

Surgeons' knowledge and attitude regarding concepts of nutritional therapy

Conhecimentos e atitudes de cirurgiões frente aos conceitos de terapia nutricional

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A B S T R A C T

Objective: To compare the knowledge of nutritional therapy (NT) of surgery residents and surgeons. **Methods:** We applied two standardized questionnaires on knowledge, attitude and behavior regarding NT to 50 physicians (35 residents and 15 surgeons) of 12 different surgical areas. We compared the proportions of hits according to the perception on the subject of each group using the Fisher exact test, with 5% significance and $p < 0.05$. **Results:** More than 80% did not feel safe regarding NT and 46% denied knowledge of the NT multidisciplinary team (NTMT). There was a higher percentage of correct answers among residents in the items: surgical trauma and its nutritional influence on the patient ($p = 0.047$); normal BMI ($p = 0.036$); preoperative NT ($p = 0.007$); and indication of preoperative NT in the group that referred that to interact with the NTMT ($p = 0.02$). Among surgeons: complications of NT and NT in previously malnourished patients ($p = 0.044$); and methods for assessing preoperative nutritional status in the group that referred to interact with the NTMT ($p = 0.01$). **Conclusion:** there are gaps in medical education. Only 13.3% were confident about NT, and their knowledge did not justify such confidence. There were no differences between the successes of confident and non-confident about NT in most subjects. The best results came from the group that claimed to be assisted by any NTMT. Better medical educational programs should be goal for this university.

Key words: Nutrition therapy. Nutrition, public health. Medical staff, hospital. Physicians. Health knowledge, attitudes, practice.

INTRODUCTION

Hospital malnutrition has a direct impact on increased morbidity and mortality, the patient's nutritional status being an independent factor influencing surgical outcome^{1,2}.

In Brazil the overall incidence of hospital malnutrition is almost 50% in patients admitted to hospitals in the National Health System (SUS), while 12.6% are severely malnourished patients and 35.5% are moderate. This percentage is higher in the North and Northeast regions and lower in the South and Southeastern³. In the UK, it is estimated that more than 40% of patients are malnourished on admission and approximately two-thirds lose weight throughout their hospitalization⁴. This high prevalence of malnutrition can be even greater when compared to statistics of surgical gastroenterology, whose figures in the preoperative hospitalization reach 65%^{5,6}.

Malnutrition in surgical patients deserves special attention, as early diagnosis and nutritional treatment in the pre- and postoperative periods may determine substantive differences in management and prognosis⁷. The presence of noninfectious complications such as dehiscence and abdominal fistulas, and infectious ones such as surgical wound infections, can be influenced by nutritional status. This fact determines the importance of nutritional diagnosis still in the pre-operative period^{8,9}.

Malnutrition in surgical patients should focus on the state of the various components of body cell mass, as fat, skin, bone, muscle and protein, according to parameters based on clinical signs, food history, anthropometric and biochemical tests. In all known methods applied, the diagnosis is usually fast and effective, providing opportunities for nutritional intervention and subsequent correlation in reducing morbidity and mortality^{2,3}.

The subjective global assessment, described by Detsky *et al.*, can only take a few minutes to be prepared,

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assessing weight loss, gastrointestinal symptoms and the disease in question, not requiring the use of large financial or technological resources^{10,11}. In a multicenter study, Correia *et al.* observed that despite the easiness of the nutritional assessment, it was rarely done. Patients were not weighted, for example, although there were scales at less than 50 meters from the bed, and there was no reference to nutritional status in medical records^{3,12}.

Several are the factors for the lack of nutritional diagnosis. Among them stands the small concern with teaching the subject in undergraduate and postgraduate levels¹³⁻¹⁵.

It is known that there is no formal, specific nutritional training during residency in surgery, and in our country, there are no available studies which investigate the medical knowledge in this area, which justifies the development of research protocols¹³⁻¹⁵.

The aim of this study was to determine the perception of knowledge and compare it with the degree of knowledge of the fundamental principles of nutritional therapy in surgery residents and surgeons.

