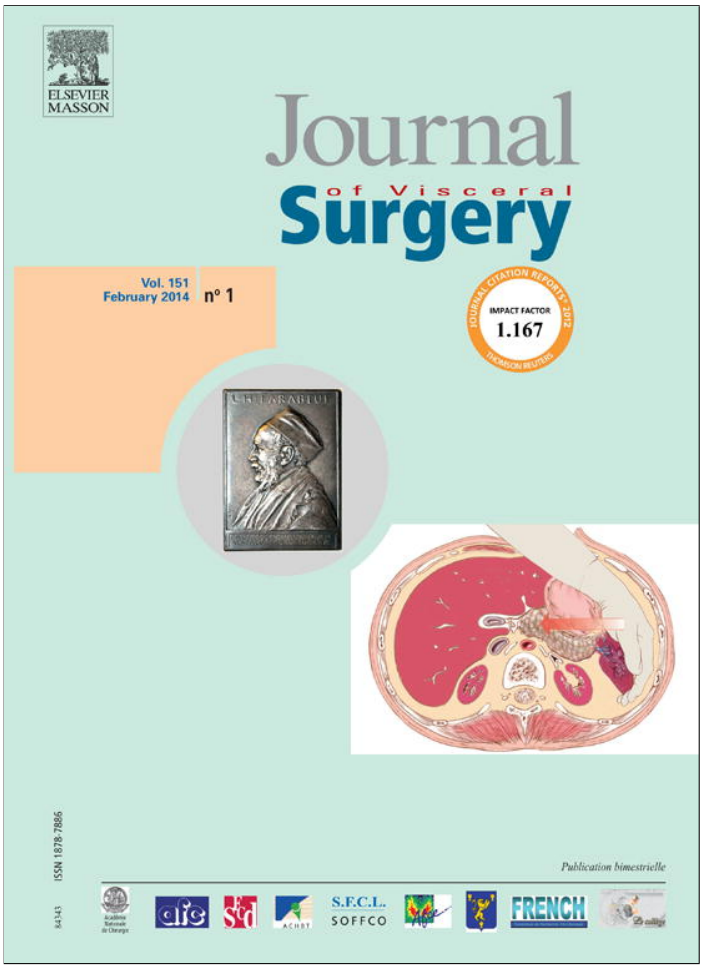

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RECOMMENDATIONS

French guidelines for enhanced recovery after elective colorectal surgery

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Summary Enhanced recovery after surgery provides patients with optimal means to counteract or minimize the deleterious effects of surgery. This concept can be adapted to suit a specific surgical procedure (i.e., colorectal surgery) and comes in the form of a program or a clinical pathway covering the pre-, intra- and postoperative periods. The purpose of these Expert Panel Guidelines was firstly to assess the impact of each parameter typically included in the fast-track programs on six foreseeable consequences of colorectal surgery: surgical stress, postoperative ileus, fluid and electrolyte imbalances, decreased postoperative mobility, sleep disorders and postoperative complications; secondly, to validate the value of each parameter in terms of efficacy criteria for success of rapid rehabilitation programs. Two primary endpoints were selected to evaluate the impact of each parameter: the duration of hospital stay and rate of postoperative complications. For some of the parameters, the lack of information in the literature forced the experts to assess the parameter using different criteria (i.e., the duration of postoperative ileus or quality of analgesia); improvement in endpoints favored the implementation of a rapid rehabilitation program. After analysis of the literature, 19 parameters were identified as potentially impacting at least one of the foreseeable consequences of colorectal surgery. GRADE® methodology was applied to determine a level of evidence and the strength of recommendation regarding each parameter. After synthesis of the work of experts on the 19 parameters using GRADE® methodology, the organizing committee reached 35 formal recommendations. The recommendations were submitted and amended by a group of reviewers. After three rounds of Delphi quotes, strong agreement was obtained for 28 recommendations (80%) and weak agreement for seven recommendations. Consensus was reached among anesthesiologists and surgeons on a number of tactics that are insufficiently applied in current rehabilitation

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programs in colorectal surgery such as: pre-operative intake of carbohydrates; optimization of intra-operative volume control; resumption of oral feeding within 24 hours; gum chewing after surgery; getting the patient out of bed and walking on D1. The panel also clarified the value and place of such approaches as: patient information; pre-operative immunonutrition; laparoscopic surgery; antibiotic prophylaxis; prevention of hypothermia; systematic medication to prevent nausea and vomiting; morphine-sparing analgesia techniques; indications and techniques for bladder catheterization. The panel also confirmed the futility of other methods such as: bowel preparation for colon surgery; maintaining a nasogastric tube; surgical drainage for colorectal surgery.

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Introduction

Definition

The concept of enhanced recovery is based on the fact that surgical aggression routinely causes hormonal, metabolic and physiologic modifications that retard convalescence, and therefore, interfere with the capacity of the patient to return home. The effects of this aggression can be amplified by extrinsic factors such as peri-operative fasting (hypocaloric intake several hours before operation and/or several days after operation), or the onset of medical or surgical complications. Intrinsic factors (active smoking, metabolic or cardiovascular disease, etc.) can also negatively influence the postoperative course and retard convalescence.

The goal is to allow the patient to recover his/her physical and psychic capacities as quickly as possible. All methods and measures that facilitate or inhibit obtaining this goal have been compiled in the literature and regrouped within a program (or clinical pathway) specific to the surgical procedure.

Enhanced recovery programs are multidisciplinary procedures that involve surgeons, anesthesiologists, and all members of the healthcare team. Other health care professionals can also participate in the elaboration and implementation of these programs such as nutritionists or physical therapists, for example.

Enhanced recovery programs start pre-operatively, when the surgeon first sees the patient and do not finish until the patient returns home. To evaluate the pertinence of these programs, the indicators usually taken into consideration

during regular audits include hospital stay, readmission rate during the first postoperative month and postoperative complication rate. After colorectal surgery, other indicators, such as postoperative ileus, can be useful measures.

Context

The population under consideration includes patients undergoing elective colorectal surgery whether for cancer or not. Patient age was not a limiting factor. Conversely, patients have to be autonomous pre-operatively.

Colorectal surgery involves all operations on the colon or rectum and represents approximately 40,000 interventions per year in France, 80% of which are elective (Alves A, Arch Surg in 2005). In 70% of cases, the indication is cancer. Mean postoperative hospital stay is 18 days. Associated mortality is 3.4%, and the complication rate ranges from 25 to 35%, according to the studies. The medico-economic impact of major surgery is important and any health care program that can lower the complication rate and the duration of hospital stay would improve management and reduce costs.

Enhanced recovery programs have been applied for several years in various hospital structures in the developed world. Colorectal surgery probably has given rise to the greatest number of publications in this domain. All the meta-analyses have shown that application of these programs have shortened the duration of hospital stay and the complication rates. Nonetheless, the impact of these parameters depends on the degree of compliance to the recommendations by all actors involved (Gustafsson et al., Arch Surg in 2011).

However, the implantation of these programs in France is still rudimentary for several reasons: poor cooperation between anesthesiologist and surgical teams, failure to recognize the consequences of stress on recuperation and convalescence, and, heterogeneity of enhanced recovery programs proposed in the literature, hindering the possibility of highlighting the importance of one or another parameter on postoperative recuperation.

To try to overcome this slow implementation, the French Associations of Anesthesia and Intensive Care (Société Française d'Anesthésie-Réanimation [SFAR]) and the French Society of Digestive Surgery (Société Française de Chirurgie Digestive [SFCD]) decided to work together to set up a common set of standard practices for enhanced recovery after colorectal surgery. Experts from each learned society, as well as Belgian and Swiss anesthesiologists and surgeons with experience in this domain were involved.

