

ORIGINAL ARTICLE

Perioperative nutrition is still a surgical orphan: results of a Swiss–Austrian survey

F Grass, Y Cerantola, M Schäfer, S Müller, N Demartines and M Hübner

Department of Visceral Surgery, University Hospital CHUV, Lausanne, Switzerland

Background/Objectives: There is strong evidence for the beneficial effects of perioperative nutrition in patients undergoing major surgery. We aimed to evaluate implementation of current guidelines in Switzerland and Austria.

Subjects/Methods: A survey was conducted in 173 Swiss and Austrian surgical departments. We inquired about nutritional screening, perioperative nutrition and estimated clinical significance.

Results: The overall response rate was 55%, having 69% (54/78) responders in Switzerland and 44% (42/95) in Austria. Most centres were aware of reduced complications (80%) and shorter hospital stay (59%). However, only 20% of them implemented routine nutritional screening. Non-compliance was because of financial (49%) and logistic restrictions (33%). Screening was mainly performed in the outpatient's clinic (52%) or during admission (54%). The nutritional risk score was applied by 14% only; instead, various clinical (78%) and laboratory parameters (56%) were used. Indication for perioperative nutrition was based on preoperative screening in 49%. Although 23% used preoperative nutrition, 68% applied nutritional support pre- and postoperatively. Preoperative nutritional treatment ranged from 3 days (33%), to 5 (31%) and even 7 days (20%).

Conclusions: Although malnutrition is a well-recognised risk factor for poor post-operative outcome, surgeons remain reluctant to implement routine screening and nutritional support according to evidence-based guidelines.

European Journal of Clinical Nutrition (2011) 65, 642–647; doi:10.1038/ejcn.2011.13; published online 23 February 2011

Keywords: immune enhancing; immunonutrition; screening; surgery; complications; infections

Introduction

Major gastrointestinal (GI) surgery can nowadays be performed with a low mortality, but complex surgical procedures are still associated with increased post-operative complication rates. This is particularly related to the fact that even severe pre-existing comorbidities, like cardiovascular disease, pulmonary restrictions, impaired renal function and malnutrition, as well as age are no longer considered as contraindications for major GI surgery. There is increasing evidence that nutritional screening and therapy are important adjuncts in modern surgical care as 40% of surgical patients are malnourished (Bozzetti *et al.*, 2007;

Schiesser *et al.*, 2008; Sorensen *et al.*, 2008; Hiesmayr *et al.*, 2009; Schindler *et al.*, 2010).

Nutritional support mainly aims to decrease post-operative morbidity, that is, infectious complications, and must be therefore considered as a prophylactic intervention (Weimann *et al.*, 2006; Bozzetti *et al.*, 2007; Stratton and Elia, 2007; Cerantola *et al.*, 2011). A typical feature of any prophylaxis is that a large number of patients must be treated to achieve a beneficial effect for the whole patient group, although it remains difficult or even impossible to predict a positive effect for the individual patient. Assessment of cost effectiveness is also needed to justify prophylactic nutritional intervention. As a consequence, large studies are needed to provide a high level of evidence; and the benefits of nutritional support may not be obvious in daily surgical practice.

Implementation of nutritional support strategies into daily clinical practice encounters many difficulties and considerable efforts are needed to be successful (Hiesmayr *et al.*, 2009; Schindler *et al.*, 2010). To facilitate this process, guidelines provided by the American and European Nutritional Societies may be helpful. For patients at nutritional risk, clear

Correspondence: Dr M Hübner, Department of Visceral Surgery, University hospital, Lausanne, Rue du Bugnon 46, 1011 Lausanne, Switzerland.

E-mail: martin.hubner@chuv.ch

Contributors: MH and SM designed the study. FG, MH, MS and YC carried out the study, performed data analyses and drafted the manuscript. ND conceived the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Received 15 October 2010; revised 29 December 2010; accepted 13 January 2011; published online 23 February 2011

recommendations based on the current evidence are given with regard to screening, timing, dose, duration and type of nutrition (ASPEN guidelines, 2002; Mariette *et al.*, 2005; Weimann *et al.*, 2006; Stratton and Elia, 2007).