METHODS

This study was conducted in the surgical wards of the São Paulo Hospital, university hospital managed by the Paulista Association of Medical Development (SPDM) and the Paulista School of Medicine Federal University of São Paulo (EPM-UNIFESP) under number CEP - UNIFESP / EPM 0953 / 10, and supported by FAPESP 2010/17964-4 and ESPEN 11-1779.

Participants

We interviewed surgery residents and Surgeons of EPM-UNIFESP, distributed according to the periods of residence in different specialties. They were addressed in the form of individual interviews, lasting approximately 15 minutes.

Intervention

Participants were assessed using two standardized questionnaires. The questions of the first questionnaire (Annex 1) sought to assess the degree of knowledge of fundamental principles in therapy and were based on guidelines for nutrition therapy in surgery developed by the Brazilian Society of Enteral and Parenteral Nutrition and also on the work of Awad *et al.*¹⁵. Participants were not aware beforehand that they would be evaluated, and answered questions without any support material and without discussing the issues with other professionals. Participants in the second questionnaire were asked to answer questions about their attitudes and behaviors regarding nutritional therapy (Annex 2), adapted from Awad *et al.*¹⁵.

Statistical Analysis

We verified if there was significant difference in the proportion of correct items on nutrition knowledge of the interest groups, divided according to the perception of knowledge on same subject. For the comparisons, we used the Fisher exact test; we considered a significance level of 5%. Thus, difference between groups was considered with a p-value < 0.05.

Expected Impacts

Relying on Awad *et al.*¹⁵, we expected to achieve an approximate number of 50-60 participants, evenly distributed according to the periods of residence. Among physicians, it was expected that less than half would answer as having adequate knowledge about nutritional therapy, more than half would state that rarely have to decide on nutritional therapy, and less than a quarter would feel able to calculate the daily energy and nutritional needs of the patients. It was also expected that more than 90% would agree that an adequate nutritional support would be essential to achieve good clinical and surgical results and that more than 40% would know of the existence of guidelines on nutritional therapy, and of these, only 10% would consult them. It was also expected that more than 70% would regard themselves as being able to identify patients at risk for malnutrition, but only 30% of these should have filled out the questions on the subject correctly. And finally, one would expect that more than 95% agreed that nutritional therapy training during residence would be valuable for the formation of the surgeon.

RESULTS

This study interviewed 50 physicians from 12 different surgical areas of EPM-UNIFESP. Thirty-five were residents and 15 surgeons.

Residents were distributed among the first four years of residency, the majority belonging to the second (31.4%) and third (40%) years (Table 1), and surgeons, according to their specialty (Table 2.)

In the analysis of responses to the questionnaire on perception of nutritional therapy (Annex 2), we observed that over 80% of the participants did not feel secure confident towards nutritional therapy (Table 3). Also, we recorded 74% of respondents without the support of the Nutrition Therapy Multidisciplinary Team (EMTN), 46% of which being unaware of the existence of an EMTN in their services (Table 4).

By generically analyzing the hits and errors of the questionnaire on general knowledge about nutrition (Annex 1), it was revealed that in 38% of the questions the percentage of correct answers was less than 50% and in only 14.2% of the questions there was a success rate above 75%.

When analyzing the data from the questionnaire on nutritional knowledge (Annex 1) and the one about perception in nutrition (Annex 2), as for residents, there was a higher percentage of correct answers in relation to operative trauma and its influence on the metabolic and nutritional status of the patient in the group who claimed not to have adequate knowledge of nutrition therapy in surgical patients ($p = 0.047$); of BMI considered normal for the eutrophic patient in the group agreeing on regularly deciding on therapy and nutritional interventions of patients ($p = 0.036$); of preoperative NT in the group that agreed on feeling that training in nutritional therapy would be valuable for the surgical career ($p = 0.007$); and of indicating nutritional therapy (NT) in a surgical patient in the group that claimed to interact with EMTN in some cases ($p = 0.02$).

