

Enteral Nutrition in the Mechanically Ventilated Patient

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Background:

Critical illness, especially in patients on mechanical ventilation, is associated with catabolism and altered gut absorption. Supplemental nutrition support is needed and improves patient outcomes. Enteral nutrition (EN) is the preferred route of feeding for mechanically ventilated patients and may be associated with modulation of the stress response and maintenance of gut integrity.

Nutritional Considerations:

- **Malnutrition:** Identification of malnutrition, including identification of sarcopenia, is important. Multiple references cite poor outcomes associated with malnutrition.
- **Refeeding Syndrome:** Critically ill patients on mechanical ventilation are at risk for refeeding syndrome, especially in those with extremes of weight, recent weight loss, pre-existing electrolyte abnormalities, on insulin or diuretic therapy, chemotherapy or with a history of substance abuse. Serum phosphate, potassium and magnesium should be monitored daily for approximately 4 days. EN and parenteral nutrition (PN) should be started at half of the patient's goal rate and increased slowly over 72 hours.
- **Energy and Protein Requirements:** Indirect calorimetry is the gold standard for determining energy needs, and predictive equations are correct only about 50% of time. Delivery of protein and calories is typically inadequate in the ICU. Protein target of approximately 1.2-2.0g/kg actual body weight/day suggested. Low protein delivery has been associated with longer length of stay, increased ventilator time and higher mortality.
- **Feeding Protocols:** Patients who are fed earlier (24-48 hours after admission) receive a higher percentage of goal nutrition with fewer feeding intolerances. Nutrition bundles may be helpful for mechanically ventilated patients and should include elements such as early initiation of feeding, use of prokinetic agents, head of bed elevation, feeding administration guidance such as volume-based feeding and participation in national databases for quality improvement evaluation.
- **Trophic vs Full EN:** There is no clear determination if trophic or full feeding is most effective during the first week of mechanical ventilation. Additional studies are needed to determine if there is an association between early adequacy and nutrition risk.
- Disease-specific EN is not recommended by the 2016 ASPEN/SCCM Critical Care Guidelines. Volume restricted formulas may be necessary in some patients.
- Acute kidney injury (AKI) is experienced by about 30% of ICU patients. Attention to electrolyte and protein provision must be made, with protein provision of 2.5g/kg/day in patients on renal replacement therapy and 1.2-2g/kg/day in AKI without renal replacement therapy.
- Limited data is available regarding liver-specific formulas during critical illness with mechanical ventilation. Protein restriction should be avoided, except in patients with Grade III-IV encephalopathy. Indirect calorimetry should be used to calculate energy needs.
- Standard recommendation for obesity (BMI 30-50) is 11-14 kcal/kg actual body weight/day and 2.0g pro/kg ideal body weight/day for BMI of 30-40. For others (BMI >50), 22-25 kcal/kg ideal body weight/day with up to 2.5g pro/kg ideal body weight/day for BMI >40.
- **Prone Position:** Placing patients in a prone position may improve outcomes in patients with ARDS. This may require post-pyloric tube placement to avoid aspiration.
- **Vasopressors/Sepsis:** Patients should be fully resuscitated prior to initiation of EN. Several studies show that EN may be safe with low dose vasopressor usage. Caution should be exercised when providing EN to patients on vasopressors and EN should only be given to those on low to moderate doses.
- **Pancreatic Disease:** Patients should be started on trophic feeding and advanced as tolerated. Recommendations for semi-elemental or standard feeding vary. Literature has shown success with both nasogastric and post-pyloric feeding tube placement. Probiotics may be useful.
- **Managing Enteral Feedings:** Patients on EN should be monitored for tolerance, including abdominal distention, bowel sounds, absence of flatus, stool, diarrhea, abdominal pain and vomiting. Overall, EN is generally well tolerated.
- Patients at high risk for aspiration may benefit from post-pyloric feeding tube placement and should be used with caution to avoid accidental lung placement.
- **Gastric Residuals:** ASPEN/SCCM CC Guidelines do not recommend monitoring of gastric residuals. If they are followed, EN should not be held for a volume < 500mL, unless other signs of feeding intolerance also exist.
- **Prokinetic Agents:** In patients with evidence of elevated gastric residual and EN intolerance, prokinetic agents may be considered to improve EN delivery and should be used only as needed.

Conclusion:

EN is an important aspect of the overall care of a mechanically ventilated patient. Each individual patient is unique. Adequate care should be given to provide benefit from EN therapy and avoid harm.

An abstract to this article may be accessed at:

<https://www.ncbi.nlm.nih.gov/pubmed/30741491>