Objectives of the formal expert recommendations

The objectives of this formal expert recommendation (FER) were:

- to validate the value of various parameters in the enhanced recovery programs in terms of efficacy, benefits and risks for the patient and;
- to identify their importance, in order to facilitate their implementation within health care structures.

Methodology

The working method used to elaborate the recommendations was the GRADE® methodology. This methodology allows determination of the quality of evidence according to quantitative analysis of the literature, i.e. measuring the level of confidence associated with the quantitative effect of the procedure and then determining a level of recommendation. There are four levels of quality of evidence:

1. high: further research is very unlikely to change our confidence in the estimate of effect;
2. moderate: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate;
3. low: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate;
4. very low: any estimate of effect is very uncertain.

An analysis of the quality of evidence is provided for each study, and then an overall evidence level is defined for each question and criteria.

The final formulation of recommendations is always binary, either positive or negative and can be either strong or weak:

- strong: definitely ''do it'', or ''do not do it'' (GRADE 1+ or 1−);
- weak: probably ''do it'' or probably ''do not do it'' (GRADE 2+ or 2−).

The strength of the recommendation is determined according to four key factors, validated by the experts after a vote, using the Delphi method:

1. estimate of the effect;
2. overall level of evidence: the higher the level, the stronger the recommendation;
3. the balance between desirable and undesirable effects: the more favorable the balance (desirable over undesirable), the more likely the recommendation will be strong;
4. values and preferences: in the case of uncertainties or wide variations, the likelihood is that the recommendation will be weak; these values and preferences should best be ascertained directly from those concerned (patient, physician, decider);
5. costs: the higher the costs or use of resources, the more probable the recommendation will be weak.

Several enhanced recovery programs have been constituted since the 1990s. The experts used a list originating from a consensus published in 2009 (Lassen, Arch Surg in 2009). This list is composed of 19 recommendations ranging from patient information to oral intake before the 24th postoperative hour.

In the first step of the present consensus, the experts observed that the parameters were quite different and that the same parameter could impact various consequences of the surgical aggression. For example, the laparoscopic approach reduces postoperative stress and pain compared with laparotomy. The experts decided to evaluate the impact of each parameter as they affected the consequences of the surgical aggression on our organism.

The consequences of surgical aggression were divided into six themes: operative stress, postoperative ileus, peri-operative nutrition, postoperative mobilization, sleep disorders, and postoperative complications. Mobilization and sleep disorders were lumped together under the same theme. The 30 experts were divided into five working groups. Each group analyzed one specific theme, composed the related enhanced recovery program, checking that there was an effect of the parameter in the field covered by the theme, and, if so, evaluating its impact on the main criteria.

The expert group chose duration of hospital stay and postoperative complications as the primary endpoints to estimate the effect of a parameter included in the enhanced recovery program. In the absence of information on these

primary endpoints, the parameter was evaluated according to its effect on a surrogate endpoint reputed to influence one of the main criteria (i.e., duration of postoperative ileus).

To be retained for analysis, publications in the literature were required to fulfill the following criteria:

1. the included population should be composed of at least 50% of patients undergoing colorectal surgery;
2. the date of publication should be later than 1999. In the case of absence of or a small number of publications in the period under study, the interval could be extended back to 1990.

Since the overall level of evidence of the available literature on enhanced recovery programs was weak, the experts were confronted with four scenarios:

- for certain parameters, there were several studies and/or meta-analyses involving mainly colorectal surgery with the correct quality of methodology, and including information on at least two of the criteria; here the GRADE® methodology could be applied in totality allowing the panel to reach recommendations;
- if the experts had no meta-analysis that permitted a response to a specific question, or, if there were not enough colo-rectal surgical patients in the consulted literature, a qualitative analysis according to the GRADE® method was possible and a systematic review was performed;
- conversely, when there were no recent publications (before 1990), and/or, they did not involve more than 50% of patients undergoing colorectal surgery, no recommendations were made;
- the fourth scenario was used for parameters for which the literature provided information on criteria other than the two primary endpoints (for example duration of ileus or quality of anesthesia). A positive impact on these criteria suggested that they might be efficacious in an enhanced recovery program.

After synthesis of the experts' accomplishments, and application of the GRADE® on the 19 parameters, 35 recommendations were formally put forward by the organizing committee. Among the 35 recommendations, 22 were strong (grade 1, positive or negative), eight were weak (grade 2 positive or negative) and there were five recommendations to which the GRADE® method could not be applied.

The entire list of recommendations was then submitted to a reading group according to the Delphi process. Outside surgeons and anesthesiologists joined 30 surgeons and anesthesiologists who were already participating in one of the working groups. After three rounds of grading and various amendments, a strong agreement (80%) was obtained for 28 recommendations and a weak agreement for seven.

Consensus between surgeons and anesthesiologists was obtained for several factors that are inadequately applied today in enhanced recovery programs in colorectal surgery, including:

- pre-operative carbohydrate intake;
- optimal intra-operative volume replacement;
- oral intake within 24 hours of operation;
- postoperative gum chewing;
- upright position and walking within 24 hours of operation.

They also underscored the value and the place of certain practical aspects such as:

- information to patients;
- pre-operative immunonutrition in patients undergoing operation for cancer;
- surgery by laparoscopic route;
- antibiotic prophylaxis;
- prevention of hypothermia;
- systematic medication to prevent nausea and vomiting;
- morphine-sparing analgesia techniques;
- bladder catheterization for less than 24 hours; use of supra-pubic catheter in men when prolonged bladder drainage was necessary.

As well, they confirmed the inutility of certain practices such as:

- colonic preparation for colorectal surgery;
- maintenance of a nasogastric tube;
- placement of drains for colonic surgery.

Recommendations

The questions and recommendations were classified by period and by parameter.

Pre-operative period

Question: Do the information and recommendations given to the patient in enhanced recovery programs have an impact on the duration of hospital stay or the onset of complications?

R1 PATIENT INFORMATION IS RECOMMENDED AND ALSO REQUIRED BY LAW (LOI N^{O} 2009-879 DU 21 JUILLET 2009 - ART. 37 DU CODE DE SANTÉ PUBLIQUE)

Strong agreement

Arguments: there are few specific studies and only indirect evidence. In a cohort study [1], among various elements of the enhanced recovery program, information to patients (contrary to other elements) was not specifically associated with reduced hospital stay.

1. Maessen J, Dejong CH, Hausel J, et al. A protocol is not enough to implement an enhanced recovery programme for colorectal resection. Br J Surg 2007;94:224—31.

Question: Does colonic preparation have an impact on duration of hospital stay or onset of complications?

R2 DURING COLONIC SURGERY, COLONIC PREPARATION IS NOT RECOMMENDED FOR SYSTEMATIC USE (GRADE 1—)

Strong agreement

Arguments: among the recent meta-analyses [1—4] evaluating the absence of colonic preparation for colorectal surgery, none included the end-point ''duration of hospital stay''. Among the randomized studies analyzing duration of hospital stay with or without colonic preparation, six did not show any statistically significant difference (but the calculation

of the number of patients was not made with this endpoint) and one showed a reduced duration of stay in the absence of colonic preparation. However, none of the meta-analyses or randomized studies have shown any benefit for colonic preparation (level of evidence 1). One meta-analysis has shown that the risk of surgical site infection was increased in case of colonic preparation (40% increase) [3]. The direct and indirect costs are at least similar (no differences for most of the endpoints), if not less, when considering that the products are not purchased, and the surgical site infection rate is decreased.

