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Energy and Protein Intake After Return Home in Colorectal Surgery Patients With an Enhanced Recovery Program: A Prospective Observational Study

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Background: In patients scheduled for colorectal surgery with an enhanced recovery program (ERP), feeding after returning home has been insufficiently investigated. The aim of this study was to measure energy and protein intake during the first month at home. *Methods:* Seventy adult patients scheduled for colorectal surgery with ERP were included. Calorie and protein intakes were calculated, and body weight was measured preoperatively and 3, 7, 15, and 30 days after discharge home. Data are mean ± SD or median (interquartile range). *Results:* Patient characteristics were age 60.0 ± 15.0 years, BMI = 25.9 ± 5.5 kg/m^2, and colon/rectum of 56/14. The duration of hospitalization was 3 (2–5) days. Calorie and protein intakes (21.9 [17.7–28.6] kilocalorie per kilogram of ideal body weight [kcal/kg IBW] and 0.81 [0.61–1.14] g/kg IBW) were significantly reduced ($P < .01$) by 15% on day 3, compared with preoperative values, and then increased gradually to reach preoperative values after 1 month. Almost 50% of the patients failed to reach the calorie intake target of 25 kcal/kg IBW, and almost no patient reached the protein intake target of 1.5 g/kg IBW 30 days after discharge home. Weight loss after 30 days at home remained at −1.8 ± 2.7 kg. *Conclusions:* Colorectal surgery, even in an ERP, is associated with energy and protein intake below the targets recommended for the rehabilitation phase and results in weight loss. Whether nutrition counseling and prolonged administration of protein-enriched oral supplements could accelerate weight gain needs to be explored. (*Nutr Clin Pract.* 2021;0:1–9)

Keywords
calories; colorectal surgery; energy intake; enhanced recovery after surgery; ERAS; oral nutrition supplements; protein

Introduction

Surgical stress induces a catabolic state resulting in weight loss. Approximately 2 kg of total lean mass is lost in 6 weeks after uncomplicated elective colonic surgery and recovery.[1,2] Four months into convalescence, whole-body protein breakdown has been reported to remain higher than in healthy controls.[3] This loss of lean body mass is accompanied by loss of function and fatigue in the first postoperative weeks recovering by 3–6 months as a function of surgery and patient clinical status. Walking capacity and levels of physical activity are reduced, and return to activities of daily living is delayed, whence the need for a period of convalescence.[1] Although adequate postoperative energy intake helps protein utilization, the

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anabolism required for optimal patient recovery can only be achieved with amino acids.[1]

An enhanced recovery program (ERP) after colorectal surgery consists of multimodal and multidisciplinary management designed to control the surgical stress response and mitigate its consequences.[4,5] ERP attenuates postoperative insulin resistance and protein catabolism and enhances substrate utilization.[1,6] It thereby reduces perioperative complications and accelerates postoperative recovery and convalescence.[5] An ERP for colorectal surgery comprises 20–25 components distributed over the preoperative, intraoperative, and postoperative periods.[6,7] Several of these elements facilitate early postoperative feeding, one of the postoperative key elements of the ERP. As a consequence of this program, patients are soon fit to leave the hospital. Because of rapid discharge from the hospital, patients can feel left on their own at home to manage postoperative side effects such as intestinal discomfort and feeding difficulties. The ERP does not include comprehensive postoperative nutrition counseling or recommendations for the patient after discharge from the hospital.[8]

Postoperative energy and protein intakes in patients included in an ERP after colorectal surgery have not been fully assessed. During the 3 first postoperative days in the hospital, energy and protein requirements are not met in most patients, even in the best-case scenario considering only those patients who tolerated early feeding.[8,9] In a retrospective study, one-third of patients still complained of feeding difficulties 2 months after surgery.[10] In this light, we carried out a prospective observational study to evaluate energy and protein intake and weight loss at home during the first month after surgery in patients scheduled for colorectal surgery with an ERP.

Materials and Methods

Patients

After approval by our Institutional Ethics Committee and obtaining written informed consent, 70 consecutive patients with American Society of Anesthesiologists physical status I–III who were scheduled for colorectal surgery in an ERP were included in this prospective observational study (see Figure 1 for CONSORT trial profile). Exclusion criteria were inadequate French language skills, inability to record food intake and fill out the nutrition questionnaire, and postoperative unreachability. The study was registered at ClinicalTrials.gov (NCT03749668).

