International Journal of Multidisciplinary Research and Development
www.allsubjectjournal.com
ISSN Online: 2349-4182 ISSN Print: 2349-5979
Received: 17-09-2025, Accepted: 17-10-2025, Published: 01-11-2025
Volume 12, Issue 11, 2025, Page No. 8-11

Role of early enteral nutrition in improving outcomes of critically ill patients

Sambhasha Brahma
In Charge, Critical Care Nutrition, KPC Medical College & Hospital, Bengal, India

Abstract
Critically ill patients often experience hypermetabolism, catabolism, and nutrient depletion due to severe physiological stress. Early enteral nutrition (EEN), defined as the initiation of nutritional support within 24–48 hours of intensive care unit (ICU) admission, has emerged as a cornerstone in critical care management. This review paper explores the role of EEN in improving outcomes of critically ill patients, focusing on mortality, morbidity, infection rates, length of hospital stay, gastrointestinal function, and overall recovery. Evidence from clinical trials, systematic reviews, and guidelines from leading health organizations is summarized to provide a comprehensive understanding of the therapeutic benefits of EEN.

Keywords: Enteral Nutrition, critically ill patent, foods, gastrointestinal function, stress

Introduction

Nutritional therapy is a fundamental component of critical care. Critically ill patients are at high risk of malnutrition due to increased metabolic demands and impaired nutrient utilization (Hill *et al*., 2021; Garai *et al*., 2023) [8, 10]. Enteral nutrition (EN), delivered via the gastrointestinal (GI) tract, is the preferred method of nutritional support when feasible, as it preserves gut integrity and immune function. Early initiation of EN has been hypothesized to reduce complications and improve clinical outcomes compared to delayed or parenteral nutrition (Schörghuber and Fruhwald, 2018) [21]. This review evaluates the clinical evidence supporting EEN in critically ill patients.

Critical illness is characterized by profound physiological stress, altered metabolic responses, and increased nutritional demands. Patients admitted to intensive care units (ICUs) frequently experience catabolic stress, systemic inflammation, and multiorgan dysfunction, which lead to rapid depletion of nutritional reserves and muscle mass (Casaer & Van den Berghe, 2014) [3]. Malnutrition, whether preexisting or acquired during hospitalization, is associated with increased morbidity, higher rates of infectious complications, prolonged mechanical ventilation, and elevated mortality (Preiser *et al*., 2015) [17]. Therefore, nutritional therapy has become a cornerstone of critical care management (Tewari, 2019) [24]. Among the available modalities, early enteral nutrition (EEN) has emerged as the preferred strategy due to its physiological advantages and potential impact on clinical outcomes (Singer *et al*., 2019) [23].

Enteral nutrition (EN) refers to the delivery of nutrients directly into the gastrointestinal (GI) tract through nasogastric, nasojejunal, or percutaneous feeding tubes. In contrast, parenteral nutrition (PN) provides nutrients intravenously, bypassing the GI tract entirely. Although PN ensures calorie delivery when EN is not feasible, it carries higher risks of bloodstream infections, metabolic complications, and hepatobiliary dysfunction (Doig *et al*., 2015) [5]. EN, on the other hand, preserves GI mucosal integrity, modulates immune responses, and reduces bacterial translocation, thereby minimizing infection risk (Wischmeyer, 2017) [25]. The timing of nutritional initiation has been widely debated; however, evidence suggests that early provision of EN within 24–48 hours of ICU admission, particularly in hemodynamically stable patients, leads to improved outcomes compared to delayed initiation (Reintam Blaser *et al*., 2017) [19, 20].

The physiological rationale behind EEN stems from the unique role of the gut in critical illness. The intestine is not merely a site of nutrient absorption but also functions as a key immune and endocrine organ. Critical illness is associated with gut hypoperfusion, impaired motility, and increased intestinal permeability, which can allow translocation of bacteria and endotoxins into systemic circulation, thereby exacerbating sepsis and systemic inflammatory response syndrome (SIRS) (O'Keefe *et al*., 2020) [16]. Early stimulation of the gut through enteral feeding helps maintain mucosal barrier function, enhances splanchnic blood flow, and stimulates secretion of immunoglobulin A and other protective factors (Wischmeyer *et al*., 2021) [26]. This gut-protective role of EN underpins its priority in critical care nutrition guidelines.

Several randomized controlled trials (RCTs) and meta-analyses have demonstrated the clinical benefits of EEN in critically ill patients. Doig *et al*. (2009) [4], in a landmark multicenter RCT, reported that patients who received EN within 24 hours had reduced rates of ventilator-associated pneumonia (VAP) and sepsis compared to those with delayed feeding. Similarly, Marik and Zaloga (2001) [11] conducted a meta-analysis showing that EEN was associated with a significant reduction in infectious complications, though mortality benefits were less consistent. More recent systematic reviews have reaffirmed that while mortality reduction remains inconclusive, the morbidity-related benefits of EEN—such as decreased infections, shorter ICU stay, and reduced ventilator dependency—are robust and clinically meaningful (Zhou *et al*., 2020) [30].