The aim of the current study was to determine whether nutritional screening and perioperative nutritional therapy are routinely used in surgical departments in Switzerland and Austria and to assess surgeon's appraisal of current evidence about perioperative nutrition.

Materials and methods

Surgical departments of public hospitals in Switzerland ($n=78$) and Austria ($n=95$) were identified from databases provided by the respective national medical associations. Chairmen of all these surgical departments were then invited to participate in the survey. Non-responders were contacted twice at least by reminder e-mails and personal phone calls. The survey was started at 1 April 2008 and closed on 31 October 2009. The questionnaire included 22 closed-ended questions covering three main topics to assess current practice of nutritional support: (1) nutritional screening before GI surgery, (2) perioperative nutritional therapy and (3) individual appraisal of current evidence of preoperative nutritional supply and the use of immunonutrition (IN). For most questions, more than one single answer could be given (online appendix). Centres were also asked about the annual number of GI surgical interventions. The questionnaire was elaborated on the basis of current guidelines of American and European Nutritional Societies (ASPEN guidelines, 2002; Weimann *et al.*, 2006; Stratton and Elia, 2007).

To assess the impact of multidisciplinary teamwork on the implementation of current guidelines regarding perioperative nutrition, hospitals with multidisciplinary nutritional teams (two or more specialists forming a nutritional task group) were compared with centres having only one single specialist involved.

All answers were entered anonymously and stored in a computer-based data file allowing identification of the respective responders for eventual further information by individual identification numbers. Descriptive statistics are expressed as absolute numbers with medians and ranges or as percentages as appropriate. Two-sided Fisher's exact test was used for the comparison of categorical variables. A P -value <0.05 was considered to indicate statistical significance. Statistical analysis was performed using standard software package SPSS 14.0 (SPSS, Inc., Chicago, IL, USA).

Results

Overall, 96 centres replied to the questionnaire, providing an overall response rate of 55%. Although 54 of 78 centres (69%) in Switzerland were included, 42 of 95 centres (44%) in Austria replied to the questionnaire. There were 10

university hospitals and 58 high-volume centres (>400 GI surgical interventions performed annually) among the responding surgical departments.

Nutritional screening before GI surgery: when, how and who?

Only 20% of the responding centres routinely screened all their GI surgery candidates for nutritional status. Nutritional screening was performed occasionally by 50% of the responding centres. The questionnaire did not specify for which conditions or diseases nutritional screening was selectively performed. Finally, there were 20 and 10% of all centres that rarely or even never assessed patients' nutritional risk, respectively. Nutritional screening was either performed at the outpatient department (52%) or at admission (54%). Postoperatively, nutritional status was assessed in 20% of the hospitals. Repeated assessment of the nutritional status with the intent of monitoring nutritional therapy was performed in about 36% (Figure 1a).

Approximately two-third of centres were using various combinations of clinical and laboratory parameters to assess patients' nutritional status. Although recent loss of weight and body mass index were the most commonly used clinical parameter (78%), serum albumin and pre-albumin levels were the preferred laboratory parameters (58%) (Figure 2a). The nutritional risk score (NRS) as the officially recommended screening tool by the European Society for Clinical Nutrition and Metabolism was used by 14% of centres only.

Surgeons performed the nutritional screening generally themselves (76%); other health-care professionals were significantly less frequently responsible ($<20\%$) for nutritional assessment. Nevertheless, about 30% of centres had dedicated multidisciplinary teams to monitor clinical nutrition (Figure 3a).

