Two phase randomised controlled clinical trial of postoperative oral dietary supplements in surgical patients

A M Keele, M J Bray, P W Emery, H D Duncan, D B A Silk

Abstract

Background—Previous work has shown that the administration of oral dietary supplements to patients who have undergone gastrointestinal surgery results in clinically significant short term benefits.

Aims—This study aimed firstly to re-evaluate these short term effects, and secondly to establish whether there are any long term benefits.

Subjects—One hundred patients admitted for elective moderate or major gastrointestinal surgery.

Methods—In the inpatient phase, patients were randomised to receive a normal ward diet postoperatively, or the same diet supplemented with an oral dietary supplement. In the outpatient phase, patients were further randomised to receive their home diet, or their home diet supplemented with the oral dietary supplement for four months.

Results—During the inpatient phase, patients treated with oral supplements had a significantly improved nutritional intake and lost less weight (2.2, 95% confidence interval (95% CI) 0.9 kg) compared with control patients (4.2 (0.78) kg, $p < 0.001$). Supplemented patients maintained their hand grip strength whereas control patients showed a significant reduction in grip strength ($p < 0.01$). Subjective levels of fatigue increased significantly above pre-operative levels in control patients ($p < 0.01$) but not in the supplemented group. Twelve patients in the control group developed complications compared with four in the supplemented group ($p < 0.05$). In the outpatient phase, supplemented patients had improved nutrient intakes but there were no significant differences in indices of nutritional status or wellbeing between the groups.

Conclusions—The prescription of oral dietary supplements to patients who have undergone gastrointestinal surgery results in clinically significant benefits. These benefits, however, are restricted to the inpatient phase.

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Keywords: oral dietary supplements, postoperative surgical patients, nutritional intake, nutritional status, complications.

and recent work indicates little improvement in the situation.⁴ In surgical patients malnutrition increases postoperative morbidity, mortality,⁵ and duration and cost⁷ of hospital stay. Previous studies evaluating the efficacy of perioperative nutritional support have shown limited benefit. Perioperative parenteral nutrition has only been shown to benefit severely malnourished patients,⁸ and the routine use of feeding jejunostomies after gastrointestinal surgery cannot be justified.⁹ Clinically significant benefits have been seen with nasojejunal feeding after gastrointestinal surgery,¹⁰ and with simple oral dietary supplements after both orthopaedic surgery¹¹ and gastrointestinal surgery.¹² The aims of this study were twofold: (1) to re-evaluate earlier work¹² showing that there are short term benefits of giving postoperative oral dietary supplements to patients undergoing gastrointestinal surgery, and (2) to establish whether there are any long term benefits of continuing supplements beyond the immediate postoperative period.

Methods

The study was conducted with the approval of Parkside district ethics committee and all patients gave informed consent. It was a prospective randomised controlled trial, comprising an inpatient and an outpatient phase.

Patients were considered for enrolment if they were adults admitted to Central Middlesex Hospital NHS Trust for elective moderate to major gastrointestinal surgery, as previously defined.¹² Patients were excluded if they were to undergo laparoscopic surgery, had diabetes or overt dementia, had received pre-operative enteral or parenteral nutrition, or had undergone previous abdominal radiotherapy. Patients were withdrawn if the attending surgical team, in consultation with the hospital nutrition team, determined that enteral or parenteral nutrition was indicated.

Phase 1: the inpatient phase

On admission to hospital patients were randomised to a control or treatment group. In the immediate postoperative period all patients received standard care. The study period started when the attending surgical team determined that free fluids or a light diet should be commenced, and continued until the day of hospital discharge. During the study period, control patients received the standard hospital diet. Patients in the treatment group received the standard hospital diet supplemented ad

Department of Gastroenterology and Nutrition, Central Middlesex Hospital NHS Trust, Acton Lane, London NW10 7NS
A M Keele
M J Bray
H D Duncan
D B A Silk

Department of Nutrition and Dietetics, King's College London, Campden Hill Road, London W8 7AH
P W Emery

Correspondence to:
Dr D B A Silk,
Department of Gastroenterology and Nutrition, Central Middlesex Hospital, Acton Lane, London NW10 7NS.

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The high incidence of malnutrition in hospital patients was highlighted almost 20 years ago¹⁻³

libitum with an oral dietary supplement (Fortisip, Nutricia, Holland), available in 200 ml cartons, in various flavours, providing 1.5 kcal and 0.05 g protein per ml. Patients were encouraged to consume the supplements in small, frequent amounts, in between meals.

