nutrition and Wound Healing

Successful wound healing depends upon adequate nutritional status. Protein provides amino acids necessary for collagen formation, fibroblast proliferation, angiogenesis, and tissue remodeling. Protein deficiency delays all phases of wound repair and increases wound dehiscence.

Vitamin C facilitates collagen synthesis and enhances immune function. Vitamin A supports epithelial regeneration and inflammatory regulation. Zinc participates in DNA synthesis, cell proliferation, and immune defense. Iron contributes to oxygen transport and collagen maturation.

Hyperglycemia adversely affects leukocyte function and collagen deposition, increasing surgical site infection risk. Therefore, nutritional interventions should complement meticulous glycemic control.

Nurses regularly assess wound appearance, identify nutritional deficiencies affecting healing, reinforce dietary recommendations, collaborate with dietitians, and educate patients regarding adequate protein and micronutrient intake during recovery.

Enhanced Recovery After Surgery (ERAS) and Nutrition

Enhanced Recovery After Surgery programs integrate evidence-based perioperative interventions designed to accelerate recovery while reducing complications. Nutrition forms one of the central pillars of ERAS protocols.

ERAS recommendations include avoidance of prolonged fasting, preoperative carbohydrate loading, early postoperative oral feeding, individualized nutritional supplementation, glycemic control, multimodal analgesia, early mobilization, and patient education (Ljungqvist et al., 2017).

Multiple randomized controlled trials have demonstrated that ERAS protocols reduce postoperative ileus, shorten hospital stay, decrease complication rates, improve patient satisfaction, and lower healthcare costs.

Nurses are instrumental in implementing ERAS pathways through patient education, nutritional monitoring, encouraging early feeding and mobilization, coordinating multidisciplinary care, documenting outcomes, and ensuring adherence to protocol recommendations.

Nursing Roles in Nutrition Support

Nurses provide continuous nutritional care throughout the perioperative period. Their responsibilities begin with comprehensive nutritional screening and continue until discharge and follow-up.

Assessment responsibilities include evaluating nutritional risk, monitoring anthropometric changes, assessing gastrointestinal function, documenting dietary intake, identifying swallowing difficulties, and recognizing signs of malnutrition.

Implementation responsibilities include administering oral supplements, managing enteral and parenteral nutrition, maintaining feeding tube safety, monitoring infusion devices, ensuring infection prevention, encouraging early oral intake, and maintaining accurate intake-output records.

Monitoring involves observing feeding tolerance, gastrointestinal symptoms, laboratory findings, electrolyte balance, glycemic control, hydration status, wound healing, and patient comfort.

Educational responsibilities include explaining nutritional goals, encouraging adherence to prescribed diets, teaching feeding tube care, reinforcing food safety, discussing protein-rich foods, promoting hydration, and preparing caregivers for home nutritional management.

Nurses also function as patient advocates, ensuring timely referrals to dietitians, participating in multidisciplinary rounds, documenting nutritional progress, and supporting evidence-based clinical decision-making.

Patient Education and Discharge Planning

Effective discharge planning begins early during hospitalization. Patients require individualized nutritional counseling according to surgical procedure, comorbidities, cultural preferences, socioeconomic status, and home support.

Education includes meal planning, adequate protein intake, hydration, vitamin supplementation, food safety, medication interactions, recognition of dehydration, management of gastrointestinal symptoms, wound nutrition, diabetes management, and follow-up appointments.

Patients receiving home enteral or parenteral nutrition require extensive education regarding equipment handling, infection prevention, troubleshooting, catheter care, feeding administration, and emergency management.

Family caregivers should participate actively in discharge education to improve long-term adherence and reduce readmissions.



Challenges in Clinical Practice

Despite strong evidence supporting perioperative nutrition, implementation remains inconsistent. Barriers include inadequate nutritional screening, insufficient nursing education, limited dietitian availability, heavy workloads, lack of standardized protocols, delayed referrals, poor documentation, and institutional resource limitations.

Patient-related challenges include reduced appetite, postoperative nausea, pain, psychological distress, financial constraints, cultural dietary practices, and low health literacy.

Addressing these barriers requires institutional commitment, interdisciplinary collaboration, standardized nutritional pathways, continuing professional education, electronic nutritional documentation systems, and quality improvement initiatives.

Future Directions

Future developments in surgical nutrition emphasize precision nutrition, personalized metabolic monitoring, artificial intelligence-assisted nutritional assessment, digital dietary monitoring, wearable biosensors, microbiome-targeted therapies, and machine learning prediction of nutritional risk.

Telehealth enables remote nutritional counseling, postoperative monitoring, and early identification of nutritional complications after discharge. Artificial intelligence may improve prediction of postoperative nutritional needs and personalize supplementation strategies.

Future nursing research should evaluate innovative educational approaches, digital nutritional monitoring systems, nurse-led nutritional intervention programs, and implementation science strategies to improve adherence to evidence-based nutrition protocols.

Conclusion

Nutrition support is an indispensable component of high-quality surgical care. Adequate nutritional assessment, early intervention, individualized nutritional therapy, and continuous monitoring significantly improve surgical outcomes while reducing complications, hospitalization, and healthcare costs. Current evidence strongly supports early enteral nutrition, avoidance of unnecessary fasting, implementation of ERAS protocols, correction of malnutrition, and multidisciplinary collaboration throughout perioperative care.

Nurses occupy a central position in delivering evidence-based nutritional care. Through comprehensive assessment, timely

intervention, vigilant monitoring, patient education, and interdisciplinary coordination, nurses substantially influence recovery, wound healing, infection prevention, and patient quality of life. Continued investment in nursing education, standardized nutritional protocols, and evidence-based practice implementation will further strengthen perioperative nutritional care and improve surgical outcomes worldwide.

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