



Complete Summary

GUIDELINE TITLE

Normal requirements - pediatrics.

BIBLIOGRAPHIC SOURCE(S)

Normal requirements - pediatrics. JPEN J Parenter Enteral Nutr 2002 Jan-Feb; 26(1 Suppl): 25SA-32SA. [83 references]

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT
CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY

SCOPE

DISEASE/CONDITION(S)

Malnutrition

GUIDELINE CATEGORY

Management
Treatment

CLINICAL SPECIALTY

Family Practice
Gastroenterology
Internal Medicine
Nutrition
Pediatrics

INTENDED USERS

Advanced Practice Nurses
Dietitians

Hospitals
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To revise the 1993 American Society for Parenteral and Enteral Nutrition Clinical Guidelines so that:
 - The Guidelines are factually up-to-date to reflect current, evidence-based, best approach to the practice of nutrition support
 - The Guidelines support the clinical and professional activities of nutrition support practitioners by articulating evidence-based recommendations upon which to base personal and institutional practices and resource allocation
 - The Guidelines serve as tools to help guide policy makers, health care organizations, insurers, and nutrition support professionals to improve the systems and regulations under which specialized nutrition support is administered
- To assist clinical practitioners who provide specialized nutrition support to patients in all care settings

TARGET POPULATION

Pediatric patients receiving enteral or parenteral nutrition support

INTERVENTIONS AND PRACTICES CONSIDERED

Determining Nutritional Requirements – Pediatrics

1. Energy needs
 - Energy calculations using standard formulas
 - Indirect calorimetry
2. Fluid and electrolytes
 - Fluid calculations
 - Measurements of sodium, potassium and chloride urinary losses
 - Calcium intake
3. Protein needs
 - Histidine supplementation
4. Carbohydrates
 - Lactose
 - Vary formulas for preterm infants and neonates
 - Monitor and adjust to avoid hyperglycemia
5. Lipids
 - High fat diet
 - Fat modified diet
6. Micronutrients
 - Vitamins and trace elements
 - Periodic monitoring

MAJOR OUTCOMES CONSIDERED

Not stated

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

A modified version of the method used by the Agency for Healthcare Research and Quality (AHRQ), US Department of Health and Human Services was used:

- A. There is good research-based evidence to support the guideline (prospective, randomized trials).
- B. There is fair research-based evidence to support the guideline (well-designed studies without randomization).
- C. The guideline is based on expert opinion and editorial consensus.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Experts selected for their detailed knowledge and experience in a chosen niche reviewed the primary literature, synthesized and summarized it, and formulated the guideline statements.

In situations where evidence-based recommendations could not be made because of a lack of relevant clinical studies, recommendations are classified as being based on class C data (see the "Rating Scheme for the Strength of Evidence" field) and reflect an attempt to make the best recommendations possible within the context of the available data and expert clinical experience.

Issues Considered During Recommendation Formulation

- A thread running throughout many of the disease-specific guidelines is the rationale for choosing enteral over parenteral specialized nutrition support (SNS) or alternatively parenteral over enteral when a decision to use SNS has been made.
- Another fundamental issue that influenced many of the discussions and recommendations is the relationship between nutrition assessment, nutrition status, malnutrition, and severity of disease.

Refer to the companion document: Guidelines for the use of parenteral and enteral nutrition in adult and pediatric patients. Section I: Introduction. JPEN J Parenter Enteral Nutr 2002 Jan-Feb; 26(1 Suppl): 1SA-6SA.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Completed drafts were reviewed by the section editors (the members of the Clinical Guidelines Task Force [CGTF]), edited and/or rewritten, and then reviewed twice by the members of the CGTF as a group. The entire document was then reedited by the CGTF Chair. This four-times-edited draft was submitted to the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) Board of Directors and more than 180 experts in the field of nutrition support (including experts and organizations outside of A.S.P.E.N.) for content, format, and style review. These reviewers were also specifically asked to check each guideline statement for appropriateness, accuracy, and strength of evidence. This review phase stimulated a final cycle of editing by the CGTF and the CGTF Chair. The

final document was then approved by the A.S.P.E.N. Board of Directors and submitted to the Journal of Parenteral and Enteral Nutrition for publication.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The strength of the evidence supporting each guideline statement is coded A, B, or C. Definitions of these classifications is provided at the end of the "Major Recommendations" field.