Patient Care and Nutrition Management

All patients received standard care for colorectal surgery according to guidelines published by the ERAS Society and GRACE (Francophone group for enhanced recovery after surgery).[6,7] ERP was fully implemented in our institution in 2015.[11] Nutrition measures included preoperative immunonutrition (Oral Impact®, Nestlé Health Science, Belgium, Brussels) in cases of severe undernutrition (preoperative weight loss > 5% of usual body weight in 1 month, body mass index < 18.5 kg/m^2, Nutritional Risk Score 2002 [NRS-2002] > 5, and/or serum albumin concentration < 30 g/L) in both cancer and noncancer patients and for all patients scheduled for rectal surgery, together with a preoperative 50-g carbohydrate load 2–3 hours before surgery. Patients were allowed to eat a light meal on the evening of the day of surgery. The day after surgery, regular ad libitum oral food intake was initiated. Oral nutritional supplementation (ONS) was not proposed systematically, except in case of major postoperative complications (<10%). Patients were discharged home when they fulfilled the following criteria: tolerance of feeding, flatus, pain amenable to oral analgesics, mobilization, and ambulation without assistance.[12] Postdischarge nutrition instructions were provided by the surgeons. Patients were recommended foods that were easy to digest and that could help minimize diarrhea, such as low-residue foods including eggs, cooked fish or tender meat, mild cheese, or soft-cooked fruits or vegetables. Raw vegetables and fiber-rich foods were ruled out.

All the patients were included in the final analysis, whether or not they tolerated early feeding and whether or not they experienced postoperative complications.

Measurements

The primary end points were energy and protein intakes. Patients received standardized questionnaires to record their food intake before surgery and 3, 7, 15, and 30 days after being discharged home from the hospital. Responses to the questionnaires were completed and validated with a dietitian on admission to the hospital for the preoperative questionnaire (food frequency questionnaire over the 5 preoperative days) and in a phone call for each of the postoperative questionnaires (food diary). The dietitians involved in recording food intake made no attempt to change patient intake and did not provide any nutrition counseling.

Secondary end points were micronutrient (vitamin C, iron, calcium, and fiber) intake, body weight, appetite, and fatigue assessed on a verbal scale of 0–10, and symptoms of gastrointestinal discomfort (stomach upset, intestinal bloating, slow digestion, diarrhea, constipation) were reported as a binary variable (Y/N). Body weight was objectively measured using patient personal scale to avoid interscale variability. These parameters were recorded at the same time points.

Daily total energy and protein intakes, together with intakes of the selected micronutrients, were calculated using the OrganizationPro Nubel Foodplanner (https://www.nubel.be). Calorie and protein intakes are reported as raw data and as values per kilogram of ideal body weight

