



Original Research Article

Parenteral and Enteral Nutrition in Patients with Intestinal Failure: A Review

Article History:

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How to cite this article:

Cristobal G.M., et, al. Parenteral and Enteral Nutrition in Patients with Intestinal Failure: A Review. *Eur J Clin Pharm.* 2019;1(1):31-33.

Received: 15-04-2019

Revised: 28-04-2019

Accepted: 05-05-2019

Published: 16-05-2019

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Abstract: Intestinal failure (IF) is a condition in which the intestine cannot maintain adequate nutrition, fluid, or electrolyte balance, making intravenous (parenteral) or artificial (enteral) nutritional support necessary. Advances in artificial nutrition have significantly improved outcomes in both pediatric and adult IF. This review delineates the roles, indications, benefits, and limitations of parenteral nutrition (PN) and enteral nutrition (EN), highlighting complications, quality of life, and evolving strategies for rehabilitation.

Keywords: Intestinal Failure (IF), Parenteral Nutrition (PN), Enteral Nutrition (EN), Nutritional Support, Complications and Rehabilitation.

INTRODUCTION

Intestinal failure results from various etiologies—including short bowel syndrome, motility disorders, and severe mucosal diseases—leading to malabsorption and requiring additional nutritional support. IF is classified by duration (acute, chronic) and need for nutritional supplementation. Management is multidisciplinary, focusing on optimizing nutrition through PN and encouraging gradual transition to EN whenever feasible^{[1][2][3][4][5]}.

Definitions and Classification

- **Intestinal Failure (IF):** Reduction of gut function below the minimum required for absorption of macronutrients, water, and electrolytes, requiring intravenous supplementation^[3].
- **Short Bowel Syndrome (SBS):** The leading cause of IF, defined by insufficient absorptive surface area, typically after major resection.
- **Types:**
 - Type 1 (Acute, short-term)
 - Type 2 (Prolonged, metabolically unstable)
 - Type 3 (Chronic, metabolically stable, long-term support required)^{[2][3][5]}.

PARENTERAL NUTRITION (PN) IN INTESTINAL FAILURE

Indications and Principles

- **Mainstay for IF** when oral/enteral routes are insufficient or unsafe (severe malabsorption, GI fistulae, post-surgical non-functioning gut)^{[1][2][6][7]}.
- **Components:** Macronutrients (amino acids, dextrose, lipids), micronutrients (electrolytes, trace elements, vitamins), and fluids tailored to individual needs^[3].
- **Administration:** Central venous catheter, often as Home Parenteral Nutrition (HPN) in stable patients.

Clinical Outcomes

- Survival and nutritional status are improved^{[1][2][6]}.
- Up to 50% of patients can be weaned off over time as adaptation occurs, but some require lifelong PN, especially with residual small intestine length <100–150 cm^{[1][2]}.
- Quality of life is variable and often impacted by complications, yet better with technological advances and individualized programs^{[1][2]}.

Complications

Complication	Description
Catheter-related Infections	Sepsis due to central venous access
Metabolic Complications	Electrolyte/fluid imbalance, micronutrient deficiency
Liver Disease (IFALD)	Cholestasis, steatosis, fibrosis from long-term PN
Thrombosis	Venous thromboembolism from catheter use
Bone Disease	Reduced mineral density

Risk mitigation requires monitoring, prompt treatment, and interventions such as cycle PN, lipid minimization, and infection-prevention protocols^{[3][6]}.

Role in Rehabilitation

- PN is a bridge therapy while encouraging gut rehabilitation and adaptation.
- Surgical interventions (restoration of continuity, lengthening procedures, or transplantation) are considered when PN cannot be weaned^{[6][5]}.

ENTERAL NUTRITION (EN) IN INTESTINAL FAILURE

Rationale and Initiation

- **Preferred route** whenever the gut is functional, as it stimulates adaptation, hormonal secretion, immune function, and maintains gut integrity^{[8][4][9]}.
- **Initiation:** Start with minimal ("trophic") feeds early post-injury/surgery, advance as tolerated to encourage adaptation^{[8][4]}.
- **Forms:** Oral, tube feeding via gastrostomy or jejunostomy, using elemental or polymeric formulas depending on tolerance.