Perioperative nutritional therapy: indication and implementation

Nutritional support was part of perioperative care in about 70% of all centres. The decision to use nutritional support was predominantly based on the type of surgery (major surgery, 49%), the presence of malignancy (29%) and the identification of patients at-risk by previous nutritional screening (49%) (Figure 1b). Hence, a selective approach was clearly preferred and only one single centre considered nutritional support as an obligatory adjunct.

Nutritional support solely restricted to the preoperative period was used in 23% of all responding hospitals. Two-thirds of centres preferred a combined approach with an extent of the preoperative administration in the post-operative period. Immunonutrition was used by 60%, whereas 52% used normal protein shakes. Duration of preoperative treatment varied among 3 (33%), 5 (31%) and 7 days (20%).

Re-assessment of nutritional status, performed in 46%, was mainly carried out by measuring clinical and laboratory values (Figure 2b).

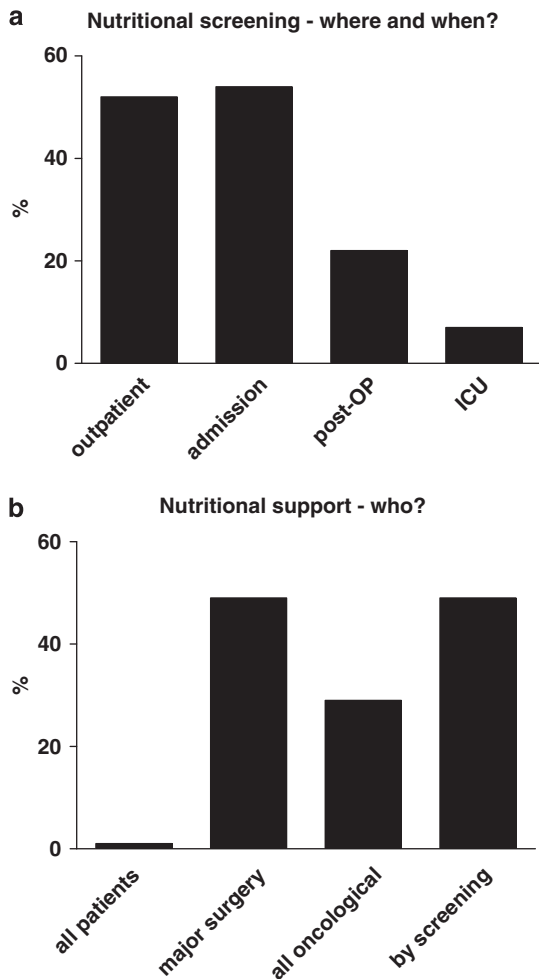


Figure 1 Details on nutritional screening and support. (a) Nutritional screening in surgical patients (%) takes place either in the outpatient' clinics, at admission, postoperatively, or at the intensive care unit. (b) Perioperative nutritional support (%) is either attributed to all patients unselectively, or by type of surgery (major), diagnosis (oncological) or screening criteria.

In 90% of all centres, surgeons were the key persons responsible for nutritional support, whereas nurses and nutritionists were less frequently involved or took the full responsibility for nutritional therapy. Nevertheless, 28 out of 96 centres (29%) had a multidisciplinary team to support surgeons in the conduct of a nutritional therapy (Figure 3b).

Appraisal of current evidence of preoperative nutritional supply

Overall, 67% of all centres estimated that there is enough scientific evidence in favour of preoperative nutritional support. Reduced complication rates and decreased length of hospital stay were considered as major advantages by 80 and 59%, respectively.

