

Guidelines for the Provision of Nutrition Support Therapy in the Adult Critically Ill Patient: American Society for Parenteral and Enteral Nutrition

Guideline Questions, Evidence Grades, Recommendations, and Clinical Applications²

In the United States, there are currently about 80,000 adult intensive care hospital beds with an average of 75% capacity depending on region.¹ Most of these critically ill patients are unable to consume nutrition orally and artificial nutrition is often provided. The purpose of this guideline is to summarize the evidence within nutrition support to guide practitioners in their provision of artificial nutrition to critically ill patients. These key questions that had GRADE level evidence are presented with an evidence-based recommendation and clinical application discussion.² For questions not addressed in this guideline, follow the 2016 guidelines until a clinical recommendations paper is published.³

GUIDELINE QUESTION 1

In adult critically ill patients, does provision of higher versus lower energy intake impact clinical outcomes?

GRADE Recommendation: No significant difference in clinical outcomes was found between patients with higher vs. lower levels of energy intake. We suggest feeding between **12-25 kcal/kg** (i.e., the range of mean energy intakes examined) in the first 7-10 days of ICU stay.

Evidence grade: Moderate

Strength of GRADE Recommendation: Weak

Discussion on Clinical Application for Question 1: Until data become available that enable more precise recommendations on energy intake, clinicians should rely on clinical judgment. When EN or PN is associated with problems in glycemic control, respiratory acidosis or high serum triglyceride concentrations, consider whether feedings should be reduced. Lipid-based sedation also provides a source of kcal that should be considered in the total daily intake. Gastrointestinal tolerance may limit how much EN can be provided. Feeding less than the EN formula volume needed to deliver Dietary Reference Intake levels may risk inadequate vitamin, mineral, and trace element intake.

GUIDELINE QUESTION 2

In adult critically ill patients, does provision of higher as compared to lower protein intake impact clinical outcomes?

GRADE Recommendation: There was no difference in clinical outcomes in the relatively limited data. Due to a paucity of trials with high-quality evidence, we cannot make a new recommendation at this time beyond the 2016 guideline suggestion for **1.2-2.0 g/kg/day**.

Evidence Grade: Low

Strength of GRADE recommendation: Weak

Discussion on Clinical Application for Question 2: Few studies have investigated the impact of higher protein doses provided with equivalent energy, thus the impact on outcomes is not known. Until more data are available, we suggest clinicians should individualize protein prescriptions based on clinician judgment of estimated needs.

GUIDELINE QUESTION 3

In adult critically ill patients who are candidates for EN, does similar caloric intake by PN versus EN as the primary feeding modality in the first week of critical illness impact clinical outcomes?

GRADE Recommendation: There was no significant difference in clinical outcomes. Since similar caloric intake provided as PN is not superior to EN and no differences in harm were identified, **we recommend that either PN or EN is acceptable.**

Evidence grade: High

Strength of GRADE Recommendation: Strong

Discussion on Clinical Application for Question 3: Our findings indicate that when similar energy is delivered by PN or EN early in critical illness for relatively short periods of time, clinical outcomes are similar. Given these data, cost and convenience of providing EN versus PN may be larger determinants of route of feeding early in critical illness than differences in clinical outcomes. The question of PN use arises when EN is not feasible or tolerated or in patients with significant gastrointestinal disease which were not the populations studied for question 3. The two reported trials gave approximately 18-20 kcal/kg/day and 0.6-0.8 g protein/kg/day, and both used a premixed PN solution. Avoidance of energy overfeeding may be the most important decision to make regarding PN use. Optimal glycemic control and catheter care are also important factors in the provision of PN to reduce infectious complications. Clinical judgment about an individual patient's metabolic tolerance to the dextrose (monitor glycemic control), ILE (monitor serum triglyceride concentrations), and amino acid dose is key to delivery of appropriate PN feedings.

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GUIDELINE QUESTION 4

In adult critically ill patients receiving EN, does provision of supplemental PN, as compared to no supplemental PN during the first week of critical illness impact clinical outcomes?

GRADE Recommendation: There was no significant difference in clinical outcomes. Based on findings of no clinically important benefit in providing supplemental PN early in the ICU admission, we recommend not initiating supplemental PN prior to day 7 of ICU admission.

Evidence GRADE: High

Strength of GRADE Recommendation: Strong

Discussion on Clinical Application for Question 4: The data in this guideline compared supplemental PN (SPN) within the first week of ICU care and excluded patients with malnutrition. These findings imply that the average critically ill patient will not be harmed by waiting a week to initiate SPN. Further, their tolerance to EN may improve in that time window. However, the needs of malnourished patients or patients who have limited lean muscle mass were not included in these trials and may differ from non-malnourished patients. Patient-specific clinical judgement should be used regarding the initiation of SPN in the first 7 days for these special cases.

GUIDELINE QUESTION 5A

In adult critically ill patients receiving PN, does provision of mixed oil lipid injectable emulsions (ILE) (i.e., medium chain triglycerides, olive oil, fish oil [FO], mixtures of oils), as compared to 100% soybean oil ILE, impact clinical outcomes?

GRADE Recommendation: Due to limited statistically or clinically significant differences in key outcomes, we suggest that either mixed oil ILE or 100% soybean oil ILE be provided to critically ill patients who are appropriate candidates for initiation of PN, including within the first week of ICU admission.

Evidence GRADE: Low

Strength of GRADE Recommendation: Weak

GUIDELINE QUESTION 5B

In adult critically ill patients receiving PN, does provision of FO containing ILE, as compared to non-FO containing ILE, impact clinical outcomes?

GRADE Recommendation: Due to finding only one outcome with a significant difference that was not supported by data covering the other key downstream outcomes, we suggest that either fish oil- or non-fish oil-containing ILE be provided to critically ill patients who are appropriate candidates for initiation of PN, including within the first week of ICU admission.

Evidence GRADE: Low

Strength of GRADE recommendation: Weak

Discussion on Clinical Application Questions 5A & 5B: In addition to 100% soybean oil ILE, mixed oil and FO-containing ILE products are now available in the United States, but health-system formulary availability of these formulations may vary. In general, ILE is a safe and effective calorie source that can be included with the PN formulation at the time of initiation, including within the first week of ICU admission. Optimizing ILE provision helps avoid excessive dextrose provision and hyperglycemia. Monitoring serum triglyceride concentrations will give information about adequacy of lipid clearance. The energy provided by lipid-based sedation should be considered in the overall estimate of lipid and energy intake. It is also important to give adequate levels of the essential fatty acids to meet requirements if the PN will be needed for more than 10 days. The essential fatty acid content of the mixed oil ILE and FO-containing ILE is lower than soybean oil ILE.

References

1. American Hospital Association. *Fast Facts on U.S. Hospitals*, 2021.
2. Compher C, Bingham AL, McCall M, et al. Guidelines for the provision of nutrition support therapy in the adult critically ill patient: American Society for Parenteral and Enteral Nutrition. *JPEN J Parenter Enteral Nutr*. 2021.
3. McClave SA, Taylor BE, Martindale RG, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *JPEN J Parenter Enteral Nutr*. 2016 Feb;40(2):159-211.

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