1. Pineda CE, Shelton AA, Hernandez-Boussard T, et al. Mechanical bowel preparation in intestinal surgery: a meta-analysis and review of the literature. J Gastrointest Surg 2008;12:2037—44.
2. Gravante G, Caruso R, Andreani SM, et al. Mechanical bowel preparation for colorectal surgery: a meta-analysis on abdominal and systemic complications on almost 5000 patients. Int J Colorectal Dis 2008;23:1145—50.
3. Slim K, Vicaut E, Launay-Savary MV, et al. Updated systematic review and meta-analysis of randomized clinical trials on the role of mechanical bowel preparation before colorectal surgery. Ann Surg 2009;249:203—9.
4. Guenaga KK, Matos D, Wille-Jorgensen P. Mechanical bowel preparation for elective colorectal surgery. Cochrane Database Syst Rev 2009;(1):CD001544.

R3 FOR RECTAL SURGERY, THE LITERATURE DOES NOT ALLOW TO RECOMMEND COLONIC PREPARATION

Weak agreement

Arguments: In rectal surgery, the Cochrane meta-anaysis [1] did not evaluate hospital stay, and one randomized study [2] showed no difference in terms of duration of hospital stay. The limited number of specific studies in rectal surgery, and the disagreement betrween the results of the meta-analysis [1] or a subgroup of one randomized study [2], and those of another randomized trial [3], do not allow establishment of any recommendation with a high level of evidence, even for endpoints other than duration of hospital stay.

1. Güenaga KF, et al. Mechanical bowel preparation for elective colorectal surgery. Cochrane Database Syst Rev 2011;(9):CD001544.
2. Bretagnol F, et al. Rectal cancer surgery with or without bowel preparation: The French GRECCAR III multicenter single-blinded randomized trial. Ann Surg 2010;252:863—8.
3. Van't Sant HP et al. The influence of mechanical bowel preparation in elective lower colorectal surgery. Ann Surg 2010;251:59—63.

Question: Does anxiolytic premedication have an impact on duration of hospital stay or onset of complications?

R4 THE LITERATURE IS NOT SUFFICIENT TO RECOMMEND ANXIOLYTIC PREMEDICATION

Strong agreement

Arguments: Usually, anxiolytic premedication is not recommended in enhanced recovery programs. The theoretical goal is to avoid postoperative somnolence that could delay awakening and difficulty in patient mobilization or early re-feeding. However, the experts did not find any recent publication showing any benefit or deleterious effect of anxiolytic premedication on hospital stay or onset of complications in colorectal surgery. For these reasons, no recommendation could be formulated.

Question: Does pre-operative fasting have an impact on duration of hospital stay or onset of complications?

R5 THE RECOMMENDATIONS OF LEARNED SOCIETIES (2 HOURS OF FASTING FOR LIQUIDS AND 4 TO 6 HOURS FOR SOLIDS) ARE VALID.

Strong agreement

Arguments: The customary order ''NPO after midnight'' has been questioned for several years because there is no evidence that ingestion of liquids up to two hours before surgery increases the risk of regurgitation of gastric contents or pulmonary aspiration [1]. In light of this evidence, recommendations have been proposed authorizing intake of clear liquids, sweetened or not, up until two hours pre-operatively in patients who have no gastric emptying disorder [2].

The effect on hospital stay of the two protocols (fasting for liquids two hours before anesthesia versus NPO after midnight) has never been evaluated [1]. The only impact of the reduction of the duration of fasting with a hypocaloric drink (50 g carbohydrates) in colorectal surgery is improvement of patient comfort [3].

1. Brady M., Kinn S., Stuart P. Preoperative fasting for adults to prevent perioperative complications. Cochrane Database Syst Rev 2003; CD004423.
2. Smith I, Kranke P, Murat I, et al. Perioperative fasting in adults and children: guidelines from the European Society of Anaesthesiology. Eur J Anaesthesiol 2011;28(8):556-69.
3. Wang ZG, Wang Q, Wang WJ, et al. Randomized clinical trial to compare the effects of preoperative oral carbohydrate versus placebo on insulin resistance after colorectal surgery. Br J Surg 2010;97(3):317—27.

Question: Does intake of an isotonic solution rich in carbohydrates have an impact on duration of hospital stay or onset of complications?

R6 PRE-OPERATIVE ORAL ADMINISTRATION OF CARBOHYDRATE-RICH ISOTONIC FLUIDS IS RECOMMENDED FOR ASA 1 OR 2 PATIENTS BEFORE ELECTIVE COLORECTAL SURGERY (GRADE 1+)

Strong agreement

R7 Pre-operative oral administration of carbohydrate-rich isotonic fluids is NOT RECOMMENDED for patients with diabetes or gastric emptying disorders (GRADE 1−)

Strong agreement

Arguments: Pre-operative carbohydrate loading is defined as oral intake of isotonic liquid providing approximately 100 g of glucose the evening before and approximately 50 g, 2 to 3 hours before anesthesia induction.

The total number of patients included in the prospective studies [1−4] was 366 patients (of which 179 had a ''carbohydrate'' load). The level of evidence of these studies is low. In three quarters of the studies, the duration of hospital stay was decreased in patients who received carbohydrate loading, while hospital stay was similar to the control group in the other studies.

Even if few studies have evaluated the impact of carbohydrate loading on duration of hospital stay of patients undergoing colorectal surgery, most patients had a decreased duration of hospital stay. In all, the gain ranged from 0 to 4 days.

In a meta-analysis regrouping 762 patients undergoing elective abdominal surgery, Awad et al. found that hospital stay was approximately one day shorter for patients who received carbohydrate loading [5].

Tolerance of oral carbohydrates was evaluated in only one study. Patients ingesting a carbohydrate-rich isotonic solution complained three times more often of secondary effects such as nausea, fullness or headache.

Of note, the patients included in these studies had a low incidence of co-morbid conditions, and, in particular, had no diabetes, or disorders leading to delayed gastric emptying.

1. Mathur S. et al. Randomized controlled trial of preoperative oral carbohydrate treatment in major abdominal surgery. Br J Surg 2010 (97) 485−494
2. Kaska M. et al. The impact and safety of preoperative oral or intravenous carbohydrate administration versus fasting in colorectal surgery − a randomized controlled trial. Wien Klin Wochenschr 2010;122:23−30.
3. Noblett SE et al. Pre-operative oral carbohydrate loading in colorectal surgery: a randomized controlled trial. Colorectal Dis 2006 (8) 563−9.
4. An GQ et al., Effects of preoperative carbohydrate loading on the changes in serum tumor necrosis factor receptors 1 and 2 and insulin resistance in patients of colon carcinoma. Zhonghua Yi Xue Za Zhi 2008;88(29):2041−4.
5. Awad S. et al., A meta-analysis of randomised controlled trials on preoperative oral carbohydrate treatment in elective surgery. Clin Nutr 2013;(32):34−44.

Question: Does immunonutrition have an impact on duration of hospital stay or onset of complications?

R8 PRESCRIPTION OF PRE-OPERATIVE IMMUNONUTRITION SHOULD PROBABLY BE RECOMMENDED IN ELECTIVE COLORECTAL SURGERY FOR CANCER (GRADE 2+)

Strong agreement

R9 Continuing immunonutrition postoperatively is NOT RECOMMENDED in elective colorectal surgery for cancer (GRADE 1−)

Strong agreement

R10 Prescription of pre-operative immunonutrition is NOT RECOMMENDED in elective non-carcinological colorectal surgery (GRADE 1−)

Weak agreement

Arguments: All studies of immunonutrition concerned patients with cancer. In this population, pre-operative immunonutrition led to shorter hospital stay. None of the studies showed any benefit of postoperative immunonutrition.