Guidelines from major organizations have consistently emphasized the importance of early initiation of EN. The European Society for Clinical Nutrition and Metabolism

(ESPEN) recommend starting EN within 24–48 hours of ICU admission in hemodynamically stable patients (Singer *et al*., 2019) [23]. Similarly, the Society of Critical Care Medicine (SCCM) and the American Society for Parenteral and Enteral Nutrition (ASPEN) advocate for early initiation of EN as the standard of care for critically ill adults (McClave *et al*., 2016) [13]. The European Society of Intensive Care Medicine (ESICM) also published clinical practice guidelines highlighting the benefits of EEN in maintaining gut function and preventing complications (Reintam Blaser *et al*., 2017) [19, 20]. These converging recommendations reflect a broad consensus on the clinical importance of EEN.

Beyond infection prevention, EEN contributes to attenuating catabolism and preserving lean body mass. Critically ill patients experience hypercatabolism due to elevated cortisol, catecholamines, and proinflammatory cytokines, which accelerate protein breakdown and impair wound healing (Preiser *et al*., 2015) [17]. Early provision of adequate protein and energy through EN supports nitrogen balance, reduces muscle wasting, and enhances recovery trajectories. Furthermore, EN facilitates better glucose control compared to PN, as it promotes endogenous insulin release and reduces the risk of hyperglycemia-associated complications (Casaer & Van den Berghe, 2014) [3].

Another crucial aspect of EEN is its role in modulating systemic inflammation. Nutrients delivered enterally stimulate the gut-associated lymphoid tissue (GALT), which constitutes a significant portion of the immune system. Specific substrates such as glutamine, omega-3 fatty acids, and short-chain fatty acids have immunomodulatory effects, reducing proinflammatory cytokine release and enhancing antioxidant defenses (Calder, 2017) [2]. This forms the basis of "immunonutrition," a specialized subset of EN formulations enriched with bioactive nutrients designed to further optimize outcomes in critically ill populations. Although evidence regarding routine use of immunonutrition remains mixed, its potential benefits in select populations such as surgical or trauma patients are promising (Heyland *et al*., 2017) [9].

Despite these advantages, challenges in implementing EEN remain. Gastrointestinal intolerance including vomiting, diarrhea, abdominal distension, and high gastric residual volumes—is a frequent barrier that may lead to feeding interruptions (Reintam Blaser *et al*., 2017) [19, 20]. Additionally, in patients with severe hemodynamic instability or uncontrolled shock requiring escalating doses of vasopressors, EN may increase the risk of bowel ischemia (O'Keefe *et al*., 2020) [16]. Careful patient selection, individualized protocols, and stepwise initiation strategies are therefore essential to ensure safe and effective delivery of EEN.

Recent research has also highlighted the role of EEN in influencing long-term outcomes. Survivors of critical illness often face post-intensive care syndrome (PICS), characterized by muscle weakness, cognitive dysfunction, and impaired quality of life (Needham *et al*., 2012) [15]. Adequate early nutrition during ICU stay may mitigate some of these sequelae by preserving muscle mass and supporting neurological recovery. However, further longitudinal studies are needed to establish the definitive impact of EEN on post-discharge outcomes.

The initiation of EN within 24-48 hours of ICU admission in hemodynamically stable patients is strongly supported by physiological rationale, clinical evidence, and international guidelines. While its mortality benefit is not consistently demonstrated, EEN reliably reduces infectious complications, shortens ICU and hospital stay, and improves overall recovery. This makes EEN a vital component of critical care management. As nutrition science advances, future research should focus on personalized feeding strategies, integration of immunonutrition, and optimization of protocols to overcome GI intolerance. The following review will comprehensively examine the evidence supporting the role of early enteral nutrition in improving outcomes of critically ill patients, highlighting both its established benefits and areas for further investigation.

Physiological Rationale for Early Enteral Nutrition

The physiological rationale for early enteral nutrition (EEN) lies in its ability to preserve gut integrity, modulate immunity, and maintain metabolic balance during critical illness. By supplying nutrients directly to the gastrointestinal tract, EEN helps sustain mucosal barrier function, thereby preventing bacterial translocation and lowering the risk of sepsis (McClave and Heyland, 2009) [12]. It also plays a pivotal role in immune modulation, as luminal nutrients stimulate local gut-associated lymphoid tissue, enhancing host defense while simultaneously reducing systemic inflammation (Forchielli, M. L., & Walker, 2005) [6]. Furthermore, the timely delivery of calories and protein mitigates the catabolic response to stress, preserving lean body mass and improving nitrogen balance. In addition, EEN promotes gastrointestinal motility, reduces the incidence of ileus, and supports nutrient absorption, ultimately facilitating faster recovery and improved clinical outcomes in critically ill patients (Yang *et al*., 2014) [28].