Patients selected their own food at meal times from the hospital multichoice menu. Soft drinks and snacks, which were readily available, were allowed as desired. Nutrient intake was assessed by daily food records from day 1 until day 7 of the study period, unless preceded by discharge. The records were kept by the study patients whenever possible, who were instructed to document intake of all food and drink, immediately after consumption, using household measures and hospital portion sizes. Portion sizes were obtained from the hospital caterers and confirmed by sample weighing. The remains of any partially drunk supplements were measured. The records were reviewed by the study dietitian and discussed with the patients to clarify intake. Energy and protein intakes were calculated using Foodbase nutrition database,¹³ with data for hospital dishes added. Nutritional status was assessed preoperatively, on day 3 of the study period, and on discharge. All assessments were carried out by the same observer (AK). Weight was measured on BASCH sitting scales. Percentage usual body weight (%UBW) was calculated, where UBW was the higher of the patients' weight two or six months after admission. Height was measured with a wall mounted stadiometer and body mass index (BMI) calculated ($BMI = \text{weight (kg)} / \text{height (m)}^2$). Midarm circumference (MAC) and triceps skinfold thickness (TSF) were measured on the non-dominant arm by accepted methods¹⁴ using a flexible steel tape and Holtain skinfold calipers. Midarm muscle circumference (MAMC) was calculated according to the formula $MAMC \text{ (cm)} = MAC \text{ (cm)} - 0.3142 \text{ TSF (mm)}$. Hand grip dynamometry was carried out with a Martin vigorimeter (Gerbrüder Martin, Germany). Patients were instructed to squeeze the bulb quickly and maximally using their non-dominant hand. Three results were recorded, allowing 10 seconds of rest between each reading, and the highest was taken as the patients' grip strength. Venous blood samples were obtained and serum albumin measured by an array rate nephelometer (Beckman Instruments UK Ltd). Nutrition risk index (NRI) was calculated according to the formula $NRI = 1.519 \text{ albumin (g/l)} + 0.417 \%UBW$, (where a score of 97.5–100 indicated borderline malnutrition, 83.5–97.5 mild malnutrition, and <83.5 severe malnutrition).⁸

Subjective levels of fatigue were measured preoperatively, on study day 3, and on discharge, in a subgroup of 34 patients, with a visual analogue scale.¹⁵ A score of 1 corresponded to feeling totally fit, and a score of 10 implied total fatigue.

Patients were monitored for complications throughout the study period. Monitoring took place by daily observation of the patient, by checking their medical and nursing notes, and

by liaison with the attending surgical team and nursing staff. The criteria previously described by Buzby *et al*¹⁶ were strictly adhered to for diagnosis of complications. Minor complications such as thrombophlebitis or urinary tract infections were not included.

Phase 2: the outpatient phase

Phase 2 continued for four months after discharge from hospital. On discharge patients were further randomised forming four groups (Table I).

Patients who were randomised to the treatment groups for the outpatient phase were given supplements on discharge and encouraged to take them ad libitum, in addition to their normal diet. Further supplies were collected from the hospital or delivered to their home. Assessments were performed one, two, and four months after discharge from hospital, in the outpatient department or the patients' homes.

Nutrient intake was assessed using four day food diaries. Verbal and written instructions were given, together with a series of photographs illustrating different portion sizes of commonly used foods (developed by Dunn Clinical Nutrition Centre, Cambridge, England). Patients were instructed to record their intake over a weekend and two weekdays, during the week before their outpatient appointment. Energy and protein intakes were calculated¹³ and an average daily intake over a week determined.

Measurements of nutritional status were repeated in phase 2.

Wellbeing was assessed using the wellbeing index for surgical patients (WISP), developed for this trial by Galen Research, Manchester (specialists in health measurement and quality of life assessment). It comprised 31 "yes" or "no" questions. Each response indicating lack of wellbeing was scored 1, giving a score range from 0 to 31, with a high score indicating poor wellbeing. The WISP has been shown to be valid and consistent.¹⁷ (See appendix 1 for WISP questionnaire.)