After literature review, four prospective randomized studies [1−4] published between 1999 and 2007 were retained. The percentage of colorectal surgery ranged from 54% to 100% and > 50% were performed for cancer. Where data were available, the proportion of malnourished patients ranged from 10% to 30%.

Three studies incorporating more than 400 patients found a decrease in hospital stay ranging from 1.3 to 3 days associated with immunonutrition. The 4th study found a more modest decrease in hospital stay (6.8 vs. 7.7 days) but the patient sample was small (28 patients). No study showed any significant advantage in favor of postoperative immunonutritional support.

No studies dealt with the tolerance of pre-operative nutritional support. Patient compliance, when evaluated, was not statistically significantly different from the control group [1].

1. Braga M, Gianotti L, Radaelli G, et al. Perioperative immunonutrition in patients undergoing cancer surgery: results of a randomized double-blind phase 3 trial. Arch Surg 1999;134(4):428−33.
2. Smedley F, Bowling T, James M, et al. Randomized clinical trial of the effects of preoperative and postoperative oral nutritional supplements on clinical course and cost of care. Br J Surg 2004;91(8):983−90.
3. Finco C, Magnanini P, Sarzo G, et al. Prospective randomized study on perioperative enteral immunonutrition in laparoscopic colorectal surgery. Surg Endosc 2007;21(7):1175−9. [Epub 2007 Mar 14].

4. Braga M, Gianotti L, Vignali A, et al. Preoperative oral arginine and n-3 fatty acid supplementation improves the immunometabolic host response and outcome after colorectal resection for cancer. Surgery 2002;132(5):805—14.

Intra-operative period

Question: Does the volume of intravenous fluids administered during the operation have an impact on duration of hospital stay or onset of complications?

R11 EXCESS FLUID ADMINISTRATION IS NOT RECOMMENDED DURING SURGERY (GRADE 1—)

Strong agreement

Arguments: The main difficulty found by the experts in the analysis of data was that the definition in the literature of ''restrictive'' and ''liberal'' was not uniform. To compare the two strategies, the authors in one meta-analysis [1] referred to a ''standard'' strategy that corresponded to volumes based on recommendations from another key reference. These authors defined three strategies: ''restrictive'', ''standard'' and ''supplemental''. In another meta-analysis, Varadhan and Lobo [2] also compared two strategies: ''balanced'' intravenous fluid support (that found in the key reference) and ''unbalanced'' fluid support (greater or less than the balanced support level). When ''restrictive'' was compared with ''standard'', neither strategy influenced hospital stay. Likewise, no difference was found in two other clinical studies [3,4]. Lastly, in another study, Nisanevitch et al. [5] found that hospital stay was shorter in patients receiving ''restricted'' volumes, but, in contrast to the other studies, this study was not restricted to patients undergoing colorectal surgery.

Rahbari et al. [1] found that patients with a ''restrictive'' regimen had a decreased rate of postoperative complications (OR 0.41 [95% CI: 0.22—0.77]). Conversely, Varhadan and Lobo [2] found no advantage in favor a ''restrictive'' strategy compared with ''standard'' or ''liberal'' strategy. Moreover, when the authors compared ''balanced'' with ''unbalanced'' (greater or less), they found that a ''balanced'' regimen was associated with a positive effect on hospital stay (reduction of 3.44 days [95% CI: —4.36——0.54]) and complication rate (OR 0.59 [95% CI: 0.44—0.81]).

1. Rahbari NN, Zimmermann JB, Schmidt T, et al. Meta-analysis of standard, restrictive and supplemental fluid administration in colorectal surgery. Br J Surg 2009;96:331—41.
2. Varadhan KK, Lobo DN. A meta-analysis of randomised controlled trials of intravenous fluid therapy in major elective open abdominal surgery: getting the balance right. Proc Nutr Soc 2010;69:448—98.
3. MacKay G, Fearon K, McConnachie A et al. Randomized clinical trial of the effect of postoperative intravenous fluid restriction on recovery after elective colorectal surgery. Br J Surg 2006;93:1469—74.
4. Abraham-Nordling M, Hjern F, Pollack J, et al. Randomized clinical trial of fluid restriction in colorectal surgery. Br J Surg 2012; 99:186—91.
5. Nisanevich V., Felsenstein I., Almogy G., et al. Effect of intraoperative fluid management on outcome after intra-abdominal surgery. Anesthesiology 2005;103:25—32.

Question: Does monitoring of intra-operative fluid administration have an impact on duration of hospital stay or onset of complications?

R12 MONITORING INTRA-OPERATIVE FLUID ADMINISTRATION, BASED ON PARAMETERS REFLECTING VOLUME REPLACEMENT, IS RECOMMENDED DURING ELECTIVE COLORECTAL SURGERY (GRADE 1+)

Strong agreement

Arguments: Three meta-analyses [1—3], one of which was exclusively dedicated to colorectal surgery [2], reviewed the impact on hospital stay of intra-operative monitoring of fluid administration. All three found a gain of approximately two days in favor of optimal fluid regimens via monitoring. The technical modalities of peri-operative fluid surveillance varied but esophageal echocardiographic monitoring of volume status was found to represent the least invasive technique and was the object of most of the publications on the subject. This recommendation is based on high quality randomized studies and several meta-analyses, and is similar to that proposed by the SFAR.

1. Corcoran T, Rhodes JEJ, Clarke S, et al. Perioperative fluid management strategies in major surgery: a stratified meta-analysis. Anesth Analg 2012; 114:640—51.
2. Srinivasa S, Taylor MH, Sammour T, et al. Oesophageal Doppler-guided fluid administration in colorectal surgery: critical appraisal of published clinical trials. Acta Anaesthesiol Scand 2011;55:4—13.
3. Bundgaard-Nielsen M, Holte K, Secher NH, et al. Monitoring of peri-operative fluid administration by individualized goal-directed therapy. Acta Anaesthesiol Scand 2007;51:331—40.

Question: Does pre-operative glucocorticoid administration have an impact on duration of hospital stay or onset of complications?R13 Pre-operative single-dose administration of glucocorticoids should PROBABLY be RECOMMENDED (GRADE 2+)

Weak agreement

Arguments: Pre-operative single-dose administration of glucocorticoids decreases the complication rate and duration of hospital stay after major abdominal surgery [1]. This meta-analysis does not define the drug to be used or best

dose regimen (30 mg methylprednisone or 8 mg of dexamethasone).

1. Srinivasa S, Kahokehr AA, Yu TC, Hill AG. Preoperative glucocorticoid use in major abdominal surgery: systematic review and meta-analysis of randomized trials. Ann Surg 2011;254:183—91.

Question: Does intra-operative normothermia have an impact on duration of hospital stay or incidence of complications?

R14 PREVENTING INTRA-OPERATIVE HYPOTHERMIA IS RECOMMENDED DURING COLORECTAL SURGERY (GRADE 1+)

Strong agreement

Comments: Preventing hypothermia reduces perioperative stress and limits the risk of infective complications after colorectal surgery. Intra-operative normothermia reduces the surgical site infection rate by a factor of three (6% vs. 19%), enhances return of intestinal motility (5.6 vs. 6.5d) and reduces hospital stay by 20% [1]. This recommendation is based on good quality randomized studies.

1. Kurz A, et al. Perioperative normothermia to reduce the incidence of surgical-wound infection and shorten hospitalization. Study of Wound Infection and Temperature Group. N Engl J Med 1996;334(19):1209—15.

Question: Does antibiotic prophylaxis have an impact on duration of hospital stay or incidence of complications?

