



ASPEN Pocket Cards
Guidelines for the Provision and Assessment of
Nutrition Support Therapy in the
Pediatric Critically Ill Patient:
SCCM and ASPEN



Overview

These cards summarize clinical guidelines for best practices in nutrition therapy in the pediatric critically ill patient (>1 month and <18 years) expected to require a length of stay >2-3 days in a PICU admitting medical, surgical, and cardiac patients. These guidelines are not intended for neonates or adult patients. The pediatric critical care population is heterogeneous, and a nuanced approach to individualizing nutrition support with the aim of improving clinical outcomes is necessary.

Clinical Guidelines

Mehta N, Skillman H, Irving S, et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Pediatric Critically Ill Patient: Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition. *JPEN J Parenter Enteral Nutr.* 2017 Jul;41(5):706-742. doi: 10.1177/0148607117711387

Abbreviations

EN, enteral nutrition; GRADE, Grading of Recommendations, Assessment, Development, and Evaluation; IC, indirect calorimetry; PICU, pediatric intensive care unit; PN, parenteral nutrition; Q, question; R, recommendation; RCT, randomized controlled trial; RDA, recommended daily allowance.

Nutrition Support Clinical Guideline Recommendations for the Critically Ill Child: Questions and Recommendations

Nutrition Status

Q1A: What is the impact of nutrition status on outcomes in critically ill children?

R1A: Based on observational studies, malnutrition, including obesity, is associated with adverse clinical outcomes, including longer periods of ventilation, higher risk of hospital-acquired infection, longer PICU and hospital stay, and increased mortality. We recommend that patients in the PICU undergo detailed nutrition assessment within 48 h of admission. Furthermore, as patients are at risk of nutrition deterioration during hospitalization, which can adversely affect clinical outcomes, we suggest that the nutrition status of patients be reevaluated at least weekly throughout hospitalization.

Quality of evidence: very low

GRADE recommendation: strong

Q1B: What are the best practices to screen and identify patients with malnutrition or those at risk of nutrition deterioration in the PICU?

R1B: On the basis of observational studies and expert consensus, we recommend that weight and height/length be measured on admission to the PICU and that z scores for body mass index for age (weight for length <2 y) or weight for age (if accurate height is not available) be used to screen for patients at extremes of these values. In children <36 mo old, head circumference must be documented. Validated screening methods for the PICU population to identify patients at risk of malnutrition must be developed. Screening methods might allow limited resources to be directed to high-risk patients who are most likely to benefit from early nutrition assessment and interventions.

Quality of evidence: very low

GRADE recommendation: strong



Energy Expenditure and Intake

Q2A: What is the recommended energy requirement for critically ill children?

R2A: On the basis of observational cohort studies, we suggest that measured energy expenditure by IC be used to determine energy requirements and guide prescription of the daily energy goal.

Quality of evidence: low

GRADE recommendation: weak

Q2B: How should energy requirement be determined in the absence of IC?

R2B: If IC measurement of resting energy expenditure is not feasible, we suggest that the Schofield or Food Agriculture Organization / World Health Organization / United Nations University equations may be used without the addition of stress factors to estimate energy expenditure. Multiple cohort studies have demonstrated that most published predictive equations are inaccurate and lead to unintended overfeeding or underfeeding. The Harris-Benedict equations and the RDAs, which are suggested by the dietary reference intakes, should not be used to determine energy requirements in critically ill children.

Quality of evidence: very low

GRADE recommendation: weak

Q2C: What is the target energy intake in critically ill children?

R2C: On the basis of observational cohort studies, we suggest achieving delivery of at least two-thirds of the prescribed daily energy requirement by the end of the first week in the PICU. Cumulative energy deficits during the first week of critical illness may be associated with poor clinical and nutrition outcomes. On the basis of expert consensus, we suggest attentiveness to individualized energy requirements, timely initiation and attainment of energy targets, and energy balance to prevent unintended cumulative caloric deficit or excesses.

Quality of evidence: low

GRADE recommendation: weak



Protein

Q3A: What is the minimum recommended protein requirement for critically ill children?