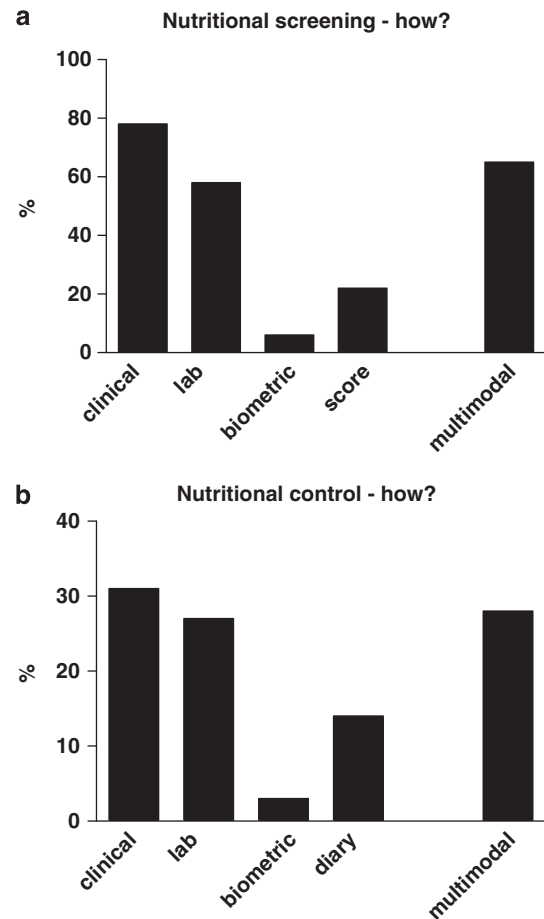


Figure 2 Tools for nutritional screening and control of preoperative nutritional support. Nutritional screening before surgery (a) or re-assessment of nutritional status (b) is assured by clinical evaluation (clinical), laboratory values (lab), biometric measurements, nutritional scores or diaries or by several of these tools (multimodal).

Sufficient evidence for the use of IN as enteral nutritional formula was only affirmed by 48% of all centres. Preoperative IN was not used because of financial or logistic issues in 49 and 32%, respectively. Most frequently cited active ingredients of IN are arginine (64%), glutamine (64%), *n*-3 fatty acids (57%) and ribonucleic acid (31%).

Does multidisciplinary teamwork increase compliance to nutritional guidelines?

Nutritional screening and support were warranted by a multidisciplinary team in 32 and 29% centers, respectively. Only 15 surgical departments (16%) had 'nutritional teams' available for both screening and treatment. This teamwork did not contribute to a better implementation of current guidelines regarding screening and nutrition. Despite task sharing, time restraints remained a major drawback. However, departments using multidisciplinary nutritional teams

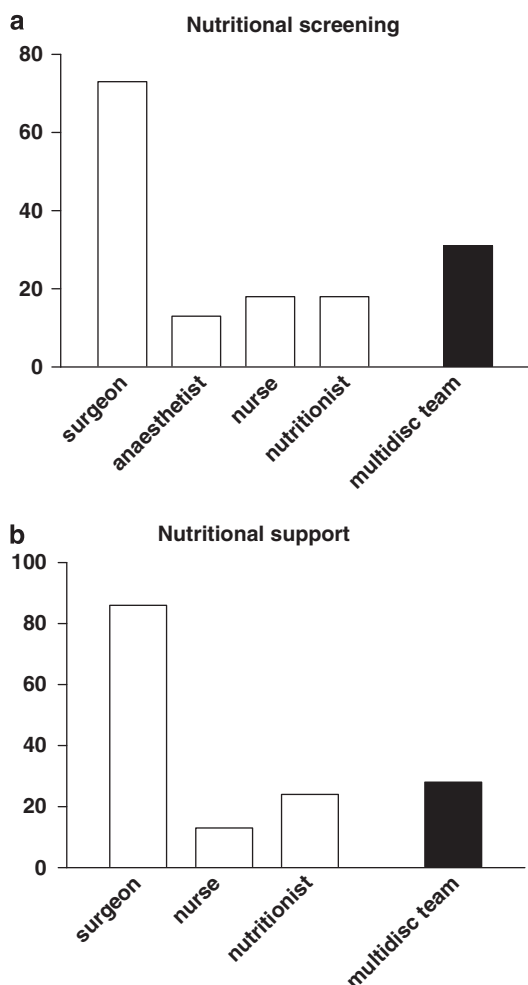


Figure 3 Responsible specialists for nutritional screening and support. Nutritional screening (a) and support (b) is assured either by the surgeon or by the anaesthetist, nutritionist or nursing staff (white bars). Some hospitals provide a multidisciplinary approach (black bars).

conducted a perioperative nutritional treatment more regularly ($P=0.023$, online appendix, question 8).