Among surgeons, that there was a higher percentage of correct answers in: complications of enteral nutrition therapy and NT in previously malnourished

patients in the group that agreed to have adequate knowledge and skills to identify patients at risk of malnutrition ($p = 0.044$); methods of preoperative nutritional assessment in the group agreeing on feeling that training in nutritional therapy would be valuable for the surgical career ($p = 0.056$); and methods of preoperative nutritional assessment in the group claiming to interact with the EMTN in some cases ($p = 0.01$).

DISCUSSION

The UK National Institute for Health and Clinical Excellence (NICE), and independent British organization responsible for providing guidance on promotion and prevention in public health in the UK, and the Brazilian Society of Parenteral and Enteral Nutrition (SBNPE) recommend that any member of the health team should receive education and training on nutritional therapy during their professional formation^{3,15,16}. It is known that medical surgical teams can often consult with the nutrition expert. However, not all hospitals have them. It is expected that the surgical staff know, fully and effectively, how to offer proper nutritional therapy for any surgical patient¹⁵.

In contrast to the recommended, our study showed that there are gaps in medical education, since more than 80% of surveyed medical residents were not confident about the nutritional therapy for their patients and that more than 50% knew a few questions about the knowledge on this area. These data are in partial agreement with previous British publications, which shows the deficiency of medical education in countries unlike Brazil in medicine¹⁵.

Based on this literature, it was expected that well over 70% of the respondents of this study would deem themselves capable of identifying patients at risk of malnutrition. Nonetheless, we showed that only 14% claimed that knowledge. It was also expected that more than 40% knew the NT guidelines available in the medical literature, but only 6% answered they had it. These data further corroborate the conclusion about the low value of medical education in NT.

It is also known that there are negative effects on the general state of the operated patient when there is a low level of knowledge on the medical nutritional therapy by doctors⁷, and yet 13.3% of respondents were sure about their skills in the subject. The results of their knowledge did not justify such certainty though, since there was no greater success rate in this group with statistical significance for most subjects.

Awad *et al.* drew attention to the need for educational programs in nutrition in British medical training by showing that the lack of knowledge about the subject was present in both groups¹⁵. Our results and conclusions are similar, because there were no statistically significant differences between the successes of both groups, nor were

Table 1 - Distribution of residents.

Specialty	n	%
Otorhinolaryngology	3	8.6
Ophthalmology	3	8.6
Neurosurgery	5	14.3
Plastic Surgery	4	11.4
Gastrointestinal Surgery	4	11.4
General Surgery	4	11.4
Urology	2	5.7
Anesthesiology	2	5.7
Thoracic Surgery	2	5.7
Gynecology / Obstetrics	6	17.1
Total	35	100
Residency year	n	%
R1	7	20
R2	11	31.4
R3	14	40
R4	3	8.6
Total	35	100

Table 2 - Distribution of surgeons.

Specialty	n	%
Otorhinolaryngology	2	13.33
Ophthalmology	2	13.33
Neurosurgery	2	13.33
Plastic surgery	2	13.33
Gastrointestinal Surgery	4	26.66
Vascular surgery	2	13.33
Head and Neck Surgery	1	6.66
Total	15	100

Table 3 - Perception regarding Nutritional Therapy.

	Residents				Surgeons			
	Disagree		Agree		Disagree		Agree	
	n	%	n	%	n	%	n	%
C1) I feel that I have adequate knowledge about nutritional therapy of surgical patients	33	94,3%	2	5,70%	13	86,67%	2	13,33%
C2) I have adequate knowledge and skills to identify patients at risk of malnutrition.	27	79,4%	7	20,6%	12	80,00%	3	20,00%
C3) I can calculate the daily energy need and nutritional support of my patient.	29	82,9%	6	17,1%	14	93,33%	1	6,67%
C4) I regularly decide on nutritional therapy and interventions of my patients.	25	71,4%	10	28,6%	10	66,67%	5	33,33%
C5) I have received adequate information (eg guidelines) to facilitate the nutritional therapy of my patient.	33	94,3%	2	5,70%	14	93,33%	1	6,67%
C6) I feel that training in nutritional therapy would be valuable in my surgical career.	6	17,1%	29	82,9%	6	40,00%	9	60,00%

Table 4 - Knowledge about the Multidisciplinary Nutritional Therapy Team.

