



# Integral nutritional approach to the care of cancer patients: results from a Delphi panel

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Received: 6 February 2018 / Accepted: 15 February 2018 / Published online: 2 March 2018  
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## Abstract

**Introduction** Malnutrition is a common complication in cancer patients and can negatively affect the outcome of treatments. This study aimed to reach a consensus on nutritional needs and optimize nutritional care in the management of cancer patients at a national level.

**Methods** A qualitative, multicenter, two-round Delphi study involving 52 specialists with experience in nutritional support in cancer patients was conducted.

**Results** Regarding the presence of malnutrition, 57.7% of the participants stated that < 30% of the patients had malnutrition at the time of diagnosis, 40.4% considered that 31–50% had malnutrition during cancer treatment, and 26.9% that > 50% at the end of the treatment. Forty percent of participants believed that the main objective of nutritional treatment was to improve quality of life and 34.6% to improve tolerability and adherence to chemotherapy. The quality nutritional care provided at their centers was rated as medium–low by 67.3%. Enteral and parenteral nutrition was administered to less than 10% and less than 5% of patients in 40.4 and 76.9% of cases, respectively. In relation to nutritional screening at the time of diagnosis, 62.9% of participants considered than screening to assess the risk of malnutrition was performed in < 30% of patients.

**Conclusions** There is an important variability in the management of cancer patient nutrition, which is associated with the absence of a national consensus on nutritional support in this field. Given the incidence of nutritional disorders in cancer patients, a specialist in clinical nutrition (regardless of his/her specialty) should be integrated into the strategic cancer plan.

**Keywords** Cancer patients · Nutrition · Nutritional support · Enteral nutrition · Parenteral nutrition · Delphi study

## Introduction

Malnutrition is a common problem in patients with cancer that can negatively affect the outcome of treatments and is an important factor in impaired quality of life. The proportion of patients with weight loss at diagnosis ranges between 15 and 40% [1], although the incidence may increase up to 85% in patients with certain cancers (e.g. pancreas) [2]. Additionally, the incidence of malnutrition increases as the diseases progresses, with severe weight loss in about 80% of patients with advanced disease [2, 3]. Early intervention with nutritional supplementation has been shown to halt malnutrition, and may improve outcome in some patients. However, increasing nutritional intake is frequently insufficient to prevent the development of cachexia [4–6]. The pathogenesis of malnutrition and cachexia in cancer patients is multifactorial in which multiple mechanisms originated by the primary tumor, anti-cancer therapies, neural, hormonal, and humoral

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signal interactions related to body fat and energy storage with the hypothalamus play a pathogenic role [7–9]. The negative effects of malnutrition on oncology outcomes as well as on the functional and psychological well-being of patients have extensively recognized [10]. Under-nutrition and cachexia are indicators of poor prognosis and, per se, responsible for excess morbidity and mortality [11]. Cancer-related malnutrition is also associated with significant health care-related costs [12]. Therefore, nutritional support, addressing the specific needs of this patient group is required to help improve prognosis and reduce the consequences of cancer-associated nutritional decline. In this respect, The European Society for Clinical Nutrition and Metabolism (ESPEN) recently published evidence-based guidelines for nutritional care in patients with cancer, in which a key step is the use multimodal nutritional interventions with individualized plans, including care focused on increasing nutritional intake, lessening inflammation and hypermetabolic stress, and increasing physical activity [13, 14].

