



# Lingnan expert consensus on the management of oral nutritional supplements for enhanced recovery after surgery in patients undergoing colorectal surgery (2018 Edition)

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Enhanced recovery after surgery (ERAS), initially known as “fast track surgery” (FTS) or “enhanced recovery protocol” (ERP), was originally pioneered in Denmark by Professor Henrik Kehlet, a professor from the University of Copenhagen. Today, this approach has been widely applied in surgery, anesthesia, nursing, and many other professional fields, achieving remarkable results. The concept of ERAS is to optimize the perioperative management according to evidence-based medicine and, by adopting a multi-mode strategy, to reduce the physiological and psychological stress responses following surgery, to stabilize the internal environment of the body, and to ultimately achieve the goals of improving post-operative recovery, which are shortening hospital stay, and reducing complications. In

early 2018, the Chinese Society of Surgery and the Chinese Society of Anesthesiology jointly released the Chinese Expert Consensus and Pathway Management Guidelines on Enhanced Recovery after Surgery (2018 edition), which emphasizes the importance of multi-disciplinary collaboration (i.e., collaboration among the departments of surgery, anesthesia, nursing, nutrition, and other disciplines) for ERAS measures during the perioperative period (1). Nutrition management runs through the entire process of perioperative ERAS. Preoperative malnutrition increases the risk of postoperative complications, delays the recovery of gastrointestinal function, and prolongs hospital stay. In contrast, rational nutritional support can reduce surgical stress, preserve lean body tissue, reduce the incidence

and mortality of perioperative complications, and thus ensure the smooth implementation of perioperative ERAS measures. With this in mind, Prof. Jieshou Li proposed the concept of “bundle management”, which combines “perioperative management”, “ERAS”, and “clinical nutrition therapy” (2). In recent guidelines, the European Society for Parenteral and Enteral Nutrition (ESPEN) (3,4), the American Society for Parenteral and Enteral Nutrition (ASPEN) (5), and the Chinese Society for Parenteral and Enteral Nutrition (CSPEN) (6) recommend oral nutritional supplements (ONS) as the preferred nutrition support therapy. However, doctors in China have different understandings about the clinical use of ONS, and there are still no uniform recommendations on the indications, contraindications, and standard operating procedures of ONS. Consequently, the Guangdong Medical Doctor Association Enhanced Recovery after Surgery Branch organized experts from general surgery and nutrition departments in the Lingnan area to develop an expert consensus on ONS for ERAS in patients undergoing colorectal surgery based on the clinical evidence in Chinese and international literature in combination with the experts’ own experience, with an attempt to standardize the use of ONS in the diagnosis and surgical treatment (especially during ERAS) of colorectal diseases in China.

### **Comprehensive nutritional diagnosis before surgery**

Patients undergoing colorectal surgery often experience malnutrition, which refers specifically to undernutrition in this high-risk population. In 2015, the Tumor Nutrition and Supportive Therapy Committee of China Anti-Cancer Association recommended that patients with colorectal cancer should undergo a three-level nutritional diagnosis, namely nutrition screening (first-level diagnosis), nutrition assessment (second-level diagnosis), and comprehensive measurement (third-level diagnosis) (7). Nutrition screening includes nutrition risk screening, malnutrition risk screening, and malnutrition screening. The ESPEN expert consensus recommends that nutrition screening should be performed for each new cancer case (4). However, the concepts of nutritional risk and malnutrition risk are often confused (8). Nutritional risk refers to the existing and potential risks associated with nutritional and metabolic factors that can lead to adverse clinical outcomes. Having a critical influence on clinical outcomes, it is mainly scored by the Nutritional Risk Screening 2002 (NRS-

2002). The NRS-2002 is a simple, convenient, and highly operable, time-saving tool. Since its release in 2003, it has been recommended as the preferred tool for nutritional screening by the ESPEN (9), CSPEN (10), ASPEN (11) and many other nutritional associations, along with the US Society of Critical Care Medicine (SCCM). Risk of malnutrition refers to the identification of individuals at risk of undernutrition and over-nutrition. The commonly used tools for screening malnutrition include the malnutrition universal screening tool (MUST) and the nutritional risk index (NRI). Malnutrition screening is focused on the detection of indicators including body weight, weight loss, and body mass index (BMI), with an attempt to learn the degree of malnutrition. Nutrition assessment is the second level of nutrition diagnosis, focusing on the identification of malnutrition and the assessment of its severity. The assessment tools include subjective global assessment (SGA) (12), patient-generated subjective global assessment (PG-SGA) (13), and mini nutritional assessment (MNA) (14). Of these, PG-SGA is a nutritional assessment tool specially designed for patients with cancer. In order to be able to effectively guide the nutritional therapy of patients at different malnutrition levels (15), the nutritional assessment in colorectal cancer patients divides the results into four groups: no or minimal malnutrition, suspected or mild malnutrition, moderate malnutrition, and severe malnutrition. Comprehensive measurement of nutrition is designed to learn the cause and type of malnutrition through medical history, physical examination, laboratory tests, and related equipment examinations, so as to evaluate the degree of malnutrition, guide the clinical treatment, and observe the effects of nutrition on human body composition, physical activity, vital organ function, mental status, and lifestyle.