Energy

1. Energy needs in infants and children should be estimated using standard formulas or nomograms and then adjusted according to the clinical course of the child. (B)
2. Energy requirements should be adjusted depending on the route of SNS administration. (B)
3. Energy needs for patients undergoing surgical procedures should be based on indirect calorimetry or adjusted down from standard formulas to avoid overfeeding. (B)

Fluid and Electrolytes

1. Fluid needs vary with the age and weight of the child and should be adjusted accordingly. (B)
2. Water and electrolyte requirements should be adjusted in pediatric patients undergoing surgical procedures or who have on-going losses from stomas or other sites. (B)

Protein Requirements

1. Protein requirements should be adjusted according to the age of the child. (B)
2. Histidine is a conditionally essential amino acid for neonates and infants up to 6 months of age and should be specifically supplemented. (B)

Carbohydrates

1. Carbohydrates should comprise 40% to 50% of the caloric intake in infants and children. (C)
2. Small amounts of carbohydrates should be used in infants and children who are not otherwise receiving nutrition support to suppress protein catabolism. (B)
3. In infants who are lactose tolerant, lactose should be the predominant enteral carbohydrate administered in the first 3 years of life. (B)
4. Preterm infants should receive a formula that has a 50/50 mixture of lactose and glucose polymers. (B)
5. For the neonate, carbohydrate delivery in PN should begin at approximately 6 to 8 mg/kg per minute of dextrose and be advanced, as tolerated to a goal of 10 to 14 mg/kg per minute. (B)

6. Carbohydrate administration should be closely monitored and adjusted in the postoperative period in neonates and children to avoid hyperglycemia. (B)

Lipids

1. Full term infants up to 1 year of age should be allowed an unrestricted fat intake. (A.)
2. Children between 1 and 2 years of age should have very limited or no restrictions on fat intake (B)
3. Between age 2 and 5 to 6 years, children should transition from a high-fat diet to a fat-modified (moderate fat) diet (less than 30% of total energy from fats and less than 10% from saturated fats). (B)

Micronutrient Requirements

1. Vitamins and trace elements should be components of all PN solutions and enteral formulas. (A)
2. Vitamin and trace element levels should be monitored periodically during long-term PN administration. (C)

Refer to Section VIII of the original guideline document for tables on the following topics:

- Estimated energy needs
- Estimates of protein requirements for healthy pediatric patients
- Daily vitamin requirement – infants
- Daily trace element requirement –infants

Definitions:

Rating Scheme

- A. There is good research-based evidence to support the guideline (prospective, randomized trials).
- B. There is fair research-based evidence to support the guideline (well-designed studies without randomization).
- C. The guideline is based on expert opinion and editorial consensus.

CLINICAL ALGORITHM(S)

Clinical algorithms of the Nutrition Care Process and Route of Administration of Specialized Nutrition Support are provided in the companion document: Nutrition care process. Section II: Nutrition Care Process. JPEN J Parenter Enteral Nutr 2002 Jan-Feb; 26(1 Suppl): 7SA-8SA.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not explicitly stated.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Micronutrients

The provision of balanced nutrients will prevent both deficiency and toxicity.

Electrolytes

In support of adequate electrolyte delivery to infants, strong evidence suggests that patients evidence failure to thrive if they develop sodium depletion. It has been shown that the depletion of total body sodium in infants with obligate electrolyte losses from a small bowel stoma results in a plateau in weight gain. Subsequent repletion of electrolytes results in resumption of growth.

Fat Modification

The rationale for prolonging the transition from a high- to a moderate-fat diet has been to minimize the potential for adverse effects on growth, development, lipoprotein profiles, and immunologic function that might occur with a more rapid transition.