On the other hand, parenteral nutrition offers the possibility of increasing or ensuring nutrient intake in patients in whom normal food intake is inadequate and enteral nutrition is not feasible, is contraindicated or is not accepted by the patient. Recommendations for the use of parenteral nutrition in cancer patients have been also reported [15], but in clinical practice, indications for and perceived benefit of parenteral nutrition remain controversial [16–18]. The decision to utilize parenteral nutrition is difficult and treatment is expensive. Moreover, there is limited information based on observational studies regarding prescription of parenteral nutrition in the hospital and outpatient oncology settings, the role of professionals involved, and the goals, indications, contraindications, and barriers for its use [19, 20]. Also, evidence-based guidelines may do not provide answers for some controversial aspects and clinical scenarios in terms of decision-making that specialists must deal with in their daily practice. In this regard, an expert consensus might represent a useful tool. The purpose of this Delphi study was to reach consensus on nutritional needs and highlight areas for improving and optimizing nutritional care in the management of cancer patients at Spanish national level. Secondary objectives were as follows: (1) to assess the level of knowledge of clinical practice guidelines on the nutritional management of cancer patients by health professionals involved in their approach; (2) to establish the level of agreement among experts regarding different aspects of nutritional management of cancer patients; (3) to gather information on those aspects with the highest levels of uncertainty related to clinical the nutritional management of cancer patients.

## Materials and methods

A qualitative non-randomized, multicenter, two-round Delphi study was used. The Delphi method is generally accepted as a powerful means of reaching consensus and generating ideas among responders on a number of issues related to health problems in conditions of low-grade evidence, knowledge or application [21]. Briefly, the method involves sending a questionnaire to the responders and analyzing their response. This is then used to develop a new questionnaire and the cycle is repeated. Three methodological aspects are important in a Delphi study. First, responders are not aware of the identity of the other responders, to ensure that their responses are independent. Second, participants respond individually to avoid group domination by certain individuals. Third, mathematical voting procedures are used which permit the ranking of items. Likewise, there are no set guidelines for deciding on the optimum number of Delphi participants as this is likely to change depending on the purpose of the Delphi survey [22].

A multidisciplinary expert panel (scientific committee) was composed of two medical oncologists, two endocrinologists, one surgeon with expertise in digestive surgery, one nutritionist, one hospital pharmacist, and one oncology nurse. Participants were authors of relevant research publications and were renowned professionals in the care of oncology patients, with expertise in nutrition. Each member of the panel proposed ten participants of their specialty, including medical and radiotherapeutic oncologists, endocrinologists, general surgeons, digestive system specialists, nutritionists, hospital pharmacists, and oncology nurses with a minimal experience of 2 years in the care and in the nutritional approach of cancer patients.

The protocol and the study questionnaire were lodged in an Internet microsite to which participants accessed via a weblink included in the e-mail. Participants selected by the scientific committee were given an electronic information leaflet with a full description of the objectives and characteristics of the survey, and those who accepted were provided with the microsite URL and the user's password.

Items to be included in the Delphi rounds were identified by members of the expert panel based on a search of the literature to identify previously conducted studies with high level of evidence, such as systematic reviews and meta-analyses, and key primary studies focused on the field of nutrition in cancer patients. A first list of topics was developed that after being submitted to the panel for comments and necessary modifications was approved as the initial draft of the questionnaire.

The final document emerged from a two-round Delphi consensus process.

The study questionnaire was divided into two main sections. Section A (nutrition in cancer patients) was composed of 17 items and included general questions regarding the frequency of malnutrition and characteristics of nutritional support in cancer patients. Section B (management of parenteral nutrition in cancer patients) included four dimensions, B1: awareness and visibility of nutritional treatment in cancer patients (13 items), B2: multidisciplinary team (3 items), B3: nutritional screening (9 items), and B4: nutritional approach for specialized nutrition support (7 items). The level of agreement was rated according to a 5-point Likert scale, ranging from 1 ‘strongly disagree’ to 5 ‘strongly agree’. A mean score of 5 was defined as agreement (positive consensus), a mean score of 1 as disagreement (negative consensus), and a mean score between 4 and 2 as lack of consensus.

Descriptive statistics for categorical variables included frequencies and percentages, and mean and standard deviation (SD) for continuous data. The SAS version 9.1.3 was used for data analysis.

## Results

### Participants

A total of 52 health care professionals volunteered to participate in the study. There were 15 men and 37 women, with a mean (standard deviation, SD) age of 44.8 (9.2) years. In 32.7% of the cases, participants were specialists in endocrinology, 28.8% in hospital pharmacy, 15.4% in nutrition, 13.5% in medical oncology, 7.7% in general surgery, 7.7% in oncological radiotherapy, and 3.8% were nurses. The mean years of practice was 17.3 (8.8). A total of 41.2% of respondents were specialized in the management of cancer patients with tumors of the digestive tract, and of all cancer patients they attended, 94.2% had an advanced stage neoplasia.