	Residents		Surgeons	
	n	%	n	%
Yes, but do not know which professionals integrate it.	9	25.7	5	33%
Yes, and interact with it in some cases.	8	22.9	5	33%
No, there is no such team in my institution	4	11.4	1	7%
No, I am not aware	14	40	4	27%
Total	35	100	15	100%

there any differences between the results regarding the perception of NT in both countries.

It is noteworthy that there was a greater number of hits on *indications of nutritional therapy in surgical patients and methods of professional preoperative evaluation* in the groups of residents and surgeons who claim to be assisted by any EMTN, which can point to the efficacy of such services in medicine. It is known that the presence of an EMTN in a service improves nutritional supply, reducing the incidence of complications and cost. It can therefore be inferred that the presence of an EMTN enriches the content of clinical discussions¹⁷. However, we found that 46% of participants are unaware of these teams in their institutions.

We also noted that the subject trauma displayed a better sedimentation of nutritional issues among

residents. We attribute this to the great historical participation of this sector in the areas of surgical expertise and its comorbidities. Also, we observed that the subject *BMI* in the same group had more hits, since it is the most respected nutritional index in medical practice. Nevertheless, we emphasize that the use of the subjective global assessment of Detsky *et al.* yields a better assessment as to weight loss, gastrointestinal symptoms and severity of the disease, and should therefore be sedimented in medical education^{10,11}.

Among surgeons, the topics complications of enteral nutritional therapy and nutritional therapy in previously malnourished patients were detected in groups that considered themselves as having good knowledge about NT. We inferred that the greater experience of these surgeons in the medical practice made them more insightful

about perioperative complications, typically observed in the malnourished patient.

Based on the data observed in the questionnaires and on the necessity of making decisions about nutritional therapy, this study examined whether knowledge of surgery residents and surgeons is appropriate. The result point to the importance, for the formation of the surgeon, of an establishment of educational programs, workshops and better access to the specific literature¹⁸⁻²².

In conclusion, there are gaps in medical education. Only 13.3% were confident about NT, and their knowledge did not justify such confidence. There were no differences between the successes of NT confident and non-confident in most items assessed. Better results were obtained from the group that claimed to be assisted by any EMTN. Better medical educational programs should be goals for this university.

R E S U M O

Objetivo: comparar o conhecimento e percepção em terapia nutricional (TN) de residentes de cirurgia e cirurgiões. **Métodos:** foram aplicados dois questionários padronizados sobre conhecimentos, atitudes e condutas em TN de 50 médicos (35 residentes e 15 cirurgiões) de 12 áreas cirúrgicas distintas. Utilizando-se o teste exato de Fisher, com significância de 5% com $p < 0,05$, foi comparada a proporção de acertos, de acordo com a percepção a respeito do assunto de cada grupo. **Resultados:** mais de 80% não se sentiram seguros frente à TN e 46% negaram conhecimento de equipe multiprofissional de TN (EMTN). Houve maior percentual de acertos, dentre os residentes, nos itens: trauma operatório e sua influência nutricional no paciente ($p=0,047$); IMC normal ($p=0,036$); e TN no pré-operatório ($p=0,007$) e indicação da TN pré-cirúrgico no grupo que diz que interagem com EMTN ($p=0,02$). Dentre os cirurgiões: complicações da TN e TN em pacientes previamente desnutridos ($p=0,044$); e Métodos de avaliação nutricional no pré-operatório no grupo que diz que interagem com EMTN ($p=0,01$). **Conclusão:** há falhas na educação médica. Apenas 13,3% estavam seguros quanto à TN, sendo que os seus conhecimentos não justificaram tal confiança. Não houve diferenças entre os acertos dos confiantes e não confiantes em TN na maioria dos assuntos. Destacaram-se melhores resultados no grupo que afirmou ser assistido por alguma EMTN. Baseando-se nos resultados, a indicação de melhores programas médicos educacionais deve ser objetivo para esta universidade.