The nutrition evaluation methods used in clinical settings mainly include single evaluation indicators and a compound evaluation index (9-15). The single evaluation indicators include serum albumin, transferrin, and BMI. Because these indicators are often not specific, and single indicators can be easily affected by other factors (e.g., drugs), their clinical application is limited and the evaluation is less comprehensive. In order to better evaluate nutritional status and improve the accuracy and comprehensiveness of the evaluation, different single indicators are combined to form a compound evaluation index, among which PG-SGA, MUST, and NRS-2002 are the more commonly used tools in clinical practice.

PG-SGA is a nutritional assessment tool developed on the basis of SGA and specially designed for cancer

patients. It consists of two sections: (I) a patient-completed section assessing weight loss, dietary intake, symptoms, and functional level; and (II) a clinician-completed section assessing metabolic stress and physical examination. The qualitative and quantitative methods in the global evaluation have good agreement. The results of quantitative assessment are divided into four grades: 0–1 point, good nutrition; 2–3 points, suspected malnutrition; 4–8 points, moderate malnutrition; and  $\geq 9$  points, severe malnutrition. The results of qualitative assessment are classified into three grades: good nutrition, 0–1 point; suspicious/moderate malnutrition, 2–8 points; and severe malnutrition,  $\geq 9$  points. Due to its specificity and efficiency in diagnosing tumors, PG-SGA has been recognized by the American Dietetic Association (ADA) and has been widely applied (16).

Used mainly in elderly patients, the scores of MUST can be divided into three sections: (I) BMI: score 2 if BMI  $< 18.5 \text{ kg/m}^2$ , score 1 if  $18.5 \text{ kg/m}^2 < \text{BMI} < 20 \text{ kg/m}^2$ , and score 0 if BMI  $> 20 \text{ kg/m}^2$ ; (II) unplanned weight loss in the last 3–6 months: score 2 if weight loss  $> 10\%$ , score 1 if weight loss 5–10%, and score 0 if weight loss 0–5%; (III) medical condition: if patient is acutely ill and there has been or is likely to be no nutritional intake for  $> 5$  days score 2. 0 = low risk, 1 = medium risk, and 2 or more = high risk (17). A study has shown that MUST has high efficiency in screening the mortality and hospital stay of elderly patients, with good consistency with other screening tools including SGA and NRS-2000 (18). It is a simple and easy-to-operate tool; however, few large-sample clinical studies have verified its efficiency.

NRS-2002 has been widely used in nutritional risk screening for hospitalized patients (including cancer patients) aged 18 to 90 years. The NRS-2002 was first proposed by the ESPEN in 2003. It is scored according to three sections: impaired nutritional status, severity of disease, and age. The first two sections score 0–3 from mild to severe, and age over 70 years adds 1 point. The total score ranges from 0 to 7. A total score of  $\geq 3$  indicates a nutritional risk thus requiring the patient receive nutritional support. Standardized nutritional support may improve clinical outcomes (19). Supported by 128 RCTs, NRS-2002 is an evidence-based tool that is highly reliable and practical. In addition, since it is simple, easy-to-operate, time-saving, and comes without additional cost, and less subjective interference (compared with PG-SGA), it has been widely applied in clinical settings.

Consensus 1: nutritional risk screening should be performed before a colorectal surgery using the

NRS-2000. For patients with colorectal cancer, PG-SGA is recommended for the assessment of nutritional status.

