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## Q: Do preoperative nutritional interventions improve outcomes in malnourished patients undergoing elective surgery?

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**A:** While preoperative malnutrition is associated with poorer outcomes, supplementation has been shown to be valuable only in severely malnourished patients.

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### Importance of preoperative nutritional status

Poor preoperative nutritional status is associated with delayed wound healing, increased susceptibility to infection, pulmonary complications, prolonged hospitalization, and mortality.<sup>1</sup> However, the ability to assess the utility of an intervention depends first on defining the population at risk. Unfortunately, there is no “gold

standard” for defining malnutrition or objectively measuring nutritional status. Moreover, it is difficult to separate the effect that malnutrition has on outcomes from the role played by the underlying disease process.

The history and physical examination provide initial evidence to support further investigation and risk stratification, but this strategy has never been validated as a means of objective risk assessment. Laboratory studies generally add little further value, although a large retrospective analysis found that preoperative serum albumin was a strong predictor of 30-day postoperative complications.<sup>2</sup> Various nutrition “risk indices” have been published, but there are no conclusive prospective or comparative studies of them. The one that is perhaps the simplest, the Nutrition Risk Index (NRI), combines serum albumin and an assessment of weight loss into a single measure (Figure).<sup>3</sup>

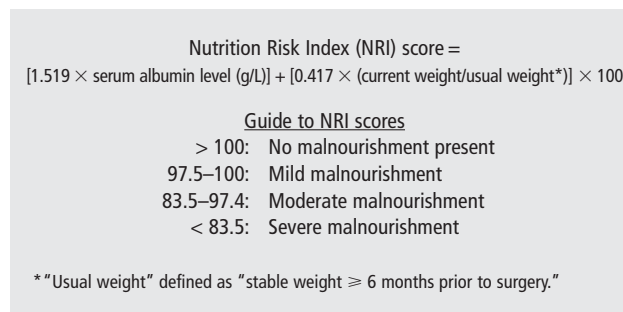
### Limited evidence on nutritional interventions

Evidence to support routine use of preoperative nutritional interventions in malnourished patients is limited.

**Total parenteral nutrition.** There are no large randomized trials of preoperative total parenteral nutrition (TPN) that have enrolled homogeneous populations and used a supplement that meets current nutritional recommendations.

The most significant single study was the Veterans Affairs Total Parenteral Nutrition Cooperative Study,<sup>4</sup> which found no overall benefit to 7 to 15 days of preoperative TPN among 395 patients undergoing elective laparotomy or thoracotomy. All patients were “malnourished,” as defined by an NRI score of 100 or less (see Figure for score categories), and 65% of patients had cancer. However, the degree of malnourishment varied significantly across the study population, and the patients were overfed relative to current standards. Overall postoperative mortality was high (12%) but did not differ between the TPN group and the control group, which did not receive TPN. The rate of infectious complications was higher in the TPN cohort than in the control group (14.1% vs 6.4%), but the overall complication rate was similar between groups. Among the subgroup of patients with the poorest nutritional status (NRI score < 83.5), the overall rate of major noninfectious complications (eg, impaired wound healing) was significantly lower in the TPN group than in the control group (5.3% vs 42.9%).

A 2001 meta-analysis of 27 randomized controlled trials of perioperative TPN included 10 studies wherein the intervention was started in the preoperative setting.<sup>5</sup> In the pooled analysis, TPN had no effect on mortality, although it may have been associ-



**FIGURE.** Method for calculating Nutrition Risk Index (NRI) score and key to score values.

ated with decreased complication rates compared with no TPN or standard care (risk ratio = 0.70; 95% confidence interval, 0.52 to 0.95). Most of the patients in these studies underwent gastrointestinal surgery, but definitions of malnourishment varied broadly, as did the composition of the TPN. In fact, the authors found that the studies were so heterogeneous that the finding of decreased complications could have been due to chance. A similar pooled analysis of 13 trials studying preoperative TPN likewise suggested that TPN decreased the risk of postoperative complications by approximately 10%, but no mortality benefit was demonstrated.<sup>6</sup>

**Enteral feeding.** There are few studies of enteral feeding as a preoperative intervention. One randomized study of 110 malnourished patients (defined by any of numerous clinical and laboratory parameters) demonstrated decreased infection and mortality rates in patients given enteral supplementation via nasogastric tube for 10 days before surgery.<sup>7</sup> Postoperatively, the patients who received supplementation had lower rates of wound infection and death, but details of the types of patients and their surgeries were not well described.

A 1992 trial randomized 151 malnourished patients (defined by a multivariable index) to receive at least 10 days of preoperative TPN, enteral nutrition, or no intervention.<sup>8</sup> All patients underwent resection of newly detected gastrointestinal cancers. Both intervention groups demonstrated a statistically significant reduction in the incidence of intra-abdominal abscess and septic complications as compared with the control group, but there was no difference between the two intervention groups. Outside of this trial, adequate comparisons between TPN and enteral intervention are lacking.

### Possible role for additional supplementation

In the future there may be a role for additional supplementation of malnourished patients with specific nutrients. A 2002 Italian study enrolled 196 mal-

nourished patients (ie, weight loss  $\geq 10\%$ ) with cancer.<sup>9</sup> Compared with controls, the group that received both pre- and postoperative supplementation, which included omega-3 fatty acids and arginine, had a shorter hospital stay and fewer overall complications.

## Conclusions

Surgery should not be delayed for either enteral or parenteral nutrition supplementation, except in the most severely malnourished patients, who may experience a modest decrease in the risk for noninfectious complications such as impaired wound healing. Enteral feeding is preferred when feasible, but no adequate trials have directly compared preoperative TPN with enteral feeding in such patients.

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