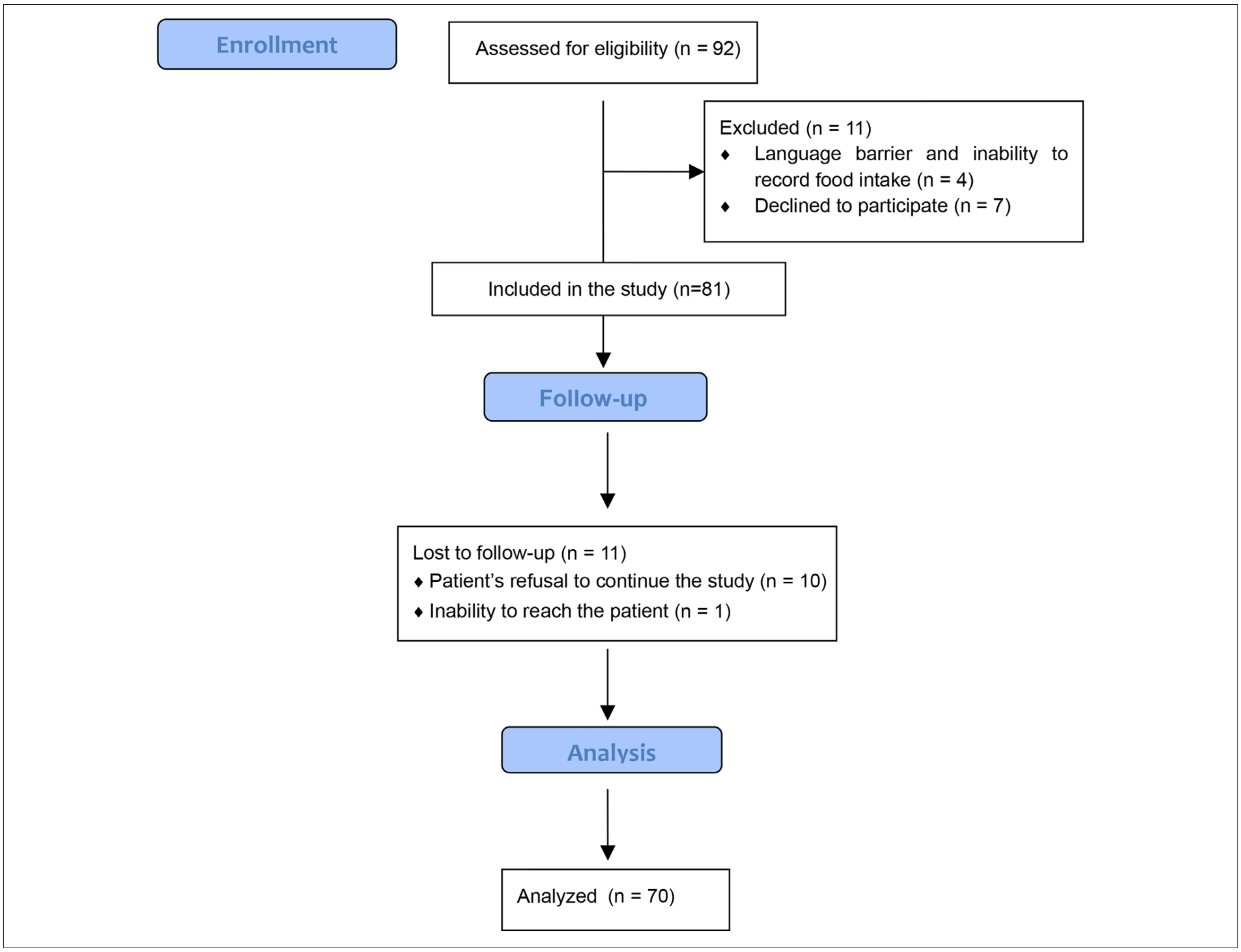

Figure 1. Consolidated Standards of Reporting Trials (CONSORT) trial profile.

(IBW). Adjusted body weight (ABW) was used for obese patients.[13]

Preoperative risk factors for prolonged hospitalization and/or delayed recovery of postoperative bowel function and refeeding were also recorded: age, severe undernutrition, surgical approach (laparotomy), type of surgery (rectal), and indication of surgery (cancer).

Statistical Analysis

The distribution of quantitative variables was investigated graphically using histograms and tested using the Shapiro-Wilk hypothesis test. Quantitative variables are expressed as mean ± SD or median (interquartile range). Qualitative data are expressed as count (percent).

After determination of calorie requirements as IBW or ABW in obese patients times 30 on a sample of 20 patients (2020 ± 251 kcal), we estimated that a sample size of 52 patients would provide an 80% power for detecting a difference of 400 kcal at an α level of 0.05, with a difference of 200 kcal being considered as not significant. A total of 70 patients were finally included.

To examine time effect across the 5 different time points, the analysis of variance (ANOVA) Friedman test was used for energy, protein, and micronutrient intakes, and generalized linear mixed models were run with logit link function for categorical (binary) variables. Body weight, fatigue, and appetite data were analyzed using ANOVA for repeated measures.

A univariate binary logistic regression model was used to assess the association between a calorie intake below 25 kcal/kg IBW (the recommended lowest energy target)[14] on days 3 and 7 after hospital discharge (dependent variable) and the following potential risk factors as independent variables: age $\geq$ 70 years, NRS-2002 score $\geq$ 3, cancer surgery, laparotomy, rectal surgery, low preoperative food intake ($\leq$21 kcal/kg IBW; ie, 70% of calorie need),[13] depression (patient under antidepressant medication). Assessment of

Table 1. Patient Characteristics (N = 70).