Discussion

This survey provides a comprehensive insight into the current practice of nutritional screening and nutritional support of the surgical community in Switzerland and Austria. A total of 96 surgical departments were evaluated providing a representative cross-section of both countries (Demartines *et al.*, 2000). About 70% of all participating centres had implemented nutritional screening and nutritional treatment, whereby 50% preferred a selective approach for both screening and nutritional support based on the type of surgery, underlying disease and nutritional

risk. Most centres were in favour for a combination of pre- and postoperative nutrition. Reduced morbidity rates and length of hospital stay were recognised as main advantages of nutritional support.

Nutritional screening

Routine nutritional screening was performed by only 20% of the responding hospitals, whereas another 50% performed a selective assessment of patients with a potential nutritional risk. Up to 30% of centres rarely or never assessed patients' nutritional status preoperatively, which has to be considered as an important shortcoming in modern GI surgery (ASPEN guidelines, 2002; Weimann *et al.*, 2006; Bozzetti *et al.*, 2007; Sorensen *et al.*, 2008). Furthermore, 48% evaluated their patients' nutritional status only at admission or even postoperatively, which is too late for an effective nutritional intervention as outlined below. In Europe, the NRS is officially recommended since 2003 as a screening tool that integrates nutritional status, severity of the disease and the age of the patient (Kondrup *et al.*, 2003a, b). Patients with a $NRS \geq 3$ are prone to develop more complications during their hospital stay and are likely to benefit from nutritional support (Kondrup *et al.*, 2003a, b; Weimann *et al.*, 2006; Schiesser *et al.*, 2008; Sorensen *et al.*, 2008). Although the NRS is well validated and easy to handle, only a minority of centres was currently using it. Most centres still adhered to traditional assessment by using weight loss, body mass index and serum albumin levels, because these parameters are available without really assessing the individual patient. And as time restraints were often mentioned as a relevant factor, it seems that many surgeons still prefer these parameters as a surrogate for an effective nutritional assessment. Our findings are in accordance with a recent European multicentric study that reported an overall routine nutritional screening rate of 52% in the participating countries (Schindler *et al.*, 2010). A remarkably high screening rate of 93% was reported from the United Kingdom, whereas only 33% of the partner hospitals in Germany and Austria performed nutritional screening; Locally developed tools were preferred over comprehensive screening instruments such as the NRS or the Malnutrition Universal Screening Tool (MUST) as in our study. In contrast to our study, participating centres were recruited on a voluntary basis and hence, represent probably a positive selection of units with a special interest in clinical nutrition. In our binational survey, we contacted all surgical units in the target region.

Perioperative nutrition and immunonutrition

Current guidelines recommend perioperative nutrition for most patients undergoing major surgery. Details on timing, duration, route of administration and product vary depending on patient- and procedure-related risk factors and from the respective societies (ASPEN guidelines, 2002; Mariette *et al.*, 2005; Weimann *et al.*, 2006; Stratton and Elia, 2007).