Statistics

A paired sample *t* test was used for within group analyses. Between group analyses were done by Student's *t* test in phase 1, and by one way analyses of variance (ANOVA) in phase 2, using Tukey-Kramer honestly significant difference (HSD) for pairwise comparison. The χ^2 goodness of fit test was used to analyse the difference in incidence of complications. Values quoted are mean (95% confidence interval given as a single $\pm$ value). In a previous controlled trial examining the efficacy of supplements in

TABLE I Treatment regimens of the four groups of patients

	Inpatient phase	Outpatient phase
Group 1	Supplements	Supplements
Group 2	Supplements	Control
Group 3	Control	Control
Group 4	Control	Supplements

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TABLE II Operations performed on the 86 study patients

	Control	Treatment
Right hemicolectomy	6	8
Left hemicolectomy	2	4
Extended right hemicolectomy	0	1
Extended left hemicolectomy	1	0
Transverse colectomy	1	0
Sigmoid colectomy	4	5
Total colectomy	2	1
Panproctocolectomy	2	0
Anterior resection	8	6
Abdominoperineal resection	4	4
Ileoanal pouch	3	2
Gastrectomy: total or subtotal	6	5
Oesophagogastrectomy	1	0
Gastrojejunostomy	0	1
Laparotomy + resection	1	1
Laparotomy + ostomy	2	3
Reversal colostomy	0	2

TABLE III Diagnosis of the 86 study patients

	Control	Treatment
Cancer, colon or rectum	26	26
Cancer, stomach	7	4
Cancer, pancreas	0	1
Inflammatory bowel disease	7	3
Diverticular disease	1	4
Slow transit colon	2	2
Rectovaginal fistula	0	1
Leiomyoma, stomach	0	1
Small bowel lymphoma	0	1

postoperative patients,¹² we found that a weight loss of 4.7 kg in control patients was significant at the 5% level compared with patients randomised to the treatment group. When designing the present trial, calculations showed that 21 patients in each treatment group would be required to achieve a significant difference in weight loss at the 5% level with a power of 95%. The final numbers in each treatment group were increased, however, to offset overall drop outs which are known to occur in this type of study.¹²

Results

Phase one

One hundred patients were entered into the study, of whom 53 were randomised on admission to the control group and 47 to the treatment group. Ten subjects were withdrawn from the control group and four from the treatment group for the following reasons. Five control patients could not have the planned operation, one refused to cooperate with the

study protocol, and three required parenteral nutrition before study day 1 – that is, before they had started free fluids postoperatively. One control patient required parenteral nutrition on study day 15. She had an anastomotic breakdown, underwent further surgery on study day 14, and developed a fistula of the small bowel. Her multiple complications were not included in the analysis of complications. Of the four patients withdrawn from the treatment group, two did not undergo the planned operation and two died, both before study day 1. The deaths were due to myocardial infarction, faecal peritonitis and sepsis.

Patient details – Table II shows the operations performed – the groups were well matched regarding the severity of the operations and underlying diagnosis (Table III). Table IV shows that there were no significant differences in the baseline nutritional variables of the two groups. On admission to the study the patients were marginally nutritionally depleted, with a mean weight loss of 4% UBW and albumin concentrations at the lower end of the normal range (35–45 g/l). NRI scores indicated mild malnutrition.⁸ Only 12 of the 86 subjects (14%) had NRI scores below 83.5, indicating severe malnutrition. Eight of the severely malnourished patients were in the treatment group and four were in the control group. The fatigue scores indicated that patients in each group were slightly tired.

Nutrient intake – Three control patients took oral dietary supplements, having been referred to the ward dietitian with poor nutritional intake. They were not excluded from the control group and the energy and protein contributed by the supplements is included in their daily nutrient intakes. Four patients in the treatment group who refused to take the supplements remained in the supplement group.

Table V shows the daily nutrient intake of patients during the inpatient phase. Discharge from hospital resulted in the gradual decline in numbers of subjects from study day 1 to study day 7. There are no significant differences in the nutrient intakes from ward diet between the two groups. However, the treatment group had significantly higher total energy and protein intakes on the first four days of the study period and a significantly higher protein intake on study day 7.