### Malnutrition in surgical patients

Although malnutrition is known to be a high risk factor for surgical complications, epidemiological studies have shown that the incidence of malnutrition in hospitalized patients ranges from 40% to 55% and can reach up to 65% in patients undergoing gastrointestinal surgery (20). Colorectal surgery patients often suffer from inadequate intake and traumatic stress caused by various acute and chronic diseases, resulting in increased catabolism, increased energy expenditure, and inadequate energy synthesis, which ultimately leads to malnutrition (21). Malnutrition increases the risk associated with surgery, the incidence and mortality of complications after operation, the medical expenditure, and the length of hospital stay (22,23). In 2016, the ESPEN determined that patients who met any of the following criteria were at high nutritional risk (9): (I) BMI  $< 18.5 \text{ kg/m}^2$ ; (II) unintentional weight loss  $> 10\text{--}15\%$  within the past six months; (III) the subjective global assessment (SGA)—grade C or NRS  $> 5$ ; and (IV) serum albumin  $< 30 \text{ g/L}$  before surgery (without underlying liver or kidney disease).

The 2017 ESPEN guidelines suggest that patients at nutritional risk or with malnutrition should receive nutritional treatment and nutritional education (4). In addition, the following patients should also receive early nutritional therapy (24): (I) cannot eat for more than 5 days; and (II) with oral intake reduced or less than 50% of the target recommended intake, lasting for more than 7 days. However, since a series of measures are applied to reduce the stress and trauma during the implementation of ERAS in the perioperative period of colorectal surgery, the commonly used BMI sometimes does not reflect the risk of complications and prolonged hospital stay. In some patients with high BMI, the loss of lean body mass and the decrease in skeletal muscle may be less obvious, which may have adverse effects on clinical outcomes (25). It has been argued that only weight loss of more than 10% within 6 months before surgery and a serum albumin level of less than 30 g/L are the predictors of postoperative complications (26). Some authors used the ACS-NSQIP database to retrospectively analyze the perioperative data of 42,483 patients with colorectal cancer and found that only hypoalbuminemia (albumin  $< 35 \text{ g/L}$ ) contributed to postoperative mortality, morbidity and length of hospital stay; in contrast, weight loss of more than 10% within 6 months before surgery and

BMI <18.5 were less predictive (27).

Consensus 2: nutrition education and nutritional support should be offered for patients at nutritional risk or with malnutrition, unable to eat for 5–7 days, and/or with oral intake reduced or less than 50% of the target recommended intake and lasting for more than 7 days.

### Indications and contraindications of ONS

According to the CSPEN guidelines, ONS can be applied in a variety of populations. It is an ideal nutritional treatment for patients who have their gastrointestinal structure and function basically intact, are able to be fed orally to meet all nutritional needs, and who are typified by at least one of the following conditions (28): inpatients with malnutrition or who are at nutritional risk; malnutrition patients who are preparing to undergo a surgery; patients with low energy and/or protein intake; patients with chronic wasting disease; patients with chewing and swallowing disorders; fragile and anorexic elderly patients; cancer patients receiving surgery or chemoradiotherapy; patients with short bowel syndrome or intestinal fistula; and patients with inflammatory bowel disease, severe absorption disorders, and/or dysphagia or after total gastrectomy. In particular, patients with malignant tumors are at high risk for malnutrition because of long-term wasting. According to a foreign report, 55% of patients with malignant tumors ate less food, 71.6% met the criteria of malnutrition, and only 57.6% received nutritional support (29). In addition, the reduction of food intake allows the early prediction of the change in the nutritional status in patients undergoing gastrointestinal surgery (30).

In addition to “inability to eat orally due to various reasons”, the contraindications of ONS also include the inability to eat due to severe infection and/or shock; complicated gastrointestinal fistula and/or abdominal infection; intestinal obstruction; acute phase of short bowel syndrome; acute inflammatory phase of inflammatory bowel disease with severe diarrhea; and severe malnutrition, intestinal wall edema, and low bowel motility.

Consensus 3: for patients at nutritional risk or with malnutrition, ONS should be given as long as they can eat orally, have basically intact gastrointestinal structure and function, and have no other ONS contraindication.