Characteristics	Values
Age, y	60.0 ± 14.9
Elderly, ≥70 y	19 (27%)
Sex (male)	32 (46%)
Weight, kg	73.4 ± 17.5
Height, cm	169.7 ± 9.8
BMI, kg/m^2	25.9 ± 5.5
Obesity (BMI ≥ 30 kg/m^2)	14 (20%)
Preoperative anemia	20 (29%)
Antidepressant therapy	4 (6%)
Colon/rectum	55/15 (75%/25%)
Laparoscopy/laparotomy	60/10 (86%/14%)
Cancer	38 (54%)
Preoperative radiotherapy/chemotherapy	10 (14%)
Preoperative weight loss	40 (57%)
Weight loss >5% of usual body weight	16 (23%)
NRS-2002	2 (2–3)
NRS-2002 score ≥ 3	33 (47%)
Adherence to ERP (out of 20 items)	17 (16–18)
Postoperative complications	19 (27%)
Grade of complications ≥ 2[a]	5 (26%)
Length of hospital stay, d	3 (2–5)

Data are mean ± SD, median (interquartile range), or count (%).
Anemia: hemoglobin concentration < 13 g/dL in men and < 12 g/dL in women. NRS-2002: a score of ≥3 indicates malnutrition risk.
Grade of complications follows the Clavien-Dindo classification.
BMI, body mass index; ERP, enhanced recovery program; NRS-2002, Nutritional Risk Score 2002.
[a]Data are number (%) of total complications.

the association between a protein intake below 1.5 g/kg IBW (the recommended protein intake)[14] and the same risk factors had been planned but could not be done, because too few patients reached this target. Odds ratios (ORs) and their 95% confidence intervals were calculated for these variables. A backward stepwise multivariate logistic regression model was used to determine independent risk factors. All variables that in the univariate analysis were associated with the dependent variable at a *P*-value of .05 or less were inserted into the logistic regression model. A *P*-value of <.05 was considered statistically significant.

Data were analyzed using STATA 15.1 Software (StataCorp LP; College Station, TX).

Results

A total of 92 patients were assessed for eligibility between November 2018 and April 2019 (Figure 1). Eighty-one patients were included in the study. Seventy patients completed all the questionnaires and were analyzed. Patient characteristics are presented in Table 1.

Daily calorie intakes were 15%–25% lower and protein intakes were 35%–54% lower than requirements preoperatively and at all time points after return home (*P* < .001) (Table 2). Daily calorie and protein intakes decreased significantly (*P* < .01) during the first days after patients were discharged from the hospital compared with preoperative values (Table 2, Figure 2). These intakes returned to preoperative values after 30 days (Table 2, Figure 2). More than 50% of the patients ingested <25 kcal/kg IBW up to 30 days after their return home. More than 75% of the patients ingested <30 kcal/kg (Figure 2). Protein intake was <1.0 g/kg IBW in >50% of the patients and was <1.5 g/kg IBW in almost all the patients except on day 30 (Figure 2). Multivariate analysis demonstrated that age of >70 years and low preoperative food intake (≤21 kcal/kg IBW) were