TABLE IV Nutritional variables and fatigue levels during phase 1

	Control			Treatment		
	Preoperative (n=43)	Study day 3 (n=42)	Discharge (n=39)	Preoperative (n=43)	Study day 3 (n=42)	Discharge (n=38)
Men/Women	23/20			25/18		
Age	60.0 (5.1) (range 19–86)			64.7 (4.9) (range 25–91)		
Weight (kg)	69.6 (4.3)	67.4 (4.3)+++	66.1 (4.1)+++	66.0 (3.7)	65.0 (3.7)+++	64.0 (3.7)+++
BMI (kg/m ²)	25.1 (1.4)	24.2 (1.4)+++	23.6 (1.4)+++	23.5 (1.2)	23.2 (1.2)+++	22.8 (1.2)+++
%UBW	96.7 (1.8)	92.8 (1.8)+++	91.4 (2.0)+++	95.3 (1.8)	93.3 (1.8)+++	91.5 (2.0)+++
Weight change (kg)		−3.0 (0.6)	−4.2 (0.8)		−1.5 (0.8)***	−2.2 (1.0)***
Albumin (g/l)	35.4 (1.4)	28.9 (1.4)+++	30.4 (1.4)+++	34.8 (1.4)	28.4 (1.2)+++	31.3 (1.2)+++
NRI	93.8 (2.4)	82.7 (2.0)+++	84.5 (2.2)+++	92.6 (2.6)	82.3 (2.2)+++	85.5 (2.4)+++
Grip (KPa)	68.5 (4.1)	63.9 (4.9)++	62.8 (4.9)++	65.7 (6.5)	63.3 (5.3)+	65.7 (6.5)
MAC (cm)	29.2 (1.2)	28.2 (1.2)+++	28.0 (1.2)+++	28.0 (1.0)	27.3 (1.0)+++	27.0 (1.0)+++
TSF (mm)	16.1 (2.6)	14.9 (2.6)+++	14.9 (2.6)+++	14.1 (2.2)	13.5 (2.2)+++	13.3 (2.4)+++
MAMC (cm)	24.1 (1.0)	23.6 (1.0)+++	23.3 (1.0)+++	23.6 (1.0)	23.1 (0.8)+++	22.9 (1.0)+++
Fatigue score	3.9 (1.2)	6.5 (1.0)++	6.1 (1.2)++	4.4 (1.2)	5.5 (1.2)	5.1 (1.2)

***p<0.001 v control (unpaired t test); ++p<0.05; +++p<0.01; +++p<0.001 v preoperative values. Values are mean (95% CI).

TABLE V Daily nutrient intake of patients during the inpatient phase

Study period (days)	Control			Treatment			
	n	Ward diet		n	Ward diet		Total intake (diet + supplement)
		Energy (kcal/day)	Protein (g/day)		Energy (kcal/day)	Protein (g/day)	Energy (kcal/day) Protein (g/day)
1	43	480 (107.8)	13.4 (3.9)	43	606 (113.7)	19.0 (4.3)	878 (121.5)*** 28.0 (4.7)***
1	42	984 (117.6)	31.1 (4.3)	43	1068 (133.3)	34.5 (4.5)	1366 (147)*** 45.2 (5.3)***
3	40	1238 (143.1)	41.9 (4.9)	40	1251 (129.4)	45.2 (4.7)	1597 (160.7)** 56.7 (5.5)***
4	31	1359 (149)	46.3 (5.5)	27	1282 (166.6)	43.9 (5.3)	1627 (217.6)* 55.5 (6.9)*
5	25	1420 (203.8)	48.9 (7.3)	20	1248 (139.2)	44.1 (7.5)	1597 (243) 55.2 (10.6)
6	17	1401 (266.6)	47.7 (8.6)	17	1486 (178.4)	48.8 (8.8)	1732 (192.1) 58.7 (9.4)
7	11	1425 (329.3)	45.5 (10.2)	12	1481 (154.8)	53.5 (9.6)	1762 (213.6) 62.9 (10.2)*

Values are mean (95% CI).
*p<0.05; **p<0.01; ***p<0.001 v control.

TABLE VI Postoperative course for inpatients

	Control	Treatment
Duration:		
Postoperative nil by mouth period (days)	5.5 (0.4)	5.1 (0.4)
Total postoperative stay (days)	13.2 (2.6) (median 11.0)	10.8 (1.2) (median 10.0)
Complications:		
Wound infection	7	2
Wound dehiscence	2	1
Gastrointestinal perforation	1	0
Subphrenic abscess	1	0
Multiple complications	1†	1‡
Total	12	4*

Values are mean (95% CI) unless stated otherwise.
†Pulmonary emboli, wound dehiscence, and chest infection;
‡wound infection and chest infection.
*p<0.05 v control.

Nutritional status and fatigue levels – Table IV shows that there was a general decline in the patients’ nutritional status during their hospital stay. Patients in both groups lost weight and serum albumin concentrations fell resulting in a reduction in NRI scores. Anthropometric values dropped in both groups. Control patients lost significantly more weight than treatment patients, both at study day 3 (3.0 (0.59) v 1.5 (0.78) kg; p<0.001) and discharge (4.2 (0.78) v 2.2 (0.98) kg; p<0.001). Control patients showed a significant reduction in hand grip strength during their hospital stay. In the treatment group, grip strength dropped at study day 3, but had returned to preoperative levels by discharge. Fatigue scores in the control group rose from 3.9 (1.18) to 6.5 (0.98) at study day 3, (p<0.01), and 6.1 (1.2) at discharge (p<0.01). By contrast the treatment group showed a small, non-significant increase in fatigue.