Descritores: Terapia nutricional. Nutrição em saúde pública. Corpo clínico hospitalar. Médicos. Conhecimentos, atitudes e prática em saúde.

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ANNEX 1

For each question, choose the best answer.

1. The indication for nutritional therapy includes:
 - a. A BMI of 20.5kg/m²
 - b. Serum albumin 3g/dL
 - c. Involuntary weight loss of 5% in the last 3 months
 - d. 32 cm distal half of the circumference of the arms and.
 - e. Involuntary weight loss greater than 10%, in the last 3 months
2. On parenteral nutrition (PN):
 - a. The infusion through catheters placed peripherally is contraindicated
 - b. The minimum period of administration of NP is 10 days
 - c. In the presence of suspected contamination, the infusion rate should be reduced by half
 - d. The electrolyte supplementation in NP recipients is never required and.
 - e. It should be initiated at half the nutritional needs of the patient and the increase should be gradual
3. How many Kcal are present in 1g of carbohydrate, fat and protein respectively?
 - a. 4, 9, 5
 - b. 6, 12, 8
 - c. 6, 12, 6
 - d. 4, 9, 4
 - e. 9, 12, 9
4. In a nutritional screening at elective hospital admission, which patient listed below is at greater risk of malnutrition?
 - a. Current weight of 80kg, BMI 28, gain of 10kg in the last two months
 - b. Current weight of 60kg, BMI 21, involuntary loss of 3 kg in the last 3 months
 - c. Current weight of 80kg, BMI 27, involuntary loss of 30 kg in the last two months
 - d. BMI 21, 32g/dl albumin without recent weight loss
 - e. Current weight 120kg, BMI 38, 5kg loss in the last 3 months
5. The following statement is true for glutamine:
 - a. It stimulates the formation of nitric oxide
 - b. Glutamine supplementation does not reduce the incidence of sepsis in ICU patients
 - c. In severe situations, glutamine becomes metabolic fuel for muscles
 - d. In severe situations, glutamine becomes a non- essential amino acid
 - e. It donates nitrogen for the synthesis of the antioxidant glutathione
6. On parenteral nutrition catheters:
 - a. The permanence time of a peripherally inserted central catheter (PICC) is typically 3 months
 - b. Forty percent of central venous catheters become infected
 - c. Fifty percent of central venous catheters have dysfunction due to fibrin sheath formation
 - d. The catheter should be removed immediately if infection is suspected
 - e. The catheter tip should ideally be positioned in the veins with high flow
7. A more appropriate conduct in case of diarrhea during feeding through a nasoenteric catheter is:
 - a. Stop nasoenteral feeding and start parenteral nutrition
 - b. Start prophylaxis with oral antibiotics
 - c. Change enteral nutrition for a formulation with high-fat
 - d. Decrease infusion from the nasoenteric catheter
 - e. Oral hydration to replace gastrointestinal losses