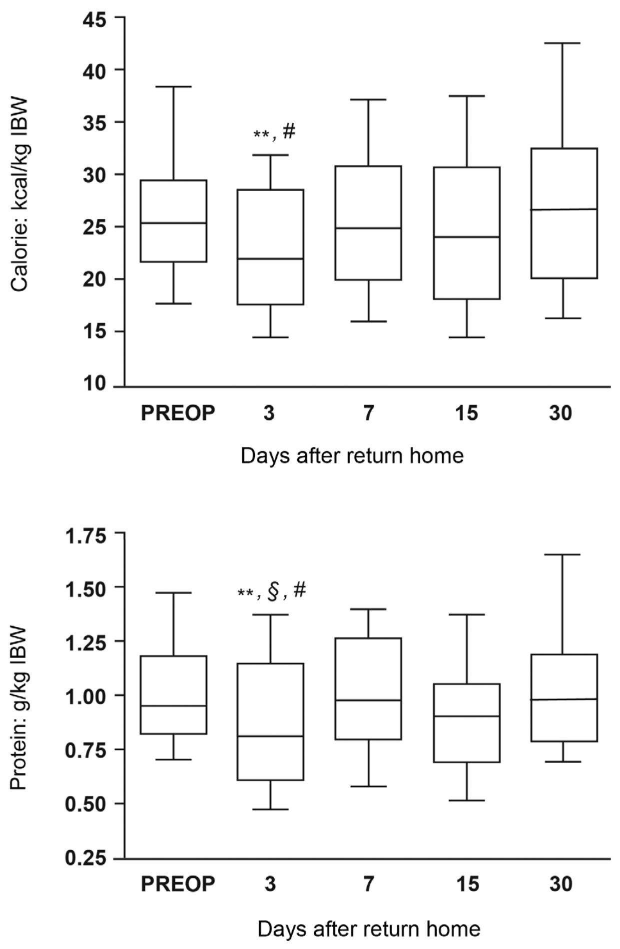

Figure 2. Energy (upper panel) and protein intake (lower panel) assessed by using a food questionnaire before surgery (PREOP), as well as on day 3, day 7, day 15, and day 30 after return home. Data are expressed as kilocalorie per kilogram of ideal body weight (kcal/kg IBW) and gram per kilogram per IBW (g/kg IBW) for protein intake. Adjusted body weight was used for obese patients. Data are median, boxes are 75th and 25th percentiles, and whiskers are 90th and 10th percentiles. $^{**}P < .01$ compared with PREOP value. $^{§}P < .05$ compared with day 7. $^{\#}P < .05$ compared with day 30.

Table 2. Actual Calorie and Protein Intakes Compared With Requirements.

	Required[a]	Preoperative	Day 3	Day 7	Day 15	Day 30	*P*
Calorie, kcal/d	2090 (1795–2312)	1752* (1504–2027)	1495***,# (1201–1858)	1654** (1378–2049)	1668*** (1317–2021)	1732* (1443–2175)	<.001
Protein, g/d	104 (90–116)	68*** (57–83)	57***,## (42–76)	65*** (52–80)	56*** (48–73)	69*** (55–84)	<.001

Actual calorie and protein intakes before surgery, as well as on day 3, day 7, day 15, and day 30 after return home, were calculated using a food questionnaire. Data are median (interquartile range).
[a]Calorie requirements (kcal/d) = ideal body weight or adjusted body weight (for obese patients) × 30; protein requirements (g/d) = ideal body weight or adjusted body weight (for obese patients) × 1.5.
*$P < .05$.
**$P < .01$.
***$P < .001$ as compared with requirements.
#$P < .05$.
##$P < .01$ as compared with preoperative value.

Table 3. Risk Factors for Calorie Intake <25 kcal/kg IBW on Day 3 After Returning Home: Univariate and Multivariate Analyses.

Risk factors	OR	95% CI	*P*	aOR	95% CI	*P*
Age > 70 y	4.38	1.13–16.91	.01	4.36	1.10–17.34	.036
Cancer	1.03	0.39–2.72	.95			
Rectal surgery	0.86	0.27–2.76	.80			
Laparotomy	1.12	0.28–4.43	.86			
NRS-2002 score ≥ 3	2.27	0.83–6.18	.11			
Low preoperative food intake	5.03	1.04–24.46	.04	5.01	1.00–25.14	.05
Depression	1.83	0.18–18.56	.61			

Low preoperative food intake = 70% of calorie need (30 kcal/kg IBW), ie, 21 kcal/kg IBW; depression = using antidepressant medication.
aOR, adjusted odds ratio; CI, confidence interval; IBW, ideal body weight; NRS-2002, Nutritional Risk Score 2002.

Table 4. Fiber and Micronutrient Intake at Home During the First 30 Days After Discharge of the Patient From the Hospital.