Clinical Benefits of Early Enteral Nutrition

Early enteral nutrition (EEN) offers multiple clinical benefits that significantly impact patient outcomes in critical care (Reintam Blaser *et al*., 2017) [19, 20]. By reducing gut permeability and bacterial translocation, EEN lowers the risk of infections, particularly sepsis, which remains a major cause of morbidity in critically ill patients (Assimakopoulos *et al*., 2018) [1]. Although evidence on direct mortality reduction is mixed, consistent improvements are observed in morbidity markers, including fewer infections, reduced organ dysfunction, and shorter intensive care unit (ICU) stays (Pronovost *et al*., 2004) [18]. EEN also enhances recovery by decreasing the duration of mechanical ventilation, supporting earlier mobilization, and promoting overall functional improvement. Importantly, the reduction in complications and hospital length of stay makes EEN a cost-effective strategy, alleviating the economic burden on both healthcare systems and patients (Formenti *et al*., 2025) [7].

Table 1: Role of Early Enteral Nutrition in Improving Outcomes of Critically Ill Patients

Clinical outcome / domain	How EEN helps (role)	References
Reduced infection risk	Maintains mucosal barrier and gut microbiome, lowering bacterial translocation and reducing ventilator-associated and other ICU infections.	(Reintam-Blaser *et al*., 2017; McClave *et al*., 2016; Zhang *et al*., 2018) [13, 19, 20, 29]
Mortality & overall morbidity	Meta-analyses show mixed effects on mortality but consistent reductions in infectious complications and some morbidity markers (organ dysfunction, some studies show shorter ICU stay).	(Zhang *et al*., 2018; Moon *et al*., 2023; Singer *et al*., 2019) [14, 23, 29]
Enhanced recovery (ventilation, mobilization)	Early gut feeding supports energy/protein delivery, reduces duration of mechanical ventilation in several trials/cohorts and facilitates earlier rehabilitation.	(Moon *et al*., 2023; Reintam-Blaser *et al*., 2017) [14, 19, 20]
Maintenance of gut integrity & immune modulation	Luminal nutrients preserve enterocyte health, gut-associated lymphoid tissue function, and microbiome composition — mechanisms that reduce systemic inflammation and infection risk.	(Singer *et al*., 2019; Xu *et al*., 2024) [23, 27]
Gastrointestinal function & tolerance	EEN stimulates peristalsis, reduces ileus in many patients, and improves nutrient absorption when tolerated; monitoring and stepwise advancement recommended.	(ESPEN practical guideline; Reintam-Blaser *et al*., 2017) [19, 20]
Cost-effectiveness	By lowering infection rates, reducing complications and shortening ICU/hospital length of stay in many series, EEN has been associated with lower overall healthcare costs.	(Zhang *et al*., 2018; Shi *et al*., 2018) [22, 29]

Conclusion

Early enteral nutrition plays a critical role in improving the clinical outcomes of critically ill patients. While evidence strongly supports its benefits in reducing infections, hospital stay, and complications, mortality benefits remain less conclusive. Nevertheless, EEN remains the preferred route of nutritional support in the ICU, provided patients are hemodynamically stable. Ongoing research into personalized and immunomodulatory nutrition may further enhance its therapeutic potential.