8. What would be the normal BMI for the eutrophic patient?
- 21.4 to 26.5
 - 18.8 to 24.6
 - 25.2 to 30.7
 - 19.9 to 24.9
 - 17.8 to 27.7
9. Complications of enteral nutrition therapy do not include:
- hypophosphatemia
 - hepatic steatosis
 - hypercapnia
 - Thiamine deficiency
 - gastrointestinal atrophy
10. On the metabolic response to sepsis:
- The gluconeogenesis occurs in a minority of patients with sepsis
 - The adequate nutritional therapy can reduce the catabolic response
 - The decrease insulin sensitivity in peripheral tissues commonly occurs in patients with sepsis
 - Septic patients have a 3 times increase in their daily energy needs
 - A nutritional intake of at least 100% above the basal metabolic rate culminates in excellent clinical results
11. Interventions which have been associated with improvement of critically ill surgical patients include:
- Parenteral rather than enteral nutrition
 - Intensive insulin therapy
 - High doses of corticosteroids
 - Aggressive fluid resuscitation
 - Maintaining hemoglobin above 10g/dl
12. Rate the affirmative true (T) or false (F) with respect to NT in previously malnourished patients
- Quick intake of calories should be offered to avoid worsening
 - Laboratory Control after the start of NT must be daily, mainly for P, K and Mg
 - If enteral nutrition is not successful after 5 days, associate NPT
 - The calorie recommendation for multiple trauma patients should be 35-40kcal/kg weight / day and 2 -3g of protein / kg / day
- FFFT
 - FTTF
 - TTTF
 - TFFF
 - TFTF
13. In case of acute pancreatitis, the nutritional approach is:
- Enteral Nutrition
 - Fasting
 - Hydration with cristaloids
 - Vitamin supplements, especially with vitamin D
 - Parenteral Nutrition
14. On the operative trauma and its influence on metabolic and nutritional status of the patient, we can say:
- The metabolic response to trauma does not imply systemic changes
 - The local inflammation caused by surgical trauma may become widespread, but not enough to produce a systemic inflammatory response (SIRS)
 - The organic response to trauma is mediated by pro-inflammatory cytokines, counter-regulatory hormones and other mediators that produce metabolic alterations such as increased acute phase proteins, edema, proteolysis, lipolysis and insulin resistance
 - The phases of the metabolic response to trauma are: one initial phase called ebb (day 1-3), characterized by fluid retention, with need of intravenous fluids to maintain homeostasis and normal- or hypometabolic state; and other

- delayed and longer lasting, called flow, characterized by a predominance of anabolism over catabolism, with increased nitrogen excretion, loss of lean body mass, etc.
- e. The end result is the emergence or worsening of malnutrition and decrease in quality of patient's immunity, but there is no increase in the rate of wound healing and infections
15. On the nutritional status and its influence on surgical results, we can say:
- The nutritional status prior to surgery directly influences morbidity and postoperative mortality
 - In Brazil, it is known that nearly 80% of patients in the public health system (SUS) are moderately or severely malnourished
 - Malnourished patients undergoing surgery for cancer have a higher incidence of complications, but no significant impact on mortality rates
 - The preoperative nutritional therapy for severe malnourished patients for 2 to 7 days is associated with a reduction of postoperative infections and length of hospital stay
 - Nutritional therapy for severely malnourished postoperative patients for 2 to 7 days is associated with a reduction of postoperative infections and length of hospital stay
16. On nutritional therapy (NT) in surgical patients?
- Weight loss > 10% in 6 months is an item not seen in a patient with severe nutritional risk and in need of NT
 - The preoperative NT is indicated for a period of 7 to 14 days in severe malnourished patients who are candidate for medium and large elective operations
 - BMI < 18.5 kg/m² and serum albumin < 3mg/dL are no indication of preoperative nutritional therapy
 - In major surgery for cancer resection, even without severe malnutrition, NT preoperative supplements containing immunonutrients for 5-7 days is indicated, but there is no need for continued it postoperatively
 - Patients with preserved appetite without prior malnutrition who will undergo major surgery do not require preoperative nutritional therapy
17. About preoperative NT, we can say that:
- Inadequate intake by mouth for more than 5 days is associated with increased morbidity and postoperative mortality
 - Several randomized trials and meta-analyzes have shown that malnourished patients benefit little from 7-14 days preoperative NT
 - The benefits of NT are primarily characterized by a lower rate of postoperative infection and shortening of hospitalization
 - In patients with gastrointestinal cancer and malnutrition, it was found that parenteral nutrition in the preoperative period (for 7 to 10 days) reduces the risk of complications by 50%
 - The benefits of NT are not primarily characterized by a lower rate of postoperative infection and shortening of hospitalization
18. On the period of preoperative fasting recommended for elective operations, it is known that:
- It is recommended to use 25% maltodextrin in a volume of 200-400 ml
 - Exceptions to the use of maltodextrin are: gastroparesis, poor gastric emptying and intestinal sub-occlusion or obstruction; however, in moderate gastroesophageal reflux disease there are no restrictions, but in the severe form
 - Morbid obesity is not a contraindication to the use of maltodextrin
 - A fasting time of 6 hours for solids and 2h clear liquids containing carbohydrates is recommended
 - A fasting time of 6 hours for solids and 2h clear liquids not containing carbohydrates is recommended
19. About the NT and postoperative reintroduction diet, we can say:
- In elective patients undergoing operations with partial resection of the stomach, small or large intestine the reintroduction of oral or enteral intake is recommended 24-48h after the operation
 - Patients undergoing resections of neoplasms of the head and neck, esophageal resection or total gastrectomy should receive NT by enteral catheter or jejunostomy, also as early as 06-12h after the operation
 - In case b, oral re-feeding is possible 14 days after surgery
 - The postoperative reintroduction of diet should be performed early (12-24h) in most surgical procedures
 - We should always wait for the return of bowel sounds to reintroduce NT
20. About the formula of perioperative NT, we can say:
- In the minority of cases, preoperative NT can be performed with standard polymeric formulas