	Preoperative	Day 3	Day 7	Day 15	Day 30	*P*	Belgian consumption
Fiber, g/d	16 (12–21)	11* (9–18)	14 (10–18)	14 (8–20)	16 (11–21)	<.01	14.9
Calcium, mg/d	607 (424–950)	552 (350–917)	565 (371–842)	599 (369–793)	573 (383–962)	NS	732
Iron, mg/d	7.6 (5.5–9.8)	6.1** (4.6–9.1)	6.8 (4.6–10.2)	6.8 (4.9–9.4)	8.2 (5.9–11.5)	<.01	8.82
Vitamin C mg/d	53 (34–87)	33* (17–54)	35 (14–75)	32* (14–71)	50 (18–97)	<.01	74

Fiber and micronutrient intake before surgery, as well as on day 3, day 7, day 15, and day 30 after return home, were calculated using a food questionnaire. Data are median (interquartile range). Recommended dietary allowances of the Belgian Superior Health Council in 2016 for the micronutrients tested were 30 g/d for fiber, 1000 mg/d for calcium, 9 mg/d for iron, and 110 mg/d for vitamin C.[15] As indicators, the last column gives the average Belgian consumptions of fiber and each of these micronutrients in 2016.
*$P < .05$ compared with preoperative value.
**$P < .01$ compared with preoperative value.

significant risk factors for a calorie intake of <25 kcal/kg IBW at day 3 (Table 3). On day 7, these 2 variables were no longer risk factors (old age: OR, 2.18 [0.73–6.44]; $P = .15$; low preoperative food intake: OR, 1.67 [0.52–5.34]; $P = .69$). Body weight was significantly decreased ($P < .01$) compared with preoperative values at day 3 after discharge from hospital and did not increase thereafter until day 30 (Figure 3).

Fiber and micronutrient intake, except calcium, decreased significantly ($P < .01$) in the early postoperative period and returned to preoperative values within 30 days. However, intakes remained well below the recommended dietary allowance (RDA) of the Belgian Superior Health Council throughout the observation period (Table 4).[15]

Postoperative fatigue increased and appetite decreased during the early period after discharge from hospital

Table 5. Fatigue, Appetite, and Symptoms of Gastrointestinal Discomfort at Home During the First 30 Days After Discharge of the Patient From the Hospital.

	Preoperative	Day 3	Day 7	Day 15	Day 30	*P*
Fatigue	4.4 ± 2.6	5.6 ± 2.2**	5.4 ± 2.3**	4.9 ± 2.5	4.3 ± 2.8	<.001
Appetite	7.2 ± 2.1	5.6 ± 2.1**	6.3 ± 2.0**	6.3 ± 2.6**	7.0 ± 2.1	<.001
Stomach upset	11 (16%)	20 (29%)	16 (23%)	16 (23%)	10 (14%)	.055
Intestinal bloating	24 (34%)	27 (39%)	25 (36%)	24 (34%)	21 (30%)	.069
Slow digestion	8 (11%)	22 (31%)**	16 (23%)*	10 (14%)	9 (13%)	<.01
Diarrhea	15 (21%)	30 (43%)**	23 (33%)*	23 (33%)*	22 (31%)	<.01
Constipation	18 (26%)	7 (10%)*	8 (11%)*	12 (17%)	6 (9%)**	<.05

Fatigue and appetite (mean ± SD) were assessed on a 0–10 verbal scale.
Symptoms of gastrointestinal discomfort are reported as a binary variable (Y/N): data are number of patients (percent) reporting the symptom.
$^{*}P < .05$ compared with preoperative.
$^{**}P < .01$ compared with preoperative.

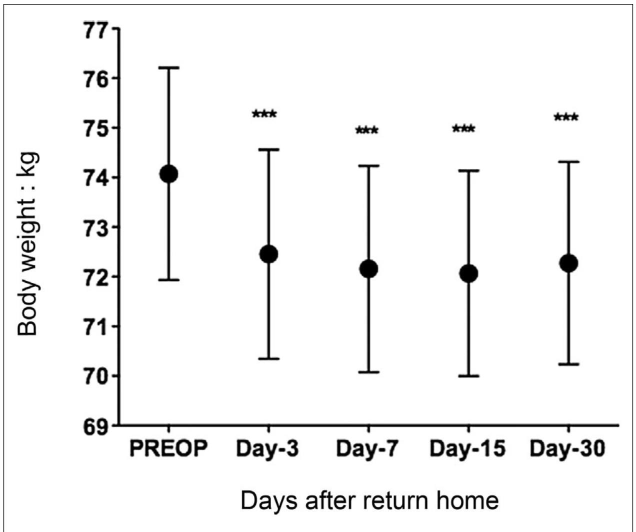

Figure 3. Change in body weight after return home. Body weight was measured before surgery and on day 3, day 7, day 15, and day 30 after return home. Data are mean ± SD. $^{***}P < .001$ compared with before surgery (PREOP).