Postoperative course of the inpatients – Table VI shows patients in both groups were nil by mouth for a similar length of time post-operatively, (5.5 (0.4) days in controls, 5.1 (0.4) days in the treatment group). The difference in the postoperative duration of stay was not significant. There were 12 complications in the control group and four in the supplement group (p<0.05).

The patients who developed complications were nil by mouth for a mean of 5.4 days. In one control patient a wound infection developed the day before study day 1, on the sixth postoperative day. In all other patients complications started between study days 1 and 9. Wound infections tended to start early – mean

study day 3 in the control group (range study days 1–8), and on study days 1 and 2 in the two treatment patients. Wound dehiscence began on study days 4 and 7 in two control patients and on study day 8 in a treatment patient. The patient with a gastrointestinal perforation underwent surgery on study day 4, and the one with a subphrenic abscess had a laparotomy and drainage of the abscess on study day 33, having had a fluctuating pyrexia since study day 9.

The control patient with multiple complications developed a chest infection on study day 6, multiple pulmonary emboli on day 10, and had her wound resutured on day 14. The treatment patient with multiple complications developed a chest infection on study day 1 and a wound infection on study day 5.

The nutritional status of patients on entry to the study who developed complications (NRI score 94.1 (3.5)) was no different from those who did not (NRI score 93.0 (2.0); p=0.6).

Phase 2

Three patients died during the outpatient phase, and four refused to cooperate and were withdrawn.

Nutrient intake – Figures 1 and 2 show the patients’ energy and protein intakes during phase 2. One month after discharge there was a significantly higher energy intake in group 1 than in groups 2 and 3 (p<0.05). Two months after discharge group 4 patients had a significantly higher intake than patients in group 2 (p<0.05). The difference in the protein intakes was not significant at any month.

Nutritional status and wellbeing – Supplementation during the outpatient phase had no significant effect on weight, weight change, MAC, TSF, MAMC, albumin, grip strength, fatigue levels, or wellbeing.

Figure 3 shows that there was a trend for group 1 patients to gain weight most rapidly, but this was not significant.

There was a trend for group 3 patients to have higher wellbeing scores, indicating a lack of wellbeing, but the difference was not significant.

Discussion

We have confirmed that the prescription of oral dietary supplements to inpatients who have undergone elective moderate to major gastro-intestinal surgery results in clinically significant

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Figure 1: Energy intake during phase 2.

Figure 2: Protein intake during phase 2.

benefits, but have been unable to show benefits of supplementation after discharge from hospital.

During the inpatient phase, energy and protein intakes in both the treatment and control groups remained below estimated requirements for postoperative patients¹⁸ for their entire hospital stay. These results are in agreement with others.¹⁹⁻²¹ Reasons for a poor nutritional intake are multifactorial. Having undergone surgery to the gastrointestinal tract and a period of starvation, many patients were initially wary of eating solid food. Appetite often did not return fully until after discharge from hospital. In addition the usual problems seen in hospitals of a restricted catering budget,

limited meal choices, and meal times imposed by routine contributed to their poor intake. In this study, offering oral dietary supplements to the patients on an ad libitum basis resulted in significant improvements in nutrient intake. As has been previously shown,^{11 12 22} giving supplements did not in any way reduce voluntary food intake.

Regardless of whether patients had been taking supplements in hospital, their dietary intake improved over the first month after discharge. Patients in groups 2 and 3 (those not taking supplements during phase 2), had an average intake of about 1700 kcal and 70 g protein per day, thus easily meeting current recommendations for protein, although their

Figure 3: Weight change during phase 1 and phase 2.

energy intakes were a little low.²³ Patients in group 1 had significantly higher energy intakes one month after discharge than those in groups 2 and 3. It is clear from Figs 1 and 2 that supplements taken at home did not diminish voluntary food intake. The nutrient intake from normal diet tended to be higher in the supplemented patients, although not significant.

Supplemented patients lost significantly less weight during their hospital stay compared with control patients. Figure 3 shows that one month after discharge from hospital all groups were still below their admission weight. Group 1 patients regained their weight most quickly (1.4 kg more than their admission weight at month 2), whereas group 3 patients were still below their admission weight four months after discharge from hospital.