- b. In patients with head and neck and digestive tract cancer, formulas containing immunonutrients (arginine, w-3 fatty acids and nucleotides) should be avoided
 - c. There is consistent evidence for the perioperative use of probiotics or synbiotics
 - d. The use of immunonutrients such as arginine, omega-3 fatty acids and nucleotides, with or without glutamine in the early postoperative period reduces the incidence of infectious complications
 - e. The use of immunonutrients such as arginine, omega-3 fatty acids and nucleotides, with or without glutamine in the early postoperative period does not reduce the incidence of infectious complications
21. Methods of preoperative nutritional assessment are:
- a. Subjective global assessment, number of lymphocytes and serum albumin
 - b. Skin test, number of monocytes, gamma globulin
 - c. Hemoglobin, renal function, erythrocyte sedimentation rate
 - d. C-reactive protein, AMC (arm muscle circumference), blood glucose
 - e. Edema, liver function, ankle-knee height

ANSWERS

1 - E 2 - E 3 - D 4 - C 5 - E 6 - E 7 - D 8 - D 9 - E 10 - C
11 - B 12 - B 13 - A 14 - C 15 - A 16 - B 17 - C 18 - D 19 - D 20 - D 21 - A

ANNEX 2

For each question, choose the best answer.

1. I feel I have adequate knowledge of nutrition therapy in surgical patients
 - a. Fully disagree
 - b. Disagree
 - c. Agree
 - d. Fully agree

2. I have adequate knowledge and skills to identify patients at risk of malnutrition
 - a. Fully disagree
 - b. Disagree
 - c. Agree
 - d. Fully agree

3. I am able to calculate the daily energy needs and nutritional support of my patient
 - a. Fully disagree
 - b. Disagree
 - c. Agree
 - d. Fully agree

4. I regularly decide on therapy and nutritional interventions of my patients
 - a. Fully disagree
 - b. Disagree
 - c. Agree
 - d. Fully agree

5. I have received adequate information (eg guidelines) to facilitate the nutritional therapy of my patient
 - a. Fully disagree
 - b. Disagree
 - c. Agree
 - d. Fully agree

6. I feel that training in nutritional therapy would be valuable in my surgical career
 - a. Fully disagree
 - b. Disagree
 - c. Agree
 - d. Fully agree

7. In your institution, are you aware that there is an EMTN (Multidisciplinary Nutritional Therapy Team)?
 - a. Yes, but do not know which professional takes part in it
 - b. Yes, and interact in some cases
 - c. No, there is no such team in my institution
 - d. No, I am not aware