### General characteristics of nutrition in cancer patients

The main results of this section of the questionnaire are shown in Table 1. More than half of participants (57.7%) stated that less than 30% of patients had malnutrition at the time of diagnosis, 40.4% considered that between 31 and 50% of patients presented malnutrition during cancer treatment, and 26.9% that more than 50% of patients had malnutrition at the end of treatment (Fig. 1). About 40% of participants stated that malnutrition in 10–30% of patients could be attributable to characteristics of the tumor and/or chemotherapy and/or radiation therapy, whereas 60% considered surgery as the causative factor of malnutrition.

Forty percent of participants believed that the main objective of nutritional treatment was to improve quality of life and 34.6% to improve tolerability and adherence to chemotherapy. Also, the quality of nutritional care provided at their centers was rated as medium–low by 67.3% of responders (low was defined as one or the combination of the following: late or absence of nutritional intervention, infrequent presence of nutrition support team; medium: early nutritional intervention or frequent nutrition reinforcement, but not both). The quality was considered to be high by the remaining 32.7% of responders (high: early intervention, increase of nutritional support, supplementation, artificial nutrition if required, monitorization the risk of malnutrition).

Less than 5% of patients were treated different types of nutritional supports for the prevention of malnutrition, whereas 59.6% received oral nutritional supplements for the treatment of malnutrition. Enteral and parenteral nutrition were administered to less than 10% and less than 5% of patients in 40.4 and 76.9% of cases, respectively. In relation to surgical treatment, parenteral nutrition was used in more than 15% of patients when inability to use the oral route for > 7 days was foreseen and in the presence of severe preoperative malnutrition, short bowel syndrome, hepatectomy, and postoperative complications impairing oral feeding. With regard to chemotherapy, 21.1% of responders used parenteral nutrition in more than 15% of patients in case of severe malnutrition, 51.9% when complications prevented oral intake, and 38.5% in bone marrow transplantation.

A total of 69.2% of participants considered that nutritional screening to assess the risk of malnutrition was performed in less than 30% of patients diagnosed with cancer. Nutritional screening was performed by the department of nutrition in 52.3% of cases, medical oncology in 50%, radiotherapy in 45.5%, and endocrinology in 31.8% (Fig. 2), using the Nutritional Risk Screening 2002 (NRS 2002), Malnutrition Universal Screening Tool (MUST) calculator and the Mini Nutritional Assessment (MNA) tool in the majority of cases. Of the specialists involved in the different hospital tumor committees, the mainly responsible for the nutritional management of the patients was the endocrinologist, in 28.8% of cases, the nutritionists in 27% and the medical oncologist in 17%. However, 36.5% of participants considered that only 10–30% of cancer patients underwent nutritional assessment during the course of the disease and that only 23.1% of centers had quality indicators of nutritional care for cancer patients. Patients with tumors of the gastrointestinal tract were rated as the more frequent candidates for in-patient and out-patient parenteral nutrition.

### Management of parenteral nutrition in cancer patients

As shown in Table 2, positive consensus was achieved in three questions regarding “the need of promoting the