### Application of ONS in perioperative ERAS for colorectal surgery

One of the core principles of ERAS is to reduce the

trauma and stress response to surgery or anesthesia, thus accelerating the recovery of patients. Early rehabilitation after surgery requires good nutritional status and rational nutritional support before and after operation. Nutrition support for cancer patients should follow the five-step model: nutrition counseling, ONS, total enteral nutrition (TEN), partial parenteral nutrition (PPN), and total parenteral nutrition (TPN) (31). According to the ESPEN guidelines, if the current step cannot meet 60% of the current energy needs for 3 to 5 days, the nutritional support in the previous step should be applied instead. The perioperative nutritional support can maintain the nitrogen balance and maintain lean body mass; more importantly, it can help to maintain organ, tissue, and immune functions, promote the repair of organs and tissues after operation, and thus achieve the goal of accelerated rehabilitation. Nutrition counseling and ONS are the first choice for malnutrition patients. For patients with good nutritional status, however, conventional nutritional supplementation is not superior to normal diet in terms of prognosis. For these patients, the application of ONS and their nutritional education mode require further investigation. ONS is a key component of perioperative ERAS for colorectal surgery. In 2017, Yeung *et al.* (32) found that the daily intake of total protein in the ERAS group was significantly higher than that in the traditional control group (0.54 *vs.* 0.33 g/kg, respectively), leading to the decrease in hospital stay and incidences of overall infectious complications in the ERAS group.

### Definition and advantage of ONS

ONS refers to oral nutritional formulas that have been enriched with micronutrients or macronutrients, in addition to regular food, to supplement nutrition deficiency. For patients who cannot attain the nutritional intake target through oral feeding after standard nutritional counseling, ONS is recommended. ONS is a means of enteral nutrition (EN), but it is closer to a natural dietary intake. Generally, it is in the form of liquid or semi-liquid product. It is made of carbohydrate, fat, protein, and various trace elements in certain proportions as foods for special medical purpose (FSMP) or in the form of powder to produce preparations with certain energy by using corresponding dispensing methods. Used as an additional nutritional supplement to the regular diet, ONS can help to maintain or improve the nutritional status of patients. It can provide 400–900 kcal/d of nutrition in the forms of dietary

supplements, sip, or meal replacement for patients with difficulty in taking solid food (28). As a form of EN, ONS can be used in patients with gastrointestinal digestion and absorption functions. Compared with parenteral nutrition (PN), ONS has the advantages of EN, which includes easy digestion and absorption; stimulation to the recovery of gastrointestinal functions; maintenance of the integrity of gastrointestinal mucosal structure and functional barrier; prevention of intestinal bacterial translocation; facilitation of protein synthesis and metabolic regulation; and ease of use conducive to clinical management (33). In patients undergoing gastrointestinal surgery, it can also reduce the incidence of shallow and deep surgical site infection (SSI) during the perioperative period, shorten hospital stay, and improve clinical outcomes (34). Compared with tube feeding (EN), ONS is more in line with physiological status, does not affect daily dietary intake, and can stimulate the secretion of gastrointestinal digestive juices. More importantly, ONS does not affect daily life. Hence, it has obvious advantages in comfort, convenience and economic utility.

Consensus 4: the recommended dose of ONS is, in addition to regular food, the daily dose of ONS reaching 400–900 kcal/d.

### ***Key points and cautions about the use of ONS***

The successful implementation of ONS depends on two conditions (35): (I) the products should be good-tasting, so that patients can continue to take them orally; and (II) the patients' own conditions should allow them to adhere to ONS. During the use of ONS, we need to observe the adherence of patients to ONS, the acceptance of ONS, and the effects of ONS on the clinical and nutritional indicators. The patients' adherence is a particularly important factor. As an EN type, the adherence to ONS can be affected by the frequency, temperature, speed, and concentration of the nutritional preparations. Other factors affecting ONS include the taste, aroma, appearance, post-drinking taste, flavor, sweetness, and thickness of ONS preparations (36). Bolton *et al.* found that 54% of patients discontinued the trial for flavor reasons (37), and that the stopping of ONS intake due to taste fatigue was also one of the reasons for decreased ONS adherence (38). The flavor of ONS can change the intake of energy and nutrients within a short period of time. Compared with ONS with poor flavor, ONS with good flavor was found to increase the total energy intake by 44% (39). The diversification of ONS flavors can also promote energy intake. In western countries, ONS

products with a variety of flavors are available, which can meet the different needs of various populations and thus increase the patients' adherence to ONS. In addition, patients' perception and awareness of ONS will affect the effectiveness of nutritional support therapy. As the effectiveness of ONS will only become apparent after a long period of use, it is generally recommended that ONS be used for no less than one month (28). In clinical practice, however, malnutrition persists or recurs due to the reduction or early withdrawal of ONS by the patients themselves. Therefore, patient education on ONS is particularly important.

The supply of ONS is flexible, and the additional energy can be provided before, during, or after meals. On the basis of regular diets, the extra energy supplied by ONS can reach 400–900 kcal/d (28), which is helpful in improving the nutritional status of the patients. In clinical settings, however, doctors or specialist nurses should convert the dosage of ONS into an easy-to-understand and easy-to-operate method according to the standard reconstitution method of a commercialized ONS product.