References

1. Assimakopoulos S F, Triantos C, Thomopoulos K, Fligou F, Maroulis I, Marangos M, *et al*. Gut-origin sepsis in the critically ill patient: pathophysiology and treatment. Infection,2018:46(6):751-760.
2. Calder P C. Immunonutrition in surgical and critically ill patients. British Journal of Nutrition,2017:117(9):12 43–1251.
3. Casaer MP, Van den Berghe G. Nutrition in the acute phase of critical illness. New England Journal of Medicine,2014:370(13):1227–1236.
4. Doig GS, Heighes PT, Simpson F, Sweetman EA, Davies AR. Early enteral nutrition, provided within 24 h of injury or intensive care unit admission, significantly reduces mortality in critically ill patients: a meta-analysis of randomised controlled trials. Intensive Care Medicine,2009:35(12):2018–2027.
5. Doig GS, Simpson F, Heighes PT. Early parenteral nutrition in critically ill patients: a review of current evidence. Nutrition in Clinical Practice,2015:30(3):314 –324.
6. Forchielli ML, Walker WA. The role of gut-associated lymphoid tissues and mucosal defence. British Journal of Nutrition,2005:93(1):41–S48.
7. Formenti P, Menozzi A, Sabbatini G, Gotti M, Galimberti A, Bruno G, *et al*. Combined effects of early mobilization and nutrition on ICU-acquired weakness. Nutrients,2025:17(6):1073.
8. Garai U, Chakrabort P, Sur M, Tewari S. Nutrition and post COVID infection: a critical review. International Journal of Food Science and Nutrition,2023:8(3):66–73.
9. Heyland DK, Elke G, Cook D, Berger MM, Wischmeyer PE. Evidence-based nutritional therapy in critical illness: an update. Critical Care,2017:21(1):226.
10. Hill A, Elke G, Weimann A. Nutrition in the intensive care unit-a narrative review. Nutrients,2021:13(8):2851.
11. Marik PE, Zaloga GP. Early enteral nutrition in acutely ill patients: a systematic review. Critical Care Medicine,2001:29(12):2264–2270.
12. McClave SA, Heyland DK. The physiologic response and associated clinical benefits from provision of early enteral nutrition. Nutrition in Clinical Practice,2009:24(3):305–315.
13. McClave SA, Taylor BE, Martindale RG, Warren MM, Johnson DR, Braunschweig C, *et al*. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient. Journal of Parenteral and Enteral Nutrition,2016:40(2):159–211.
14. Moon SJ, Kim H, Lee J, Park S, Cho Y, *et al*. The effectiveness of early enteral nutrition on clinical outcomes in critically ill patients: a systematic review. Nutrients, 2023.
15. Needham DM, Davidson J, Cohen H, Hopkins RO, Weinert C, Wunsch H, *et al*. Improving long-term outcomes after discharge from intensive care unit: report from a stakeholders' conference. Critical Care Medicine,2012:40(2):502–509.
16. O'Keefe SJ, McClave SA, Chang WK. Short bowel syndrome and nutritional therapy. Gastroenterology Clinics of North America,2020:49(2):329–345.
17. Preiser JC, Ichai C, Orban JC, Groeneveld AB. Metabolic response to the stress of critical illness. British Journal of Anaesthesia,2015:114(6):999–1005.
18. Pronovost PJ, Rinke ML, Emery K, Dennison C, Blackledge C, Berenholtz SM, *et al*. Interventions to reduce mortality among patients treated in intensive care units. Journal of Critical Care,2004:19(3):158–164.
19. Reintam Blaser A, Starkopf J, Alhazzani W, Berger MM, Casaer MP, Deane AM, *et al*. ESICM Working Group on Gastrointestinal Function. Early enteral nutrition in critically ill patients: ESICM clinical practice guidelines. *Intensive care medicine*,2017:43(3):380-398.
20. Reintam Blaser A, Starkopf J, Alhazzani W, Berger M M, Casaer M, Deane AM, Oudemans-van Straaten, H. M. Early enteral nutrition in critically ill patients: ESICM clinical practice guidelines. Intensive Care Medicine,2017:43(3):380–398.

21. Schörghuber M, Fruhwald S. Effects of enteral nutrition on gastrointestinal function in patients who are critically ill. The Lancet Gastroenterology Hepatology,2018:3(4):281–287.
22. Shi J, Li X, Wang Y, Zhang Q, Zhao L, *et al*. Effect of combined parenteral and enteral nutrition versus enteral nutrition alone on clinical outcomes in critically ill patients. Medicine (Baltimore), 2018.
23. Singer P, Blaser AR, Berger MM, Alhazzani W, Calder PC, Casaer MP, *et al*. ESPEN guideline on clinical nutrition in the intensive care unit. Clinical Nutrition,2019:38(1):48–79.
24. Tewari S. Therapeutic diet to control diseases. AkiNik Publications, 2019, 1–79.
25. Wischmeyer PE. Tailoring nutrition therapy to illness and recovery. Critical Care,2017:21(3):316.
26. Wischmeyer PE, Berger M, Taylor B. Optimal nutrition therapy in critical illness: bringing science to the bedside. Critical Care Clinics,2021:37(2):321–336.
27. Xu F, Zhang Y, Li L, Chen J, Zhou W, *et al*. Enhancing sepsis therapy: the evolving role of enteral nutrition. Critical Care, 2024.
28. Yang S, Wu X, Yu W, Li J. Early enteral nutrition in critically ill patients with hemodynamic instability: an evidence-based review and practical advice. Nutrition in Clinical Practice,2014:29(1):90–96.
29. Zhang G, Chen Y, Wang Z, Liu H, Sun L, *et al*. The effect of enteral versus parenteral nutrition for critically ill patients: a systematic review and meta-analysis. Critical Care, 2018.
30. Zhou X, Li Y, Wang X, Wu H. Early versus delayed enteral nutrition in critically ill patients: a systematic review and meta-analysis. Journal of Intensive Care Medicine,2020:35(8):779–787.