Several meta-analyses and systematic reviews analysing the use of different nutritional formula have been recently published (Waitzberg *et al.*, 2006; Weimann *et al.*, 2006; Stratton and Elia, 2007; Jones and Heyland, 2008; Cerantola *et al.*, 2011). Despite some disparities exist, it is now generally accepted that perioperative nutrition is beneficial for patients undergoing major GI surgery by reducing overall complication rates, postoperative infectious complications and length of hospital stay (Waitzberg *et al.*, 2006; Weimann *et al.*, 2006; Stratton and Elia, 2007; Jones and Heyland, 2008; Sorensen *et al.*, 2008). Immunonutrition, containing arginine, ribonucleic acid and *n*-3 fatty acids should be preferred as standard nutritional formula in patients undergoing GI cancer surgery (Waitzberg *et al.*, 2006; Weimann *et al.*, 2006; Xu *et al.*, 2006; Bozzetti *et al.*, 2007; Cerantola *et al.*, 2011). Contents and importance of IN were respected by only about half of the responders in our study. Nutritional support is most beneficial if given 5–7 days preoperatively with an optional prolongation in the post-operative course (Waitzberg *et al.*, 2006; Weimann *et al.*, 2006; Xu *et al.*, 2006; Bozzetti *et al.*, 2007). However, the recommended timing and duration of perioperative nutritional support were often not appropriate; therefore potential benefits of perioperative nutrition have the risk of getting lost.

Impact of multidisciplinary collaboration in perioperative nutrition

Surgeons were in charge of nutritional screening and support in the majority of hospitals (76 and 90%, respectively). Although time restraints were mentioned by 32% as main reasons against the use of perioperative nutrition, it would be expected that a multidisciplinary approach would facilitate the proper implementation of routine nutritional screening and nutritional support. The Nutrition Day study did not find a major impact of nutritional specialists on quality of care and their findings go along with our results that nutritional teams do not do any better (Schindler *et al.*, 2010).

A limitation of the survey is a potential non-response bias of included centres. It is in the nature of a survey that only a selection of the surveyed subjects might reply. As non-responders are likely to have the lowest sensibility to the investigated issue, real implementation of guidelines could be worse than reported. However, as the overall response rate was 55% with representative 69% responders from Switzerland and 44% from Austria, we can strongly assume that this evaluation represents pretty well the opinion and current practice of nutritional screening and nutritional support in both countries (Demartines *et al.*, 2000). Selection bias was also avoided by approaching all surgical units in the area of interest. But of note, assuming a positive selection bias, reality may be even worse than the results of this current study. As this study was only performed in two European countries, its results cannot be generalised to the whole Western world.

In conclusion, the benefits of a proper nutritional support are acknowledged by most surgeons, and current guidelines provide clear instructions and tools. Implementation in daily clinical practice remains to be improved, but proven benefits for patients' outcome and its cost effectiveness justify the necessary efforts.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

We thank Giustina Mariotti and Bettina Scuffi for their valuable help in data acquisition and management.

We kindly thank all responding centres:

Switzerland: University Basel, University Bern, University Lausanne, University Zürich, Aarau, Aarberg, Affoltern, Altdorf, Biel, Baden, Bellinzona, Bruderholz Basel, Bern Tiefenau, Burgdorf, Bülach, Chur, Davos, Frauenfeld, Fribourg, Glarus, Grabs, Herisau, Ilanz, Interlaken, La Chaux-de-Fonds, Lachen, Laufen, Liestal, Luzern, Mendrisio, Monthey, Morges, Münsingen, Münsterlingen, Olten, Payerne, Rheinfelden, Riaz, Samedan, Sarnen, Schaffhausen, Schlieren, Sion, St Gallen, Sursee, Triemli Zürich, Uster, Waid Zürich, Wetzikon, Winterthur, Yverdon, Zofingen, Zollikerberg, Zug.
Austria: University Innsbruck, University Wien, Bad Aussee, Barmherzige Brüder Salzburg, Barmherzige Schwestern Wien, Braunau, Bregenz, Bruck a.d. Mur, Deutschlandsberg, Dornbirn, Donauspital Wien, Eisenstadt, Feldkirch-Tisis, Elisabethinen Graz, Elisabethinen Linz, Elisabethinen Klagenfurt, Floridsdorf Wien, Friesach, Gmunden, Hainburg/Donau, Hall in Tirol, Hartberg, Hollabrunn, Horn, Judenburg, Kufstein, Lienz, LKH Graz, Mistelbach, Neunkirchen, Rottenmann, Scheibbs, Schladming, Schwarzach im Pongau, St. Johann in Tirol, Tamsweg, Tulln, Villach, Vöcklabruck, Waidhofen an der Ybbs, Wels, Wiener Neustadt.