**Table 1** General characteristics of nutrition in cancer patients

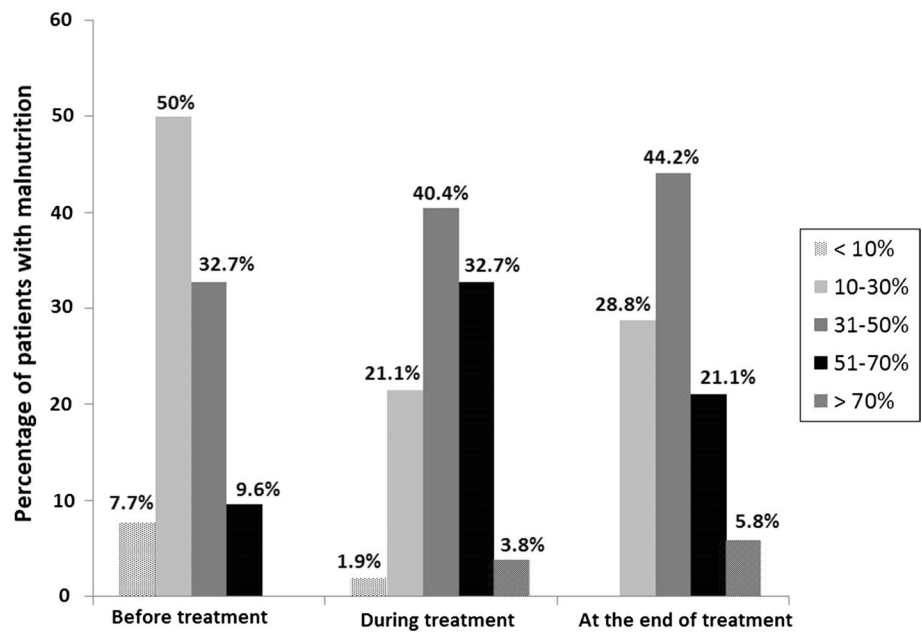
	Number (%) <sup>a</sup>
<b>Causes of malnutrition</b>	
<b>Tumor-related</b>	
< 10%	2 (3.8)
10–30%	24 (46.1)
31–50%	19 (36.5)
51–70%	7 (13.5)
> 70%	0
<b>Chemotherapy-related</b>	
< 10%	3 (5.8)
10–30%	22 (42.3)
31–50%	18 (34.6)
51–70%	9 (17.3)
> 70%	0
<b>Radiotherapy-related</b>	
< 10%	7 (13.5)
10–30%	21 (40.4)
31–50%	18 (34.6)
51–70%	5 (9.6)
> 70%	1 (1.9)
<b>Surgery-related</b>	
< 10%	4 (7.7)
10–30%	31 (59.6)
31–50%	13 (25.0)
51–70%	4 (7.7)
> 70%	0
<b>Main objective of nutritional therapy</b>	
Improvement of tolerability and adherence to anticancer treatment	18 (34.6)
Control of some adverse effects of anticancer treatment	3 (5.8)
Improvement of quality of life	22 (42.3)
Increase of survival	9 (17.3)
<b>Use of different types of nutritional support to prevent malnutrition</b>	
<b>Oral nutrition plus oral nutritional supplements</b>	
25%	28 (53.8)
50%	11 (21.1)
75%	11 (21.1)
100%	2 (3.8)
<b>Enteral nutrition</b>	
< 10%	27 (51.9)
10–20%	19 (36.5)
21–40%	3 (5.8)
> 40%	3 (5.8)
<b>Parenteral nutrition</b>	
< 5%	40 (76.9)
5–10%	10 (19.2)
11–15%	2 (3.8)
<b>Mixed enteral and parenteral</b>	
< 5%	44 (84.6)
5–10%	6 (11.5)
11–15%	2 (3.8)