($P < .01$) and then returned to preoperative values (Table 4). Patients complained of symptoms of gastrointestinal discomfort significantly more often after surgery than preoperatively (Table 5).

Discussion

Our study demonstrates that most patients who had undergone colorectal surgery with an ERP did not adhere to the energy and protein recommendations for the rehabilitation phase after surgery during the first month after return home.[14] Energy and protein consumption was significantly lower 3 days after discharge from hospital than preoperative values and returned thereafter to preoperative values. However, >50% of the patients fell short of the target energy intake of 25 kcal/kg IBW during the first month at home, and the protein intake of 1.5 g/kg IBW was barely reached by 9 patients. A weight loss of approximately 2 kg was observed on day 3. Despite the progressive increase in calorie and protein intake during the first month, no weight gain was recorded during this period. Finally, our study highlights micronutrient deficiencies in patients' diet: vitamin C, iron, calcium, and fiber remained below the RDA throughout the observation period.

The energy and protein requirements after major abdominal surgery are estimated at 25–30 kcal/kg IBW and 1.5 g/kg IBW, respectively.[14] Inadequate oral intake for >14 days increases postoperative morbidity.[16] Surgical nutrition messages often focus mainly on providing energy.[1] However, exogenous protein is crucial to stimulate anabolism and facilitate recovery by compensating for increased proteolysis and the added demands secondary to inflammatory protein synthesis and wound healing.[1,14] Provision of protein, independently of whether total calorie requirements are met, therefore seems essential to maintaining lean muscle mass.[14] Our results suggest that in the absence of dietary counseling and postoperative follow-up, >50% of the patients did not reach the energy target of 25 kcal/kg during the first month after hospital discharge. Elderly patients and patients eating <21 kcal/kg IBW before surgery were particularly at risk of taking in less energy, but only during the first days at home. Therefore, food intake after returning home should be monitored in all patients to provide dietary counseling in case of uncovered energy need. A calorie intake of 25 kcal/kg covers the energy expenditure reported by Hill et al (20–25 kcal/kg) during the 12 first days after major abdominal surgery.[17] However, the conventional care for these surgical patients, which did not include the enforced mobilization of ERP, can explain a low-activity energy expenditure.[17] Compensation for enforced mobilization, a key element of ERP,[18] thus requires more calories. The deficiency in protein intake was even more noteworthy, with only 9 patients reaching the target of 1.5 g/kg IBW 1 month after discharge home. Loss of appetite and gastrointestinal discomfort, as reported by our patients, can affect dietary intake.[8] Prolonged administration of ONS and dietary counseling, therefore, appear necessary to reach these energy and protein targets.[1,14,16,19] Overall adherence to ONS is, however, low in the hospital despite nutrition information on the importance of ONS intake.[9] Few data are available concerning adherence to ONS at home after colorectal surgery.[19,20] The deficits in protein and, to a lesser extent, in energy intakes might have contributed to postoperative fatigue and the absence of weight gain during the first month after return home in our patients.

The energy and protein intakes of our patients may appear low. Questionnaires to assess energy and protein consumption can be suspected of underestimation because snacks, sweets, and soft drinks between main meals can be overlooked. However, in this study, all the questionnaires were reviewed with the patient by a dietitian before validation. We therefore consider our estimations to be accurate as much as possible. Others have reported similar energy intake without ONS after colorectal surgery[19] or even lower intake.[17,21] However, the preoperative intake (an average of the 5 preoperative days) was potentially affected by the preoperative low-residue diet, intestinal discomfort secondary to surgical pathology, and adjuvant treatment and was therefore 20% lower than requirements as reported by others.[22] Hence, the actual postoperative reduction in energy and protein intake compared with the usual preoperative intake and/or requirements might have been slightly underestimated.[17]