References

- ASPEN Board of Directors and the Clinical Guidelines Task Force (2002). Guidelines for the use of parenteral and enteral nutrition in adult and pediatric patients. *JPEN J Parenter Enteral Nutr* 26, 1SA–138SA.
- Bozzetti F, Gianotti L, Braga M, Di Carlo V, Mariani L (2007). Postoperative complications in gastrointestinal cancer patients: the joint role of the nutritional status and the nutritional support. *Clin Nutr* 26, 698–709.
- Cerantola Y, Hubner M, Grass F, Demartines N, Schafer M (2011). Immunonutrition in gastrointestinal surgery. *Br J Surg* 98, 37–48.
- Demartines N, Freiermuth O, Mutter D, Heberer M, Harder F (2000). Knowledge and acceptance of telemedicine in surgery: a survey. *J Telemed Telecare* 6, 125–131.
- Hiesmayr M, Schindler K, Pernicka E, Schuh C, Schoeniger-Hekele A, Bauer P *et al.* (2009). Decreased food intake is a risk factor for mortality in hospitalised patients: the NutritionDay survey 2006. *Clin Nutr* 28, 484–491.

- Jones NE, Heyland DK (2008). Pharmaconutrition: a new emerging paradigm. *Curr Opin Gastroenterol* **24**, 215–222.
- Kondrup J, Allison SP, Elia M, Vellas B, Plauth M (2003a). ESPEN guidelines for nutrition screening 2002. *Clin Nutr* **22**, 415–421.
- Kondrup J, Rasmussen HH, Hamberg O, Stanga Z (2003b). Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. *Clin Nutr* **22**, 321–336.
- Mariette C, Alves A, Benoist S, Bretagnol F, Mabrut JY, Slim K (2005). [Perioperative care in digestive surgery. Guidelines for the French society of digestive surgery (SFCD)]. *Ann Chir* **130**, 108–124.
- Schiesser M, Muller S, Kirchhoff P, Breitenstein S, Schafer M, Clavien PA (2008). Assessment of a novel screening score for nutritional risk in predicting complications in gastro-intestinal surgery. *Clin Nutr* **27**, 565–570.
- Schindler K, Pernicka E, Laviano A, Howard P, Schutz T, Bauer P *et al.* (2010). How nutritional risk is assessed and managed in European hospitals: a survey of 21 007 patients findings from the 2007–2008 cross-sectional nutritionDay survey. *Clin Nutr* **29**, 552–559.
- Sorensen J, Kondrup J, Prokopowicz J, Schiesser M, Krahenbuhl L, Meier R *et al.* (2008). EuroOOPS: an international, multicentre study to implement nutritional risk screening and evaluate clinical outcome. *Clin Nutr* **27**, 340–349.
- Stratton RJ, Elia M (2007). Who benefits from nutritional support: what is the evidence? *Eur J Gastroenterol Hepatol* **19**, 353–358.
- Waitzberg DL, Saito H, Plank LD, Jamieson GG, Jagannath P, Hwang TL *et al.* (2006). Postsurgical infections are reduced with specialized nutrition support. *World J Surg* **30**, 1592–1604.
- Weimann A, Braga M, Harsanyi L, Laviano A, Ljungqvist O, Soeters P *et al.* (2006). ESPEN guidelines on enteral nutrition: surgery including organ transplantation. *Clin Nutr* **25**, 224–244.
- Xu J, Zhong Y, Jing D, Wu Z (2006). Preoperative enteral immunonutrition improves postoperative outcome in patients with gastrointestinal cancer. *World J Surg* **30**, 1284–1289.

Supplementary Information accompanies the paper on European Journal of Clinical Nutrition website (<http://www.nature.com/ejcn>)

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.