R15 ANTIBIOTIC PROPHYLAXIS AGAINST AEROBIC AND ANAEROBIC BACTERIA IS RECOMMENDED DURING COLORECTAL SURGERY (GRADE 1+)

Strong agreement

Comments: Colorectal surgery is at best clean-contaminated surgery. Antibiotic prophylaxis reduces the risk of surgical site infection by 50% [1]. The drugs proposed are single-dose Cefoxitin or an aminopenicillin + betalactamase inhibitor delivered 30 minutes before the start of the operation (with re-administration of the same dose if the operation lasts longer than 2 hours).

1. http://www.sfar.org/_docs/articles/Antibioprophylaxieversion2010.doc.pdf

Question: Does prevention of nausea and vomiting have an impact on duration of hospital stay or incidence of complications?

R16 PREVENTION OF NAUSEA AND VOMITING IS RECOMMENDED (GRADE 1+)

Strong agreement

Arguments: None of the studies evaluating the role of anti-emetics in the management of postoperative ileus has detected an effect of these agents. Nonetheless, the prevention or treatment of nausea or vomiting can facilitate early postoperative oral intake. Prophylaxis should follow the recent recommendations of a strategy based on the Apfel score [1]. Treatment of actual nausea and vomiting should also follow these recent recommendations.

1. Prise en charge des nausées et vomissements postopératoires: http://www.sfar.org/article/197/prise-en-charge-des-nausees-et-vomissements-postoperatoires-ce-2007.

Question: Does the surgical approach have an impact on duration of hospital stay or onset of complications?

R17 THE LAPAROSCOPIC APPROACH IS RECOMMENDED (GRADE 1+)

Strong agreement

Arguments: Laparoscopy induces a lesser inflammatory response on Day 1; published reports (one meta-analysis [1], 4 randomized studies [2—5] and one case-control study [6]), suggest a reduction of operative stress. These studies agree in concluding that hospital stay is reduced (—2 days in the study of Gustafsson et al.).

That laparoscopy decreases postoperative ileus and has an impact on duration of hospital stay has been demonstrated with a high level of evidence (3 meta-analyses [7—9]). In the study by Vlug et al. [10], the association « laparoscopy and enhanced recovery » provides the best outcome (5 days [range 4—8]) but laparoscopy, by itself, even without an enhanced recovery protocol, reduces hospital stay by two days.

1. Sammour T, et al. The humoral response after laparoscopic versus open colorectal surgery: a meta-analysis. J Surg Res 2010;164:28—37.
2. Tang CL, et al. Randomized clinical trial of the effect of open versus laparoscopically assisted colectomy on systemic immunity in patients with colorectal cancer. Br J Surg 2001;88:801—7.
3. Pascual M, et al. Randomized clinical trial comparing inflammatory and angiogenic response after open versus laparoscopic curative resection for colonic cancer. Br J Surg 2010;98:50—9.
4. Tsimogiannis KE, et al. Toll-like receptors in the inflammatory response during open and laparoscopic colectomy for colorectal cancer. Surg Endosc 2011; DOI:10.1007/s00464-011-1871-2 [in press].
5. Veenhof AAFA, et al. Surgical stress response and postoperative immune function after laparoscopy or open surgery with fast track or standard perioperative care: a randomized trial. Ann Surg 2012;255:216—21.
6. Gustafsson UO, Tiefenthal M, Thorell A, et al. Laparoscopic-assisted and open high anterior resection within an ERAS protocol. World J Surg. 2012;36: 1154—61.

7. Schwenk W, Haase O, Neudecker J, et al. Short term benefits for laparoscopic colorectal resection. Cochrane Database Syst Rev 2005;(3):CD003145.
8. Abraham NS, Young JM, Solomon MJ. Meta-analysis of short-term outcomes after laparoscopic resection for colorectal cancer. Br J Surg 2004;91:1111—24.
9. Siddiqui MR, Sajid MS, Qureshi S, et al. Elective laparoscopic sigmoid resection for diverticular disease has fewer complications than conventional surgery: a meta-analysis. Am J Surg 2010;200:144—61.
10. Vlug MS, Wind J, Hollmann MW, et al. Laparoscopy in combination with fast track multimodal management is the best perioperative strategy in patients undergoing colonic surgery: a randomized clinical trial (LAFA-study). Ann Surg 2011 254:868—75.

R18 NO RECOMMENDATION CAN BE MADE AS CONCERNS THE TYPE OF INCISION FOR LAPAROTOMY (TRANSVERSE OR MIDLINE).

Strong agreement

Arguments: When laparotomy is indicated, a 2006 meta-analysis [1] suggested that transverse incisions for right hemicolectomy did not influence the duration of hospital stay (the two studies analyzed were comprised of very small population samples). This study did not show any difference as concerns postoperative pain in favor of the transverse incisions. The study by Seiler et al. [2] is a controlled study on major abdominal surgery with a large number of patients ($n = 200$), 20% of whom underwent colectomy. This study did not show any difference in the duration of hospital stay according to whether a transverse or midline vertical incision was performed. This study also showed no difference as concerns postoperative pain, pulmonary complications, resumption of diet or incisional hernia at one year. The only statistically significant difference was that postoperative infection was more prevalent after a transverse incision.

1. Brown SR, Goodfellow PB. Transverse verses midline incisions for abdominal surgery. Cochrane Database Syst Rev, 4. Art. no.: CD005199.doi:10.1002/14651858.CD005199.pub2 (2005).
2. Seiler CM, Deckert A, Diener MK et al. Midline versus transverse incision in major abdominal surgery: a randomized, double-blind equivalence trial. Ann Surg 2009: 249; 913—20.

Postoperative period

Question: Does leaving a nasogastric tube after the operation have an impact on duration of hospital stay or incidence of complications?

R19 LEAVING A NASOGASTRIC TUBE AFTER COLORECTAL SURGERY IS NOT RECOMMENDED (GRADE 1—)

Strong agreement

Arguments: Three recent meta-analyses [1—3] have evaluated the presence or absence of nasogastric tubes after colorectal surgery. One meta-analysis was specifically dedicated to colorectal surgery alone [3]; the others included various other abdominal procedures. The endpoint ''duration of hospital stay'' was analyzed in two meta-analyses by the same authors [1,2]. In the first meta-analysis [1], hospital stay was shorter in most of the studies when the nasogastric tube was omitted, but the heterogeneity of these studies did not allow quanatification of the therapeutic effect. In the second meta-analysis [2], the duration of hospital stay was shortened by 0.53 days but this difference was not statistically significant [CI: —0.39—1.46]. However, in this meta-analysis, in addition to the effect on duration of hospital stay, omission of the nasogastric tube procured other significant benefits (60—80% reduction of bronchopulmonary and laryngopharyngeal complications and a 50% reduction of ileus). Routine omission of prophylactic postoperative nasogastric drainage is associated with level 1 evidence, even if the impact on hospital stay is not significant.

1. Nelson R, Tse B, Edwards S. Systematic review of prophylactic nasogastric decompression after abdominal operations. Br J Surg 2005;92:673—80.
2. Verma R, Nelson RL. Prophylactic nasogastric decompression after abdominal surgery. Cochrane Database Syst Rev 2007, 3. Art. No.: CD004929.
3. Rao W, Zhang X, Zhang J, et al. The role of nasogastric tube in decompression after elective colon and rectum surgery: a meta-analysis. Int J Colorectal Dis 2011;26:423—9.

Question: Does the postoperative analgesia technique have an impact on duration of hospital stay or incidence of complications?

R20 PRESCRIPTION OF A MULTIMODAL ANALGESIA TECHNIQUE, PRIVILEGING NON-OPIOID DRUGS, AND/OR A LOCOREGIONAL TECHNIQUE IS RECOMMENDED (GRADE 1+)

Strong agreement

Arguments: these analgesia techniques allow decreased usage of postoperative opioids (opioid-sparing). A direct dose-response relationship has been found between peri-operative opioid administration and the duration of postoperative ileus.