During the inpatient phase both groups showed a significant drop in midarm muscle circumference, but the results of the hand grip dynamometry indicate that skeletal muscle function was preserved to a greater extent in the treatment group. Similar effects were seen in our previous study with oral dietary supplements¹² and rapid effects of nutritional support on hand grip strength have also been shown with parenteral nutrition.²⁴ Post-operative fatigue, assessed subjectively by a 10 point analogue scale, developed to a greater extent in the control group compared with the treatment group in the inpatient phase. Other work has shown that increase in fatigue after abdominal surgery correlates with post-operative weight loss.²⁵ Both grip strength and fatigue levels had returned to preoperative levels in all groups one month after discharge from hospital.

The most important finding in the inpatient phase was the reduced incidence of post-operative complications in the treatment group – four patients developed complications compared with 12 in the control group ($p < 0.05$). There was a total of nine infectious complications in the control group compared with four in the treatment group. This reduction was similar to that seen in other studies.^{12 26} In

addition, we have shown a reduction in technical complications; three control patients developed wound dehiscence, compared with only one control patient. The Veterans Affairs TPN Cooperative Study Group showed that perioperative parenteral nutrition resulted in reduced complications only in severely malnourished patients ($NRI < 83.5$).⁸ By contrast we have shown that giving an oral dietary supplement resulted in a reduction in serious complications regardless of the preoperative nutritional status of the patients.

It is well established that chronic malnutrition affects muscle function,^{27 28} immune function,²⁹ wound healing,³⁰ and psychological function,³¹ although the effect of a short period of starvation after surgery is not so clear. Our results indicate that taking supplements post-operatively may have had a beneficial effect on all the above functions. Moreover, the rapidity of the effects suggests a direct action of key nutrients rather than repletion of tissue stores. It may seem surprising that the modest improvement in nutritional intake seen in the study can have such a profound effect, but other studies in which nutritional intake was improved to a similar extent have also shown dramatic benefits in clinical outcome.^{11 12 32}

After discharge from hospital it is difficult to find an endpoint that can be measured to determine the patients' recovery. The well-being index was developed to try to overcome this problem. There was no significant difference in the wellbeing scores of the four groups of patients one, two, and four months after discharge. This is probably because patients in all groups were eating fairly well and feeling much better by one month after discharge, therefore supplementing their intake had little effect on their wellbeing. It is possible that differences between the groups may have been found if the patients had been assessed earlier than one month after discharge, or if more patients had been studied. However, the only conclusion that can be drawn from our outpatient results is that administering nutritional support in the form of oral dietary supplements after discharge from hospital did

not have a significant effect on the patients' wellbeing.

In conclusion, the results of this study provide no evidence to support the routine prescription of oral dietary supplements to patients who have undergone elective moderate to major gastrointestinal surgery after discharge from hospital. We have, however, shown that the prescription of oral dietary supplements to these patients in hospital results in clinically significant benefits. On the basis of this study, which is in agreement with our earlier work,¹² we would strongly advocate the routine postoperative prescription of oral dietary supplements to inpatients who have undergone elective moderate to major gastrointestinal surgery.

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Appendix 1: WISP questionnaire

	Yes	No
I have plenty of energy	☐	☐
On the whole I enjoy life	☐	☐
It hurts when I sit too long	☐	☐
I often feel nervous	☐	☐
I soon lose interest in things	☐	☐
It hurts me to go to the toilet	☐	☐
I often get depressed	☐	☐
I have to be careful what I eat	☐	☐
It hurts when I get out of bed	☐	☐
I have to sit down a lot	☐	☐
I just pick at my food	☐	☐
It's an effort to talk to people	☐	☐
I sleep well at night	☐	☐
I worry about overdoing things	☐	☐
I often feel weak	☐	☐
I am easily irritated	☐	☐
I feel sore inside	☐	☐
My bowels give me a lot of problems	☐	☐
I wake up feeling tired	☐	☐
I have enough energy for the things I want to do	☐	☐
I feel sick when I eat	☐	☐
I get discomfort in my stomach	☐	☐
I need to lie down during the day	☐	☐
I can only eat small meals	☐	☐
I'm in pain when I move about	☐	☐
I often feel like crying	☐	☐
It hurts me when I stand up	☐	☐
I often feel bored	☐	☐
I'm tired all the time	☐	☐
I often feel bloated	☐	☐
I have a good appetite	☐	☐

Galen Research 1993, for Nutric.

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