Similar to other studies,[8,9] our colorectal surgery patients included in an ERP took in more energy and protein during the 10–15 days after surgery than patients with conventional care, as reported in earlier work, widely considered superseded.[17,21] In a study by Yeung et al, the greater in-hospital intakes in ERP patients were due to the inclusion of ONS.[9] In the absence of comprehensive nutrition recommendations for the patient after discharge from the hospital, the anabolic benefits of the ERP are not sustained after discharge home.[14] Indeed, the reduction in fat-free mass loss reported with an ERP compared with traditional care 8 days after surgery is not maintained after 4 weeks.[23] In line with this observation, like Smedley et al, we did not find any significant weight gain during the first month after return home. Our patients included in an ERP, however, experienced a smaller weight loss in the early postoperative period than patients in traditional care.[16,19] Similarly, postoperative fatigue was improved during the early postoperative period by ERP, but after 1 month there was no difference from traditional care.[24]

This study evidenced postoperative deficiency in some micronutrients. Deficiency in vitamin C, fiber, and iron could be explained by a diet including low-residue foods and excluding raw vegetables and fruits. Avoidance of dairy products because of potential intolerance resulted in low calcium intake. Special attention should be paid to iron. One-third of the patients scheduled for colorectal surgery have preoperative anemia, with iron deficiency in 50%.[25] Preoperative anemia, a risk factor for poor postoperative outcome,[26] is further worsened by intraoperative bleeding and the postoperative inflammatory reaction. Intravenous iron might, therefore, be considered to circumvent the intolerance of oral iron, accelerate correction of anemia, and potentially improve patient recovery.[27]

Despite the benefits of an ERP, postoperative complications persist, particularly in high-risk patients. To further improve postoperative outcome, the concept of prehabilitation, which includes nutrition advice to increase protein intake, was introduced. Unfortunately, prehabilitation does not seem to diminish postoperative complications and patient-reported outcome measures in colorectal surgery patients in an ERP.[28,29] A close follow-up of patients once they have returned home could improve outcome and quality of life.[30] Our results and those in the literature suggest there is a place for nutrition counseling and prolonged postoperative prescription of protein-enriched ONS to improve energy and mainly protein intake at home.[20,30] This is the concept of "perioperative surgical home."[31] Whether this approach would further accelerate convalescence, weight gain, and return to normal activities and improve quality of life remains to be assessed.[32]

Our study has several limitations. Our patients were not provided systematically with in-hospital ONS as recommended in an ERP. In-hospital adherence to ONS is usually low.[9] Furthermore, almost 75% of our patients had no complication and a short hospital stay (2–3 days). We doubt that ONS during such a short period of time could impact energy and protein intake after discharge from hospital. Our preoperative assessment is affected by the preoperative low-residue diet, preoperative anxiety, bowel discomfort secondary to the surgical pathology, and adjuvant therapy. A matched case-control study using patients not scheduled for colorectal surgery might give a truer assessment of usual preoperative energy and protein intake. We reported weight loss but did not measure fat-free mass loss, a parameter more associated with loss of function. Finally, indirect calorimetry would have provided relevant information to discuss the adequacy of patient ingesta compared with energy and substrate expenditure.

In conclusion, this study demonstrates that in the absence of nutrition counseling and prolonged postoperative prescription of ONS, >50% of the patients undergoing colorectal surgery in an ERP consumed <25 kcal/kg during the first postoperative month at home, whereas almost no patient reached the target of 1.5 g/kg protein. These deficiencies are associated with significant weight loss. These targets are, however, recommended for the rehabilitation phase after surgery. Although the energy and protein intake progressively increased to reach preoperative values, no weight gain occurred during the first month. Whether dietary counseling and prolonged postoperative prescription of protein-enriched ONS could correct these deficiencies and whether this nutrition care could accelerate convalescence, weight gain, and return to normal activities and could improve quality of life need to be determined.

Statement of Authorship

J. Joris contributed to the conception and design of the research; M. Hubert, D. Gabriel, S. El Khouda, M. Coster, C. Routiaux, G. Hans, and N. Nihant contributed to the design of the research; J. Joris, M. Hubert, D. Gabriel, S. El Khouda, M. Coster, C. Routiaux, and N. Nihant contributed to the acquisition and analysis of the data; J. Joris, M. Hubert, D. Gabriel, S. El Khouda, M. Coster, C. Routiaux, N. Nihant, and G. Hans contributed to the interpretation of the data; and J. Joris, M. Hubert, and G. Hans drafted the manuscript. All authors critically revised the manuscript, agree to be fully accountable for ensuring the integrity and accuracy of the work, and read and approved the final manuscript.

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