Enteral Versus Parenteral Nutrition

Differentiating Two Types of Clinical Nutrition Support

The choice of nutrition support and route of administration depends on the patient's clinical state. The rule of thumb is, "if the gut works, use it." However, supplemental or total parenteral nutrition is indicated when nutritional requirements cannot be met via oral or enteral feeding or if oral or enteral feeding are contraindicated.

Enteral and Parenteral Nutrition Defined

Enteral nutrition (EN) includes oral nutritional supplements (ONS) and enteral tube feeding via nasogastric, nasoenteral or percutaneous tubes. EN provides nutrients and energy to the mucosal cells, stimulating epithelial cell metabolism, bile flow and pancreatic secretions as well as the release of enterotrophic gastrointestinal (GI) hormones, and increasing mucosal blood flow. Whereas parenteral nutrition (PN) provides nutrients, via an intravenous infusion, directly into the systemic circulation, bypassing the gastrointestinal (GI) tract.

Indications for EN or PN

In order to prevent under-nutrition and related adverse effects, all intensive care unit (ICU) patients who are not expected to be on a full oral diet should first receive clinical nutrition, preferably EN within 24 to 48 hours of admission. However, EN alone is often insufficient in providing the required amount of energy and protein. This may result in nutritional deficits known to worsen clinical outcomes. Patients receiving less than their targeted enteral feeding after two to three days should be considered for supplemental PN to fill the caloric gap.

When EN Is Contraindicated, PN Is Recommended

EN alone is often insufficient in providing the required amount of energy and protein. This may result in nutritional deficits known to worsen clinical outcomes. In these cases, supplemental PN can help to fill the caloric gap. If EN is contraindicated or a limited tolerance for EN over a prolonged period does not allow sufficient intake to cover the patient's nutritional needs, supplemental PN or even total PN are indispensable to supplement or replace enteral tube feeding, so as to avoid disease-related malnutrition.

The European Society for Clinical Nutrition and Metabolism (ESPEN) recommends to administer PN to ICU patients...
within 24 to 48 hours if EN is contraindicated or the patient cannot tolerate EN. The Society of Critical Care Medicine (SCCM) and the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) recommend that if there is evidence of protein calorie malnutrition on admission and EN is not feasible, it is appropriate to initiate PN as soon as possible.

Nutritional support is not restricted to the exclusive administration of EN or PN, but PN and EN may complement each other, e.g. with the use of PN plus minimal “trophic” enteral feeding or EN plus supplemental PN.

Specific circumstances that suggest a need for PN include:

- Intestinal failure due to:
  - (Post-operative) paralytic and mechanical ileus
  - Trauma
  - Inflammatory bowel disease
  - Enterocolitis (AIDS, chemo/radiation therapy)
  - Intestinal resection (short bowel syndrome)
  - Pancreatitis
  - High output fistula
  - Burn injury
  - Gastrointestinal (GI) cancer
  - Immaturity (premature babies)

- Insufficient enteral/oral feeding

**Which Nutrients Are Provided by PN?**

PN provides water and essential nutrients such as amino acids, carbohydrates, lipids and micronutrients.

These nutrients are infused in their essential form:

- **Carbohydrates**: infused as glucose to provide rapidly available energy.
- **Amino acids**: used by the body as primary constituents of muscle proteins, and play a role in biochemical reactions and immune response.
- **Lipids**: represented by lipid emulsions containing triglycerides; serve as a compact way to store energy due to their high energy and low water content; supply essential fatty acids and constitute an important part of the structure of the cells.

All three macronutrients in the right amounts provide balanced and adequate nutrition support to positively affect clinical outcomes such as infection rates, length of hospital stay or mortality.

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