R21 NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAID) SHOULD PROBABLY BE RECOMMENDED AFTER COLORECTAL SURGERY BUT DOUBT PERSISTS AS TO THE RISK OF INTESTINAL SUTURE-LINE LEAKAGE (GRADE 2+)

Weak agreement

Arguments: NSAID's have a dual mechanism of action: a mean sparing effect of 30% on morphine analgesic use, which is associated with reduction of undesirable side effects, and an anti-inflammatory effect that counters the intestinal hypo-motility resulting from inflammatory mediators released during manipulation of the intestines and peritoneum. However, two retrospective studies [2—4] and one cohort study [5] have found that NSAID's and COX 2 inhibitors are risk factors for anastomotic leaks.

1. Marret E, et al. Effects of nonsteroidal antiinflammatory drugs on patient-controlled analgesia morphine side effects: meta-analysis of randomized controlled trials. Anesthesiology 2005;102(6):1249—60.
2. Holte K, et al. Cyclo-oxygenase 2 inhibitors and the risk of anastomotic leakage after fast-track colonic surgery. Br J Surg 2009
3. Klein M, et al. Increased risk of anastomotic leakage with diclofenac treatment after laparoscopic colorectal surgery. Dig Surg 2009;26(1):27—30.
4. Gorissen KJ, et al. Risk of anastomotic leakage with non-steroidal anti-inflammatory drugs in colorectal surgery. Br J Surg 2012;99(5):721—7
5. Klein M, et al. Postoperative use of non-steroidal anti-inflammatory drugs in patients with anastomotic leakage requiring reoperation after colorectal resection: cohort study based on prospective data. BMJ 2012;345:e6166.

Thoracic epidural analgesia

R22 AFTER LAPAROSCOPIC SURGERY, THORACIC EPIDURAL ANALGESIA SHOULD PROBABLY NOT BE RECOMMENDED (GRADE 2—)

Weak agreement

R23 After colorectal surgery via laparotomy, thoracic epidural analgesia is one of the RECOMMENDED techniques (GRADE 1+)

Strong agreement

Arguments: Implementation of a multimodal enhanced recovery program, especially when associated with the laparoscopic approach, has led to decreased duration of hospital stay in elective colorectal surgery. Within this setting, it is difficult to isolate the role of the analgesic technique in terms of hospital stay or re-admission rate [1]. The more subtle effects that impact on hospital stay and long-term complications (i.e., post-surgery chronic pain) need to be compared in further specific studies, comparing the different analgesic techniques and taking into account individual risk factors. When the surgical approach is exclusively via laparotomy, the duration of hospital stay is reduced by thoracic epidural compared to patient-controlled opioid analgesia [2] or continuous pre-peritoneal analgesia administered via catheter [3].

1. Marret E, Remy C, Bonnet F. Postoperative Pain Forum Group. Meta-analysis of epidural analgesia versus parenteral opioid analgesia after colorectal surgery. Br J Surg 2007;94(6):665—73.
2. Carli F, et al. Epidural analgesia enhances functional exercise capacity and health-related quality of life after colonic surgery: results of a randomized trial. Anesthesiology 2002;97(3):540—9.
3. Jouve P, et al. Epidural versus continuous preperitoneal analgesia during fast-track open colorectal surgery: a randomized controlled trial. Anesthesiology 2013;118(3):622—30.

Laparoscopic surgery and/or contra-indication to epidural analgesia

R24 CONTINUOUS INTRAVENOUS (IV) ADMINISTRATION OF LIDOCAINE IS RECOMMENDED FOR COLORECTAL SURGERY (GRADE 1+)

Strong agreement

Arguments: Several meta-analyses or systematic analyses have reported positive results for continuous IV lidocaine infusion on the interval to return of bowel function (first passage of gas and/or stool) and duration of hospital stay [1,3]. The mechanisms behind this effect of IV lidocaine on gastrointestinal function are multiple: anti-inflammatory effect, specific inhibition of intestinal sympathetic plexuses, reduction of sympathetic activity, and morphine-sparing effect. Intravenous lidocaine represents an alternative to thoracic epidural analgesia [4]. This drug is particularly interesting after laparoscopy [5,6].

1. Marret et al. Meta-analysis of intravenous lidocaine and postoperative recovery after abdominal surgery. Br J Surg 2008;95(11):1331—8.
2. McCarthy GC, et al. Impact of intravenous lidocaine infusion on postoperative analgesia and recovery from surgery: a systematic review of randomized controlled trials. Drugs 2010;70(9):1149—63.
3. Sun Yet al. Perioperative systemic lidocaine for postoperative analgesia and recovery after abdominal surgery: a meta-analysis of randomized controlled trials. Dis Colon Rectum 2012;55(11):1183—94.
4. Kuo CP, et al. Comparison of the effects of thoracic epidural analgesia and i.v. infusion with lidocaine on cytokine response, postoperative pain and bowel function in patients undergoing colonic surgery. Br J Anaesth 2006;97(5):640—6.

5. Kaba et al. Intravenous lidocaine infusion facilitates acute rehabilitation after laparoscopic colectomy. Anesthesiology 2007;106:11—8
6. Herroeder S, et al. Systemic lidocaine shortens length of hospital stay after colorectal surgery: a double-blinded, randomized, placebo-controlled trial. Ann Surg 2007;246(2):192—200.

R25 WOUND INFUSION WITH LOCAL ANESTHETIC AGENTS SHOULD PROBABLY BE RECOMMENDED AFTER COLORECTAL SURGERY (GRADE 2+)

Weak agreement

Arguments: Even if continuous wound infusion with local anesthetic agents significantly decreases movement-related postoperative pain and opioid consumption, this benefit does not seem to affect the duration of postoperative ileus and the duration of hospital stay [1]. The heterogeneity of the various studies, and especially of the infusion technique (type of catheter, modality of administration of local anesthetics, etc.) might explain why definitive conclusions cannot be reached. One recent study [2] showed that this technique is less effective than epidural analgesia with local anesthetic drugs in terms of postoperative pain and duration of hospital stay.

1. Karthikesalingam A, et al., Continuous wound infusion of local anaesthetic agents following colorectal surgery: systematic review and meta-analysis. World J Gastroenterol 2008;14(34):5301—5.
2. Jouve P, et al., Epidural versus continuous preperitoneal analgesia during fast-track open colorectal surgery: a randomized controlled trial. Anesthesiology 2013;118(3):622—30.

R26 TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK SHOULD PROBABLY BE RECOMMENDED FOR PAIN CONTROL AFTER COLORECTAL SURGERY, BUT BENEFITS IN TERMS OF POSTOPERATIVE RECOVERY REMAIN TO BE DEMONSTRATED (GRADE 2+)

Strong agreement

Arguments: First-day morphine-sparing is 10 to 60 mg with this technique [1—3]. This morphine-sparing may result in accelerated postoperative return of gut function, but postoperative ileus has never been specifically studied.

1. McDonnell et al. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: a prospective randomized controlled trial. Anesth Analg 2007;104:193—7.
2. Conaghan et al. Efficacy of transversus abdominis plane blocks in laparoscopic colorectal resections. Surg Endosc 2010;24:2480—4.
3. Zafar et al. The evolution of analgesia in an 'accelerated' recovery programme for resectional laparoscopic colorectal surgery with anastomosis. Colorectal Dis 2010;12:119—24.

Question: Does thromboembolic prophylaxis have an impact on duration of hospital stay or onset of complications?