The adverse effects of ONS are similar to EN. First, the currently available ONS products in China have repetitive flavors, and some patients cannot tolerate these products after becoming over-accustomed to their taste. Second, these products can cause abdominal distension and diarrhea. These adverse effects vary among individual patients and can also be related to the concentration, temperature and drinking amount of the reconstituted ONS products. The concentration of ONS depends on the patient's preference and intestinal adaptability. In theory, the concentration of ONS increases from thin to thick, and the total amount of ONS increases from small to large. Adequate communication with patients and their families on the risk and consequences of malnutrition and on the amount and administration method of ONS will help to increase patients' compliance with ONS and reduce the adverse effects (40).

Consensus 5: the smooth and sustained use of ONS requires good product flavor and patient adherence, for which patient education on nutrition is critically important.

Consensus 6: doctors and specialist nurses should use an easy-to-understand and easy-to-operate method to educate patients on the reconstitution and oral administration of ONS, thus increasing patients' adherence to ONS.

### ***Application of ONS before colorectal surgery***

When the energy needs of patients without nutritional

risk are met, the current clinical evidence does not indicate a benefit of ONS in improving the clinical outcomes of patients undergoing colorectal surgery (41). It has been suggested that patients should be encouraged to take ONS, regardless of their nutritional status, when their energy needs cannot be met via regular diet (42). Patients who underwent surgery for esophageal, gastric or abdominal tumors were included in a study. All of these patients had slight weight loss (6–7%) within six months before surgery, whereas their preoperative albumin level remained normal. After two consecutive weeks of preoperative ONS support (500 kcal daily), the preoperative nutritional status was markedly improved, accompanied by a reduction in the number and severity of postoperative complications. This may be explained by the preoperative long-existing metabolic catabolism in patients with gastrointestinal or abdominal tumors. If not properly controlled, malnutrition will occur, which will ultimately affect the clinical outcome. Therefore, regular ONS administration is required for patients with pre-operative weight loss. However, larger clinical data sets are needed to validate the results of this study. For patients at nutritional risk or with malnutrition, the nutritional risk or undernutrition risk can cause nutrition- or surgery-related complications. As a result, all the ESPEN guidelines (3), ASPEN guidelines (6), and CSPEN guidelines (28) recommend the use of ONS in patients who can eat orally but achieve less than 60% of the recommended energy and protein intake. Before surgery, ONS should be used at least 7 to 14 days to correct preoperative nutritional status. However, in the real-world clinical settings of China, the preoperative nutritional support cannot be maintained for such a long period of time. It is then suggested that ONS should be initiated during outpatient visits before admission.

Consensus 7: for patients undergoing colorectal surgery at nutritional risk or with malnutrition, and who can eat orally, the use of ONS is recommended.

Consensus 8: for patients with indications, ONS should be initiated at least 7 to 14 days before surgery to correct preoperative nutritional status. It is recommended that ONS be implemented at outpatient visits.

### *Application of ONS after colorectal surgery*

ERAS has been widely applied in general surgery, urology, orthopaedics, and other fields, and its application in colorectal surgery has also shown remarkable promise.

Many clinical studies since the 1990s have confirmed the safety of early oral intake after surgery. It is recommended that oral intake be resumed early after surgery. The patients should be encouraged to start on a liquid diet 4 hours after surgery, which can lower the risk of infections and the incidence of postoperative complications without increasing the incidence of anastomotic leakage (3). In one study, feeding was started on postoperative day (POD) 1 with a small amount of ONS, and the amount was progressively increased; the results showed that the ONS group had a better recovery than the conventional feeding group (43). However, the specific timing and dosage of meals should be based on clinical experience, surgical process, and patients' tolerance. Additional ONS should be applied until the oral intake can meet 60% of the patients' energy needs.

In addition, ERAS promotes patients to achieve early oral postoperative feeding through a variety of measures, including intraoperative and postoperative restrictive transfusion, reduced use of opioids, early ambulatory activities, chewing gum, and multi-modal analgesia, to alleviate intestinal edema and promote intestinal peristalsis, thus creating the optimal conditions for early oral postoperative feeding. Therefore, the expert consensus on ERAS for colorectal surgery recommends that peripheral transfusion should be stopped early, and that ONS is the best perioperative nutritional support (44,45). A meta-analysis showed that early postoperative ONS could reduce the incidence of complications (especially infectious complications), shorten ICU stay, and reduce the length of hospital stay (46).

