indicated. A review of the child's newborn screen may also be warranted. Observation during feeding and home visitation, if possible, is of great diagnostic value in assessing feeding problems, food preferences, mealtime distractions, unusual or disruptive parent-child interactions, and the home environment.

TREATMENT

Treatment must address the child's nutritional requirements and the social issues of the family. Initial treatment should focus on the nutritional and medical management of the child while engaging the family in the treatment plan. Parents of malnourished children may feel personally responsible and threatened by the diagnosis of FTT. Parents may be so depressed or dysfunctional they cannot focus on their child's needs; they may not recognize the psychosocial and family contributors to the malnutrition. These issues can have a profound effect on the success of treatment, and they need to be addressed.

Children with mild malnutrition whose cause is easily identified can be managed by the primary care physician and family. In more challenging cases, a multidisciplinary team, including pediatricians, nutritionists, developmental specialists, nurses, and social workers, improves nutritional outcome in children with FTT. Most children with FTT can be treated in the outpatient setting. Children with severe malnutrition, underlying diagnoses that require hospitalization for evaluation or treatment, or whose safety is in jeopardy because of maltreatment require hospitalization. Admitting children to the hospital to induce and document weight gain is not recommended unless intensive outpatient evaluation and intervention has failed or the social circumstances are a contraindication for attempting outpatient management.

Nutritional management is the cornerstone of treatment, regardless of the etiology. Children with FTT may require more than 1.5 times the expected calorie and protein intake for their age for catch-up growth. Children with FTT who are anorexic and picky eaters may not be able to consume this amount in volume and require calorically dense foods. For formula-fed infants, the concentration of formula can be adjusted appropriately (Table 21-3). For toddlers dietary changes should include increasing the caloric density of favorite foods by adding butter, oil, sour cream, peanut butter, or other high-calorie foods. High-calorie oral supplements (30 cal/oz) are often well tolerated by toddlers. In some cases, specific carbohydrate, fat, or protein additives are used to boost calories by increasing calories without increasing volume requirements. Additionally vitamin and mineral supplementation is needed, especially during catch-up growth. In general the simplest and least costly approach to dietary change is warranted.

Depending on the severity of the malnutrition, initiation of catch-up growth may take 2 weeks. Initial weight gain two to three times normal growth can be seen. Weight improvement precedes improvement in stature. For children with chronic, severe malnutrition, many months are needed to reverse all trends in growth. Although many children with FTT eventually reach normal size, they remain at risk for developmental, learning, and behavioral problems.

Table 21-3 | Infant Formula Preparation*

AMOUNT OF POWDER/ LIQUID	AMOUNT OF WATER (OZ)	FINAL CONCENTRATION
1 cup powdered formula	29	20 kcal/oz
4 scoops powdered formula	8	20 kcal/oz
13 oz liquid concentrate	13	20 kcal/oz
1 cup powdered formula	24	24 kcal/oz
5 scoops powdered formula	8	24 kcal/oz
13 oz liquid concentrate	9	24 kcal/oz
1 cup powdered formula	21	27 kcal/oz
5.5 scoops powdered formula	8	27 kcal/oz
13 oz liquid concentrate	6	27 kcal/oz

From Jew R, editor: Department of Pharmacy Services Pharmacy Handbook and Formulary, *2000–2001. Hudson, Ohio, 2000, Department of Pharmacy Services, p 422.*

*Final concentrations are reached by adding formula to water. One scoop of powdered formula = one measuring tablespoon. For healthy infants, formulas are prepared to provide 20 kcal/oz.

COMPLICATIONS

Malnutrition causes defects in host defenses. Children with FTT may suffer from a **malnutrition-infection cycle,** in which recurrent infections exacerbate malnutrition, leading to greater susceptibility to infection. Children with FTT must be evaluated and treated promptly for infection and followed closely.

During starvation, the body slows metabolic processes and growth to minimize the need for nutrients and uses its stores of glycogen, fat, and protein to maintain normal metabolic requirements. The body also generally maintains homeostasis and normal serum concentrations of electrolytes. With the rapid reinstitution of feeding after starvation, fluid and electrolyte homeostasis may be lost. Changes in serum electrolyte concentrations and the associated complications are collectively termed the **refeeding syndrome.** These changes typically affect phosphorus, potassium, calcium, and magnesium and can result in life-threatening cardiac, pulmonary, or neurologic problems. Infants and children with marasmus, kwashiorkor, and anorexia nervosa and those who have had prolonged fasting are at risk for refeeding syndrome. Refeeding syndrome can be avoided by slow institution of nutrition, close monitoring of serum electrolytes during the initial days of feeding, and prompt replacement of depleted electrolytes.

Occasionally children who live in psychological deprivation develop short stature with or without concomitant FTT or delayed puberty, a syndrome called **psychosocial short stature.** The signs and symptoms include polyphagia, polydipsia, hoarding and stealing of food, gorging and vomiting, drinking from toilet bowls, and other notable behaviors. Affected children are often shy and passive and are typically depressed and socially withdrawn. Endocrine dysfunction is often identified in affected children, who may have decreased growth hormone secretion and a muted response to exogenous growth hormone. Removal of the child from the adverse environment typically results in rapid improvement in endocrine function and subsequent rapid somatic and pubertal growth of the child. The prognosis for children with psychosocial short stature depends on the age at diagnosis and the degree of psychological trauma. Early identification and removal from the environment portends a healthy prognosis. Those diagnosed in later childhood or adolescence may not reach their genetic potential for growth and have a poorer psychosocial prognosis.