R3A: On the basis of evidence from RCTs and as supported by observational cohort studies, we recommend a minimum protein intake of 1.5 g/kg/d. Protein intake higher than this threshold has been shown to prevent cumulative negative protein balance in RCTs. In critically ill infants and young children, the optimal protein intake required to attain a positive protein balance may be much higher than this minimum threshold. Negative protein balance may result in loss of lean muscle mass, which has been associated with poor outcomes in critically ill patients. Based on a large observational study, higher protein intake may be associated with lower 60-d mortality in mechanically ventilated children.

Quality of evidence: moderate

GRADE recommendation: strong

Q3B: What is the optimal protein delivery strategy in the PICU?

R3B: On the basis of results of randomized trials, we suggest provision of protein early in the course of critical illness to attain protein delivery goals and promote positive nitrogen balance. Delivery of a higher proportion of the protein goal has been associated with positive clinical outcomes in observational studies.

Quality of evidence: moderate

GRADE recommendation: weak

Q3C: How should protein delivery goals be determined in critically ill children?

R3C: The optimal protein dose associated with improved clinical outcomes is not known. We do not recommend the use of RDA values to guide protein prescription in critically ill children. These values were developed for healthy children and often underestimate the protein needs during critical illness.

Quality of evidence: moderate

GRADE recommendation: strong

Enteral Nutrition

Q4A: Is EN feasible in critically ill children?

R4A: On the basis of observational studies, we recommend EN as the preferred mode of nutrient delivery to the critically ill child. Observational studies support the feasibility of EN, which can be safely delivered to critically ill children with medical and surgical diagnoses and to those receiving vasoactive medications. Common barriers to EN in the PICU include delayed initiation, interruptions due to perceived intolerance, and prolonged fasting around procedures. On the basis of observational studies, we suggest that interruptions to EN be minimized in an effort to achieve nutrient delivery goals by the enteral route.

Quality of evidence: low

GRADE recommendation: strong

Q4B: What is the benefit of EN in this group?

R4B: Although the optimal dose of macronutrients is unclear, some amount of nutrient delivered as EN has been beneficial for gastrointestinal mucosal integrity and motility. Based on large cohort studies, early initiation of EN (within 24–48 h of PICU admission) and achievement of up to two-thirds of the nutrient goal in the first week of critical illness have been associated with improved clinical outcomes.

Quality of evidence: low

GRADE recommendation: weak

Q5A: What is the optimum method for advancing EN in the PICU population?

R5A: On the basis of observational studies, we suggest the use of a stepwise algorithmic approach to advance EN in children admitted to the PICU. The stepwise algorithm must include bedside support to guide the detection and management of EN intolerance and the optimal rate of increase in EN delivery.

Quality of evidence: low

GRADE recommendation: weak



Enteral Nutrition

Q5B: What is the role of a nutrition support team or a dedicated dietitian in optimizing nutrition therapy?

R5B: On the basis of observational studies, we suggest a nutrition support team, including a dedicated dietitian, be available on the PICU team, to facilitate timely nutrition assessment, and optimal nutrient delivery and adjustment to the patients.

Quality of evidence: low

GRADE recommendation: weak

Q6A: What is the best site for EN delivery: gastric or small bowel?

R6A: Existing data are insufficient to make universal recommendations regarding the optimal site to deliver EN to critically ill children. On the basis of observational studies, we suggest that the gastric route be the preferred site for EN in patients in the PICU. The postpyloric or small intestinal site for EN may be used in patients unable to tolerate gastric feeding or those at high risk for aspiration. Existing data are insufficient to make recommendations regarding the use of continuous vs intermittent gastric feeding.

Quality of evidence: low

GRADE recommendation: weak



Enteral Nutrition

Q6B: When should EN be initiated?

R6B: On the basis of expert opinion, we suggest that EN be initiated in all critically ill children, unless it is contraindicated. Given observational studies, we suggest early initiation of EN, within the first 24–48 h after admission to the PICU, in eligible patients. We suggest the use of institutional EN guidelines and stepwise algorithms that include criteria for eligibility for EN, timing of initiation, and rate of increase, as well as a guide to detecting and managing EN intolerance.

Quality of evidence: low

GRADE recommendation: weak

Table. Language for Guidelines Recommendations.