The standard operating procedure (SOP) of nutritional support after colorectal surgery in the Center of Gastrointestinal Surgery of the First Affiliated Hospital of Sun Yat-sen University is as follows: (I) on the day of operation, 20 mL of water is given 4 hours after surgery, and 50–100 mL of ONS is given every 3 hours depending on the patients' tolerance; (II) on the first postoperative day (day 1), 100–150 mL of ONS is given every 2–3 hours depending on the patient's tolerance, with a target total amount of 500–750 mL; (III) on day 2, 150–200 mL of ONS is given every 2–3 hours depending on the patients' tolerance, with a target total amount of 750–1,000 mL; (IV) on day 3, 200–250 mL of ONS is given every 2–3 hours depending on the patients' tolerance, with a target total amount of 1,000–1,500 mL. The specific process depends on the patient's tolerance, and the supplementation of ONS after surgery follows the principle of gradual progress from

a small amount to a large amount.

Consensus 9: early oral postoperative feeding is recommended for patients undergoing colorectal surgery. Early use of ONS helps to increase nutritional supply.

Consensus 10: a variety of ERAS measures can be applied during the perioperative period to promote early oral postoperative feeding.

Consensus 11: early postoperative use of ONS can reduce the incidence of complications (especially infectious complications).

### ***Application of ONS after recovery and discharge from colorectal surgery***

The hospital discharge criteria of ERAS for colorectal surgery include no complications, resumption of semi-liquid diet, and no need for intravenous fluid therapy. However, patients who still suffer from malnutrition after discharge can continue to receive ONS treatment in addition to regular diet. Notably, both ERAS and regular diet alone during the perioperative period can result in different degrees of weight loss after surgery; without intervention with ONS after discharge, the body weight will not return to normal on the 28th postoperative day. In Nygren *et al.*'s study (47), the calorie intake was only 1,400 kcal on the 3rd postoperative day in both the ERAS group and the traditional management group. If there was no nutritional intervention after discharge, there was no significant difference in body weight or body composition on the 28th day after surgery, suggesting that the weight loss after surgery was not restored due to such negative energy balance. Another clinical study on colorectal surgery had similar findings (48): use of ONS for 4 consecutive weeks after surgery significantly decreased weight loss and reduced the incidence of postoperative complications, with high cost-effectiveness. Wei *et al.* used NRS-2002 and SGA to evaluate the nutritional status of 6,638 inpatients in 34 large hospitals of 18 big cities in China in 2014. The results showed that the weight, hemoglobin, and albumin decreased in most patients when they were discharged from hospital, indicating the nutritional status had become even worse (49). Therefore, we must pay attention to nutritional intervention after discharge. Nutritional support can not only create conditions for patients to recover as soon as possible but also provide an important guarantee for patients to tolerate subsequent chemotherapy or radiotherapy. During the follow-up visits, in addition to the subsequent treatment protocols and evaluation of wound

healing, nutritional assessment and survey on nutritional support should also be performed, along with the establishment of an appropriate family nutritional support program. Since PE is inconvenient at home after discharge, ONS is the most suitable nutritional supplementation mode and can be well accepted by patients and their families (28). ONS should be used until the patient can resume a regular diet, and then be discontinued when the target amount of nutrients in the body is reached through daily dietary intake. In China, education on family nutrition support should be enhanced considering its low coverage and great economic advantages.

Consensus 12: patients undergoing colorectal surgery should continue family nutritional support after discharge. ONS offers a practicable nutritional supplementation mode.

Consensus 13: patients with severe malnutrition and those with malignant colorectal cancer requiring postoperative radiochemotherapy should continue to receive ONS for 2 weeks to several months after discharge.

### **Conclusions**

The successful implementation of ERAS for colorectal surgery requires good nutritional status before surgery, after surgery, after discharge, and during chemotherapy. Therefore, adequate nutritional diagnosis must be made to determine the next nutritional support protocol. ONS is characterized by its simplicity, conformity to physiological function, and high cost-effectiveness. It is the preferred nutritional support mode for patients at malnutrition risk or with malnutrition. In addition to regular diet, use of ONS (400–900 kcal/d) 7–14 days before surgery can improve the clinical outcomes of patients undergoing colorectal surgery. Early oral postoperative feeding of ONS following the principle of gradual progress from a small amount to a large amount is recommended. A ONS-based family nutritional support protocol should be established after discharge. In clinical practice, the implementation of ONS requires the adequate and tailored-to-patient education by doctors and nurses, so as to maximize the benefits of the strategy.

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