Subgroups Most Likely to Benefit

There may be a benefit to increasing energy delivery to human immunodeficiency virus (HIV)-infected children who are growth impaired; however, studies are needed to confirm this.

POTENTIAL HARMS

Protein Levels for Neonates

In low-birth-weight or premature neonates, the administration of protein in a range higher than 4 g/kg per day may result in abnormal amino acid profiles. When protein 6 g/kg per day is given to low-birth-weight neonates, untoward effects such as azotemia, pyrexia, a higher rate of strabismus, and lower intelligence quotient (IQ) have been reported.

Glucose Levels for the Neonate or Surgical Patient

Lesser amounts of glucose in a young neonate will lead to hypoglycemia because of inadequate hepatic production of glucose. Older neonates tolerate greater loads of glucose, provided it is administered through a central venous catheter (10 to 14 mg/kg per minute). Glucose intolerance in the premature infant is not uncommon and is not only manifested by hyperglycemia, but also quite commonly by hypertriglyceridemia.

Hyperglycemia is a major adverse effect of carbohydrate administration in the immediate postoperative period. This problem is due to a decrease in insulin

concentration and possibly due to an increase in gluconeogenesis. Hyperglycemic states resolve much more quickly in neonates compared with adult postoperative patients. Glucose levels were found to be two times preoperative values after major surgery in neonates and returned to baseline levels after 12 hours. Postsurgical hyperglycemia appears to be due to elevated levels of catecholamines. Postoperative hyperglycemia also appears to be associated with increased production of both lactate and pyruvate.

Micronutrients

To avoid potential toxicity related to impaired metabolism, multivitamin preparations administered to the preterm infant should be formulated without propylene glycol or polysorbate, which may be found in adult formulations.

Blood concentrations of copper, chromium and manganese may become elevated because of contamination of total parenteral nutrition (TPN) solutions by these metals.

Compatibility problems due to precipitation of iron phosphate and trivalent-induced instability of lipid emulsions must be considered before iron supplementation using PN solutions.

Subgroups Most Likely to Experience Harms

Copper and manganese should be administered cautiously, if at all, in patients with impaired biliary excretion or cholestatic liver disease. Because of renal excretion of these elements, dosage reduction for selenium, molybdenum, and chromium should be evaluated in patients with renal dysfunction.

QUALIFYING STATEMENTS

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These American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) Clinical Guidelines are general statements. They are based upon general conclusions of health professionals who, in developing such guidelines, have balanced potential benefits to be derived from a particular mode of medical therapy against certain risks inherent with such therapy. However, the professional judgment of the attending health professional is the primary component of quality medical care. The underlying judgment regarding the propriety of any specific procedure must be made by the attending health professional in light of all of the circumstances presented by the individual patient and the needs and resources particular to the locality. These guidelines are not a substitute for the exercise of such judgment by the health professional, but rather are a tool to be used by the health professional in the exercise of such judgment. These guidelines are voluntary and should not be deemed inclusive of all proper methods of care, or exclusive of methods of care reasonably directed toward obtaining the same results.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2002 Jan-Feb

GUIDELINE DEVELOPER(S)

American Society for Parenteral and Enteral Nutrition - Professional Association

SOURCE(S) OF FUNDING

Not stated

GUIDELINE COMMITTEE

Clinical Guidelines Task Force

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Not available at this time.

Print copies: Available from the American Society for Parenteral and Enteral Nutrition (ASPEN), 8630 Fenton St, Suite 412, Silver Spring, MD 20910-3805; (800) 741-8972. For details, please see the [ASPEN Web site](#).

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Guidelines for the use of parenteral and enteral nutrition in adult and pediatric patients. JPEN J Parenter Enteral Nutr 2002 Jan-Feb;26(1 Suppl): 1SA-6SA.
- Nutrition care process. JPEN J Parenter Enteral Nutr 2002 Jan-Feb;26(1 Suppl): 7SA-8SA.

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PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on May 5, 2004.

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