Quality of Evidence	Weighing Risks vs Benefits	GRADE Recommendations	Clinical Guideline Statement
High to very low	Net benefits outweigh harms	Strong	We recommend
High to very low	Trade-offs for patient are important	Weak	We suggest
High to very low	Uncertain trade-offs	Further research needed	We cannot make a recommendation at this time

GRADE: Grading of Recommendations, Assessment, Development, and Evaluation.

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Parenteral Nutrition

Q7A: What is the indication for and optimal timing of PN in critically ill children?

R7A: On the basis of a single RCT, we do not recommend the initiation of PN within 24 h of PICU admission.

Quality of evidence: moderate

GRADE recommendation: strong

Q7B: What is the role of PN as a supplement to inadequate EN?

R7B: For children tolerating EN, we suggest stepwise advancement of nutrient delivery via the enteral route and delaying commencement of PN. Based on current evidence, the role of supplemental PN to reach a specific goal for energy delivery is not known. The time when PN should be initiated to supplement insufficient EN is also unknown. The threshold for and timing of PN initiation should be individualized. Based on a single RCT, supplemental PN should be delayed until 1 wk after PICU admission for patients with normal baseline nutrition state and low risk of nutrition deterioration. On the basis of expert consensus, we suggest PN supplementation for children who are unable to receive any EN during the first week in the PICU. For patients who are severely malnourished or at risk of nutrition deterioration, PN may be supplemented in the first week if they are unable to advance past low volumes of EN.

Quality of evidence: low

GRADE recommendation: weak

Immunonutrition

Q8: What is the role of immunonutrition in critically ill children?

R8: On the basis of available evidence, we do not recommend the use of immunonutrition in critically ill children.

Quality of evidence: moderate

GRADE recommendation: strong



Definitions

Nutrition support therapy refers to the provision of enteral nutrition (EN) by enteral access device and/or parenteral nutrition (PN). Standard therapy refers to provision of intravenous fluids, no EN or PN, and advancement to oral diet as tolerated.

Target Patient Population for Guideline

The target of these guidelines is intended to be the pediatric critically ill patient (>1 mo and <18 years) expected to require a length of stay (LOS) >2–3 days in a PICU admitting medical, surgical, and cardiac patients. These guidelines are not intended for neonates or adult patients. We believe that neonates are different physiologically from older children; therefore, these guidelines do not include them. These guidelines are not intended for patients with specific diagnoses, such as burn injuries. These guidelines are directed toward generalized patient populations, but, like any other management strategy in the PICU, nutrition therapy should be tailored to the individual patient.

Target Audience

These guidelines are intended for use by all healthcare providers involved in nutrition therapy of the critically ill child—primarily, physicians, nurses, dietitians, and pharmacists.

GRADE Process and Criteria

Information about the GRADE process and criteria and complete reference information can be found in the full-text of the guideline.

Appendix. Targeted Indirect Calorimetry

Children who are at high risk for metabolic alterations are suggested candidates for targeted measurement of resting energy expenditure in the PICU. This includes the following:

- Underweight, overweight, or obese
- Children with >10% weight change during ICU stay
- Failure to consistently meet prescribed energy goals
- Failure to wean or need to escalate respiratory support
- Neurologic trauma (traumatic, hypoxic, and/or ischemic)
- Oncologic diagnoses (including children with stem cell or bone marrow transplant)
- Children with thermal injuries or amputations
- Children requiring mechanical ventilator support for >3 days
- Children suspected to be severely hypermetabolic (status epilepticus, hyperthermia, systemic inflammatory response syndrome, dysautonomic storms, etc) or hypometabolic (hypothermia, hypothyroidism, pentobarbital or midazolam coma, etc)

Any patient with ICU LOS >4 weeks may benefit from IC to assess adequacy of nutrient intake.



Disclaimer

These clinical guidelines recommendations do not constitute medical or other professional advice, and should not be taken as such. To the extent the content presented herein may be used to assist in the care of patients, this is the result of the sole professional judgment of the attending health professional whose judgment is the primary component of quality medical care. The information presented in these clinical guidelines is not a substitute for the exercise of such judgment by the health professional.



Read the full text of these clinical guidelines for free online at <https://doi.org/10.1177/0148607117711387>