Benefits

- Promotes mucosal growth, brush-border enzyme activity, and gut motility,
- Reduces risk of sepsis and IFALD compared with exclusive PN,
- Improves body composition, muscle mass, and quality of life, especially in home settings^{[8][4]}.

Limitations and Complications

- Not always feasible in severe IF, high-output fistula, or GI intolerance^[8].
- Complications include feeding intolerance (bloating, diarrhea), aspiration risk, and tube-related infections, though rates are low when protocols are followed^[4].

Outcomes

Studies demonstrate:

- Improved nutritional parameters (weight, body composition, phase angle) and SF-36 quality of life scores with home EN,
- Safe and cost-effective, with low readmission rates and reduced medical costs,

- Can be combined with PN to minimize dependency and support rehabilitation^[4].

Integrated Nutrition Strategy

Characteristic	Parenteral Nutrition (PN)	Enteral Nutrition (EN)
Indication	Non-functional gut, severe malabsorption	Functional gut, partial tolerance
Route	Central vein	GI tract (oral or tube)
Advantages	Complete nutrition; bypasses gut pathology	Physiologic, maintains gut structure, lower complications
Complications	Infection, liver disease, metabolic issues	Intolerance, tube issues (rare)
Role in IF	First-line for acute/severe IF; chronic support when needed	Always attempt; goal for transition from PN

Quality of Life, Monitoring, and Future Directions

- **Quality of life** improves with successful home nutrition programs and structured monitoring^{[1][3][4]}.
- **Multidisciplinary teams** (nutritionist, physician, nurse, pharmacist) are essential for individualized care, line-care education, and complication prevention^[3].
- **Intestinal rehabilitation centers** achieve lower complication rates, foster intestinal adaptation, and facilitate transition from PN to EN when feasible^{[3][8][4]}.
- **Emerging therapies:** Hormonal agents (e.g., GLP-2 analogs), surgical autologous reconstruction, and transplantation are reserved for refractory cases^{[2][5]}.

DISCUSSION

Optimal management of IF requires a tailored approach, balancing the life-sustaining benefits of PN with efforts to stimulate and maximize enteral tolerance. Early introduction and advancement of EN, even when minimal, is key to long-term adaptation and improved outcome, while minimizing PN-associated complications. Home-based nutrition support is the gold standard for chronic IF, improving physical, psychological, and social functioning^{[1][3][4][5]}.

CONCLUSION

Parenteral and enteral nutrition are complementary, not competing, strategies in the care of patients with intestinal failure. Timely, individualized application, vigilant monitoring, and a multidisciplinary approach maximize survival, promote adaptation, and enhance quality of life. Ongoing innovation in rehabilitation, nutrition components, and care models will continue to improve outcomes for this challenging population.

REFERENCES

1. Bielawska, B., et al. "Parenteral Nutrition and Intestinal Failure." *PMC*, 2017.
2. Bielawska, B., et al. "Parenteral Nutrition and Intestinal Failure." *PubMed*, 2017.
3. Cuerda, C., et al. "Clinical Nutrition in Chronic Intestinal Failure." *ESPEN*, 2021.
4. Kurkchubasche, A. G., et al. "Parenteral Nutrition in Intestinal Failure." *NDS*, 2015.
5. Le, H. D., et al. "Innovative Parenteral and Enteral Nutrition Therapy for Intestinal Failure." *NIHMS*, 2010.
6. Kong, X., et al. "Effect of Home Enteral Nutrition on Nutritional Status, Body Composition, and Quality of Life in Malnourished Patients with Intestinal Failure." *Frontiers in Nutrition*, 2021.
7. Lee, Y-C., et al. "Advances in Nutritional and Therapeutic Strategies for Type 2 Intestinal Failure: A Narrative Review." *Nutrition Reviews*, 2025.
8. ECHN. "Nutrition in Intestinal Failure: Parenteral and Enteral Approaches." *TheInsides.co*, 2024.
9. "Enteral Nutrition in Intestinal Failure." *AboutKidsHealth*, 2024.