# [High-energy nutrition in paediatric cardiac critical care patients: a randomized controlled trial.](https://www.ncbi.nlm.nih.gov/pubmed/30548121)

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**Take Home Points:**

* Infants with congenital heart disease are at high risk for malnutrition. The immediate postoperative period can worsen malnutrition and increase mortality in infants and children due to increased energy requirements, inadequate calorie intake, intestinal malabsorption, and fluid restriction.
* This study was aimed at assessing efficacy and safety of feeding high-energy formula (HF) to infants with congenital heart disease in the early postoperative period after cardiac surgery. The authors found that infants fed HF gained more weight but had higher rates of feeding intolerance. Feeding intolerance was relieved with medication and did not deter feed advancement.

**Commentary from Dr. Anne Elisa Cossu, a practicing pediatric cardiac anesthesiologist at Riley Hospital for Children in Indianapolis, IN:** Several clinical studies have been designed to investigate the effects of feeding HF to infants with congenital heart disease (CHD). The results have shown that HF increases caloric intake, however, there is not clear evidence as to the effect of HF on weight gain and gastrointestinal function. Studies have suggested a resting energy expenditure of 40-60 kcal/kg/day in CHD patients. The authors’ aim of the current study was to evaluate safety and efficacy of HF during the early postoperative period after cardiac surgery in infants with CHD.

The study was a randomized, controlled trial that divided patients into two groups—an intervention group and a control group. Inclusion criteria were the following: diagnosis of CHD based on symptoms, ultrasound and imaging; < 1 year of age; and parent agreement to cardiac surgery. Exclusion criteria were the following: diseases that cause nutritional disorders, preoperative gastrointestinal intolerance, use of total parenteral nutrition after surgery, or length of stay in the CICU predicted to be < 5 days. Feeds were begun post-operatively, and patients in the intervention group received HF (51-89 kcal/kg/day) whereas the control group received standard-energy formula (SF) (44-56 kcal/kg/day) for an interval of 7 days. The primary outcome measures were weight gain in grams by the seventh day of feeding and feeding intolerance from the first day to the seventh day after starting enteral feeding. Feeding intolerance was considered to be present when infants had any of the following symptoms: vomiting three or more times per day, abdominal distension (abdominal circumference increased by more than 10%), formula volume decrease or lack of increase for 3 days, gastric residual volume greater than one third of the previous feed, greater than two unscheduled feeding breaks or diarrhea. Secondary outcomes included the following: prealbumin (mg/L) level within 24 hours of surgery and at 3 and 7 days postop; enteral energy intake during feeding with HF or SF; and duration of mechanical ventilation, CICU length of stay, hospital length of stay and number of participants who developed necrotizing enterocolitis.

A total of 59 infants completed the trial (intervention group n=30 and control group n=29). The two groups did not differ significantly in baseline characteristics. Infants who received HF had less weight loss as compared to the SF group. The HF group experienced significantly more gastrointestinal intolerance in contrast to the SF group. Nine infants in the HF group were administered drugs to improve gastrointestinal function versus 6 in the SF group. In terms of secondary outcomes, serum prealbumin levels gradually increased in the HF group but declined in the SF group. Enteral nutrition energy intake of both groups gradually increased, but more rapidly in the HF group. There were no statistical differences in the other secondary outcomes between the HF and SF groups.

Previous studies have established improved clinical outcomes when enteral nutrition is provided in the early postoperative period. Protocols for early feeding can promote these practices, which was a strength of the current study. Body weight decreased in all study participants, however, began to rebound 4-5 days after intervention due to adequate caloric intake. The exact dose-response relationship between energy intake and weight gain remains unclear. Infants in the intervention group (HF) had increased serum albumin levels compared to infants in the control (SF) group who had decreased albumin levels, which may indicate better nutritional status of the infants in the HF group. Limitations of the study included reporting bias in outcome indicators such as abdominal distension, short intervention time of 7 days, and limited time for collecting follow-up data. Additionally, weight gain may not be a reliable indicator of nutritional status as it may only indicate generalized edema. Ultimately, the authors drew the conclusion that HF enteral feeding might increase energy intake, reduce weight loss and improve nutritional status but may also cause gastrointestinal intolerance. More studies are needed to confirm safety and efficacy of HF.



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