R27 HIGH-DOSE PROPHYLACTIC LOW-MOLECULAR WEIGHT HEPARIN IS RECOMMENDED AFTER COLORECTAL SURGERY (GRADE 1+)

Strong agreement

Comments: 1.2% of postoperative morbidity after colorectal surgery is related to venous thrombo-embolism (TE) events: pulmonary embolism (PE) or deep venous thrombosis (DVT). The risk of distal DVT, evaluated by imaging studies, ranges from 20 to 40%, and, that of proximal DVT, from 3 to 8%. The incidence of PE ranges from 1.5 to 4%; that of fatal PE, from 0.4 to 1%. In colorectal surgery for cancer, the overall risk of TE events in the absence of TE prophylaxis, as evaluated by imaging studies, is 35%. The TE risk after colorectal surgery for cancer is elevated far beyond the risk for patients without cancer. First line prophylaxis with high-dose low-molecular weight heparin is recommended, renal function permitting. Fondaparinux sodium is an alternative. Support stockings are recommended in association with anticoagulation therapy. Intermittent pneumatic compression by itself or in association with drug prophylaxis has not been shown to be effective in colorectal surgery. Treatment must start pre-operatively, and be pursued for 10 days to one month postoperatively in case of carcinologic surgery. Patients must be mobilized early and ambulation should be encouraged as soon as possible in colorectal surgery.

Question: Does abdominal drainage have an impact on duration of hospital stay or incidence of complications?

R28 ABDOMINAL DRAINAGE IS NOT RECOMMENDED FOR COLONIC SURGERY (GRADE 1—)

Strong agreement

Arguments: In 1999, the SFCD published recommendations concerning drainage in gastrointestinal surgery. There was a high level of evidence that prophylactic use of abdominal drainage was not necessary after intra-peritoneal colorectal anastomosis [1].

1. Mutter D, Panis Y, Escat J. Drainage in digestive surgery. French Society of Digestive Surgery. J Chir 1999;136:117—23.

R29 FOR INFRAPERITONEAL RECTAL ANASTOMOSES, SUCTION DRAINAGE SHOULD PROBABLY BE RECOMMENDED (GRADE 2+)

Strong agreement

Arguments: As concerns infra-peritoneal anastomoses, the expert recommendations in 1999 were in favor of pelvic suction drainage. Such prophylactic drainage was questioned by the results of one meta-analysis [1] and by a prospective study suggesting that suction drainage could promote onset of anastomotic fistula [2]. More recently, a retrospective Dutch multicenter study showed that anastomotic failure was independently associated with the absence of suction drainage and ileostomy in rectal surgery. Moreover, the presence of a drain and ileostomy decreased the risk of re-operation in case of anastomotic failure [3].

1. Urbach DR, Kennedy ED, Cohen MM. Colon and rectal anastomoses do not require routine drainage: a systematic review and meta-analysis. Ann Surg 1999;229:174—80.
2. Tang R, Chen HH, Wang YL, et al. Risk factors for surgical site infection after elective resection of the colon and rectum: a single-centre prospective study of 2809 consecutive patients. Ann Surg 2001;234:181—9.
3. Peeters KC, Tollenaar RA, Marijnen CA, et al. Risk factors for anastomotic failure after total mesorectal excision of rectal cancer. Br J Surg 2005;92:211—6.

Question: Does early patient mobilization (before 24 hours) have an impact on duration of hospital stay or incidence of complications?

R30 ENFORCED PATIENT MOBILIZATION (LESS THAN 24 HOURS) IS RECOMMENDED AFTER COLORECTAL SURGERY (GRADE 1+)

Strong agreement

Arguments: Enforced (early) patient mobilization decreases the risk of thromboembolic events and muscular deconditioning, thereby also decreasing the risk of postoperative complications and facilitating recovery. However, there are very few studies that have specifically evaluated the impact of enforced mobilization during enhanced recovery programs after surgery, and information on the impact on duration of hospital stay and return of gastrointestinal function activity is lacking. Three studies, with imperfect methodology, could draw no conclusions as to the effect of enforced mobilization on postoperative fatigue. One study of the effects of enforced mobilization on early oral nutrition and lean body mass reported a negative influence [1]. However, two other studies reported a positive effect in favor of enforced mobilization and physical exercise in preserving quadriceps muscle strength and therefore enhancing postoperative recovery [2—3].

1. Henriksen MG, et al., Early oral nutrition after elective colorectal surgery: influence of balanced analgesia and enforced mobilization. Nutrition 2002;18(3):263—7
2. Henriksen MG, et al., Enforced mobilization, early oral feeding, and balanced analgesia improve convalescence after colorectal surgery. Nutrition 2002;18(2):147—52.
3. Houborg KB, et al., Postoperative physical training following colorectal surgery: a randomised, placebo-controlled study. Scand J Surg 2006;95(1):17—22.

Question: Does early oral feeding (less than 24 hours post-operative) have an impact on duration of hospital stay or onset of complications?

R31 STARTING ORAL FEEDING EARLIER THAN 24 HOURS AFTER ELECTIVE COLORECTAL SURGERY IS RECOMMENDED (GRADE 1+)

Strong agreement

Arguments: Early feeding is defined as initiation of feeding with fluids and/or solid food within 24 hours of elective colorectal surgery. The « traditional » group includes patients who waited at least 24 hours or until return of intestinal function before oral intake. The analysis is based on seven randomized studies [1—7] of colorectal surgery patients only, and two meta-analyses [8,9] of studies involving major upper and lower abdominal surgery. The randomized studies demonstrated that early (< 24 hours) feeding decreased the duration of hospital stay with a gain ranging from 0.3 to 12.5 days. In one meta-analysis [8], the mean gain was 0.89 days [—1.58, —0.20]. In another meta-analysis [9], the mean gain was 1.28 days, although the result was not statistically significant [—2.94, 0.38]. The rate of complications (OR 0.55; 95% CI: 0.35—0.87) [9] and mortality (OR 0.41; 95% CI: 0.18—0.93) [8] were decreased.

In five studies, tolerance to early oral intake was evaluated by onset of vomiting or necessity to (re-) insert a nasogastric tube. Combining the prevalences of all events, 14.6% had at least one event in the early intake group vs. 10.3% in the « traditional » group.

1. Dag A, Colak T, Turkmenoglu O, et al. A randomized controlled trial evaluating early versus traditional oral feeding after colorectal surgery. Clinics (Sao Paulo) 2011;66(12):2001—5. [Pubmed PMID: 22189721; Pubmed Central PMCID: PMC3226591].
2. Lobato Dias Consoli M, Maciel Fonseca L, Gomes da Silva R, et al. Early postoperative oral feeding impacts positively in patients undergoing colonic resection: results of a pilot study. Nutr Hosp 2010;25(5):806—9. [Pubmed PMID: 21336439].

3. da Fonseca LM, Profeta da Luz MM, Lacerda-Filho A, et al. A simplified rehabilitation program for patients undergoing elective colonic surgery-randomized controlled clinical trial. Int J Colorectal Dis 2011;26(5):609—16. [Epub 2010 Nov 11. Pubmed PMID: 21069355].
4. El Nakeeb A, Fikry A, El Metwally T, et al. Early oral feeding in patients undergoing elective colonic anastomosis. Int J Surg 2009;7(3):206—9. [Epub 2009. Pubmed PMID: 19332156].
5. Lucha PA Jr, Butler R, Plichta J, et al. The economic impact of early enteral feeding in gastrointestinal surgery: a prospective survey of 51 consecutive patients. Am Surg 2005;71(3):187—90. [PMID: 15869128].
6. Aihara H, Kawamura YJ, Konishi F. Reduced medical costs achieved after elective oncological colorectal surgery by early feeding and fewer scheduled examinations. J Gastroenterol 2003;38(8):747—50. [Pubmed PMID: 14505128].
7. Kawamura YJ, Uchida H, Watanabe T, et al. Early feeding after oncological colorectal surgery in Japanese patients. J Gastroenterol 2000;35(7):524—7. [Pubmed PMID: 10905360].
8. Andersen HK, Lewis SJ, Thomas S. Early enteral nutrition within 24 h of colorectal surgery versus later commencement of feeding for postoperative complications. Cochrane Database Syst Rev 2006;(4):CD004080.
9. Osland E, Yunus RM, Khan S, et al. Early versus traditional postoperative feeding in patients undergoing resectional gastrointestinal surgery: a meta-analysis. JPEN J Parenter Enteral Nutr 2011;35(4):473—87.

