

Emergency Nutrition for Sick/Injured Infants and Children

A. **Introduction.** The goal of nutritional therapy in a critically ill infant or child is to provide sufficient calories and protein to spare mobilization of body reserves, prevent catabolism, promote wound healing, and protect from infection. In the initial phase of trauma or illness, metabolic rate decreases and the body becomes catabolic. As the patient becomes more stable, exogenous calories and protein can be utilized to promote anabolism. It is important to avoid both underfeeding which can compromise healing, and overfeeding, which can lead to re-feeding syndrome.

Calorie and Protein Needs of Infants and Children

Age	Calories/kg	Grams protein/kg	
		Tube feeds or PO	Parenteral nutrition
Infants 0-1 yr	80-120	2.5-3.5	2.0-2.5
1-10 yr	60-90	2.0-2.5	1.7-2.0
11-18 yr	30-75	1.5-2.0	1.0-1.5

B. **Calories needs** are generally lower in extremely ill vs. healthy children due to lack of activity and a catabolic state that inhibits utilization of calories for growth. Calorie needs will increase, however, as the infant/child becomes stable. **Protein needs**, however, are elevated in sick infants and children, particularly those with open wounds, burns, or losses such as in diarrhea or ostomy output.

C. **Re-feeding Syndrome**—occurs when a malnourished patient is rapidly re-fed. Catabolism of fat and muscle leads to loss of lean muscle mass, water, and minerals with total body depletion of phosphorus (serum levels may remain normal). When carbohydrates are given, insulin is released with enhanced uptake of glucose and phosphorus and increased protein synthesis. This leads to a deficiency in phosphorus containing compounds leading to cardiac and neuromuscular dysfunction, anemia, and acute ventilatory failure.

Prevent refeeding syndrome by recognizing patients at risk. Slowly increase rate and concentration of carbohydrate delivery, maintain hydration, measure electrolytes and blood glucose frequently and correct abnormalities. If laboratory data is not available, physical signs include muscle weakness, labored breathing, seizures, diarrhea, retching, and volume overload.

D. **Tube feedings**—use an age-appropriate product if available. Standard adult formulas are acceptable in children older than 1 yr if that is all you have. Protein content will be 1.5 to 2 times that of pediatric products. Avoid exceeding 4 grams of protein per kg. Higher protein concentrations will stress the kidneys so be sure that fluid intake is adequate. Minimum calories can usually met even while giving this maximum amount of protein. Additional calories can be given using vegetable oil (100 kcal/15 ml) and sugar (48 calories per 15 ml).

Guidelines for Initiating and Advancing Continuous Feedings

Age	Initial Infusion	Incremental Advances
Infant to 1 yr	1-2 ml/kg/hr	10-20 ml/kg/d
1-6 yr	1 ml/kg/hr	1 ml/kg q 2-8 hr
>7 yr	10-25 ml/hr	25 ml q 2-8 hr

Goal rate for enteral feedings depends on caloric and fluid needs. If patient is on IV fluids, adjust volume as enteral feeds are advanced so you do not exceed calculated fluid requirements.

E. **Nutrient needs in specific conditions**

1. Burns and open wounds—high protein, supplement with vitamin C and zinc if available; otherwise, use a standard multivitamin-mineral supplement.
2. Ventilated and sedated—lower end of calorie needs, goal protein.
3. Sepsis—mid-range of calories, goal protein. Sepsis with fever, use upper range of calories and goal protein.

For specific questions, you may email either:

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