Question: Does the duration of bladder catheterization have an impact on duration of hospital stay or incidence of complications?

R32 AFTER COLONIC SURGERY, THE DURATION OF BLADDER CATHETERIZATION SHOULD NOT EXCEED 24 HOURS (GRADE 1+)

Strong agreement

R33 After low rectal surgery that requires bladder drainage for longer than four days, insertion of a suprapubic catheter is RECOMMENDED in men (GRADE 1+)

Strong agreement

Arguments: Short duration of urinary bladder drainage is possible in most patients. This decreases the risk of infection, without increasing the risk of retention. After removal of bladder catheterization 24 hours after colonic resection, the risk of urinary retention is low in patients without pre-operative urinary disorders.

Two meta-analyses [1,2] have compared urethral catheterization to suprapubic drainage after colorectal surgery in terms of urinary tract infection, urinary retention, duration of drainage, patient comfort and patient preference. When duration of drainage exceeds five days, supra-pubic catheterization reduces the risk of urinary tract infection and improves patient comfort in men as compared to urethral catheterization. Prolonged catheterization (> 5 days) seems necessary in certain patients with risk factors such as low rectal cancer and/or previous urinary disorders.

In rectal surgery, it seems preferable to insert a supra-pubic catheter rather than an intra-urethral catheter in patients likely to require bladder catheterization for at least four days, and especially in patients undergoing surgery for low rectal cancer, in order to decrease the morbidity.

1. Branagan GW, Moran BJ. Published evidence favors the use of suprapubic catheters in pelvic colorectal surgery. Dis Colon Rectum 2002;45:1104—8.
2. McPhail MJ, et al. A meta-analysis comparing suprapubic and transurethral catheterization for bladder drainage after abdominal surgery. Br J Surg 2006;93: 1038—44.

Question: Does administration of morphine antagonists have an impact on duration of hospital stay or incidence of complications?

R34 NALOXONE IS NOT RECOMMENDED (GRADE 1—)

Weak agreement

Arguments: Naloxone administration increases the risk of blocking the analgesic effects of opioids because of its non-selective antagonist action on opioid receptors. The other peripheral-acting opioid antagonists (alvimopan, methylnaltrexone), which do not present a high risk of inhibiting analgesia, have not proved effective (methylnaltrexone) in significantly decreasing the duration of ileus or are not universally available (alvimopan) [1].

1. Viscusi et al. Alvimopan, a peripherally acting mu-opioid receptor antagonist, compared with placebo in postoperative ileus after major abdominal surgery: results of a randomized, double-blind, controlled study. Surg Endosc 2006; 20:64—70.

Question: Does gum chewing have an impact on duration of hospital stay or incidence of complications?

R35 GUM CHEWING SHOULD PROBABLY BE RECOMMENDED (GRADE 2+)

Strong agreement

Arguments: The effects of chewing-gum on the duration of postoperative ileus (POI) and hospital stay were evaluated in six meta-analyses, most of which included the same studies [1—6]. All showed a decrease in POI when postoperative patients chewed gum. As concerns the duration of hospital stay, two studies found a significant decrease in duration [1,2], two found a favorable tendency [3,4] while the remaining two [5,6] found no difference.

1. Noble EJ, Harris R, Hosie KB, et al. Gum chewing reduces postoperative ileus? A systematic review and meta-analysis. Int J Surg. 2009;7(2):100—5.
2. Chan MK, Law WL. Use of chewing gum in reducing postoperative ileus after elective colorectal resection: a systematic review. Dis Colon Rectum 2007;50(12):2149—57.
3. Vásquez W, Hernández AV, Garcia-Sabrido JL. Is gum chewing useful for ileus after elective colorectal surgery? A systematic review and meta-analysis of randomized clinical trials. J Gastrointest Surg 2009;13(4):649—56.
4. Purkayastha S, Tilney HS, Darzi AW, et al. Meta-analysis of randomized studies evaluating chewing gum to enhance postoperative recovery following colectomy. Arch Surg 2008;143(8):788—93.
5. Parnaby CN, MacDonald AJ, Jenkins JT. Sham feed or sham? A meta-analysis of randomized clinical trials assessing the effect of gum chewing on gut function after elective colorectal surgery. Int J Colorectal Dis 2009; 24(5): 585—92.
6. Fitzgerald JE, Ahmed I. Systematic review and meta-analysis of chewing-gum therapy in the reduction of postoperative paralytic ileus following gastrointestinal surgery. World J Surg 2009;33(12):2557—66.

Grading of recommendations as a function of peri-operative period and impact

Pre-operative

Parameters	Main recommendations	Secondary recommendations	Absence of recommendation
Information and patient counseling	Yes		
Colonic preparation	No if supra-rectal colonic surgery		Rectal surgery Absence of data
Anxiolytic premedication			
Pre-operative fasting	Solids: 6 hours Clear and/or sweetened liquids: 2 hours		
Carbohydrate intake the evening and morning before operation	Yes, if patients ASA 1 or 2 No, if patients have diabetes or gastric emptying disorders		
Immunonutrition	Yes, pre-operatively for carcinologic surgery No, pre-operatively for non-carcinologic surgery No, postoperatively		

Intra-operative

Parameters	Main recommendations	Secondary recommendations	Absence of recommendation
Intra-operative fluid loading	Yes: optimal volume replacement No: excessive volume infusion		
Prevention of operative stress	Yes: single dose glucocorticoid intake immediately before operation		
Prevention of surgical site infection	Yes: prevention of intra-operative hypothermia Administration of antibiotic prophylaxis		
Prevention of postoperative nausea and vomiting	Yes: systematic administration of anti-emetics		
Surgical approaches	By laparoscopy		If by laparotomy, no recommendation as to the type of incision can be made

Postoperative

Parameters	Main recommendations	Secondary recommendations	Absence of recommendation
Nasogastric tube	No, to be removed at the end of operation		
Postoperative analgesia: overall principals	Multimodal analgesia privileging non-opioid antalgic agents and/or loco-regional analgesia	Prescription of non-steroidal anti-inflammatory drugs	
Postoperative analgesia: laparotomy	Yes: thoracic epidural analgesia	1) Wound irrigation or 2) Intravenous lidocaine or, 3) Transversalis abdominis muscle block	
Postoperative analgesia: laparoscopy	Yes: continuous intravenous administration of lidocaine No: thoracic epidural analgesia	1) Wound irrigation or, 2) Transversalis abdominis muscle block	
Thromboembolic prophylaxis	Yes, by high dose prophylactic low molecular weight heparin		
Surgical drainage	Yes, if surgery with infra-peritoneal anastomosis No, if intra-abdominal colonic anastomosis		
Enforced mobilization	Yes, before 24 hours		
Oral feeding	Yes, start before 24 hours post-surgery		
Bladder catheterization	Yes, if limited to < 24 hours after colonic surgery	Low rectal surgery: preferential use of supra-pubic catheterization in males	
Prevention of postoperative ileus	Yes: gum chewing No: naloxone administration		