**Table 1** (continued)

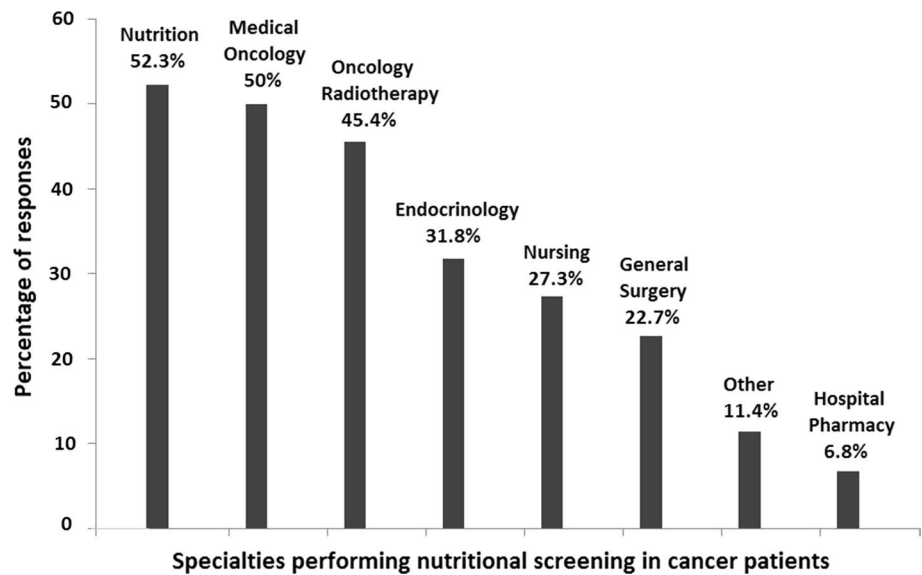
	Number (%) <sup>a</sup>
Use of different types of nutritional support for the treatment of malnutrition	
Oral nutrition plus oral nutritional supplementation	
25%	19 (36.4)
50%	14 (26.9)
75%	17 (32.7)
100%	2 (3.8)
Enteral nutrition	
< 10%	21 (40.4)
10–20%	17 (32.7)
21–40%	8 (15.4)
> 40%	6 (11.5)
Parenteral nutrition	
< 5%	40 (76.9)
5–10%	11 (21.1)
11–15%	1 (1.9)
Mixed enteral and parenteral	
< 5%	42 (80.8)
5–10%	10 (19.2)
11–15%	0
Nutritional screening at the time of diagnosis of malignancy	
Not performed	8 (15.4)
< 10%	16 (30.8)
10–30%	12 (23.1)
31–50%	7 (13.5)
51–70%	3 (5.8)
> 70%	6 (11.5)
Patients undergoing nutritional assessment over the course of the disease	
Not performed	1 (1.9)
< 10%	5 (9.6)
10–30%	19 (36.5)
31–50%	16 (30.8)
51–70%	6 (11.5)
> 70%	5 (9.6)
Existence of indicators of quality of nutritional care in the hospital	
Yes	12 (23.1)
No	40 (76.9)
Indicators of quality of nutritional care	
Prevalence of malnutrition in cancer patients	5 (9.6)
Nutritional screening	6 (11.5)
Nutritional assessment	10 (19.2)
Survival	1 (1.9)
Catheter-related infection eliminar repetido due to parenteral nutrition	6 (11.5)
Quality of life	4 (7.7)
Performance status	7 (13.5)
Other	

<sup>a</sup>Total valid responses 52

**Fig. 1** Percentage of patients with malnutrition before, during, and after anticancer therapy reported by 52 responders to the Delphi survey



**Fig. 2** Specialties involved in nutritional screening in cancer patients reported by 52 responders to the Delphi survey



implementation of actions among the health care personnel aimed at preventing malnutrition in cancer patients with positive screening or at risk of malnutrition” (82.4% of agreement), “it is necessary to inform appropriately the patient and their caregivers regarding the prescribed nutritional support to make them involved and to improve adherence” (78.4% of agreement), and “nutritional support improves quality of life of cancer patients” (62.7% of agreement).

In the three items related to the multidisciplinary team, a positive consensus (score 5) was reached in 50, 44, and 54%, respectively (Table 3). In the nine items of nutritional screening, the level of agreement was also higher than 4 for six questions, with positive consensus ranging between

40 and 72%. Consensus was not reached for three items, including compulsory screening, which should be performed by nurses or health care personnel, the need for reevaluation (at least at each visit) of patients with negative initial nutritional screening, and the use of automated nutritional alert filters for facilitating generalized screening of cancer patients (Table 3).

In relation to nutritional approach for specialized nutrition support (7 items), the mean the level of agreement was higher than 4 in four items, although the percentages of positive consensus (score 5) ranged between 34 and 58% (Table 4). The highest level of consensus (58%) was achieved for the need of developing good clinical practice

**Table 2** Management of parenteral nutrition in cancer patients

Items of the questionnaire	5-point Likert scale <sup>a</sup>					Mean (SD)
	1	2	3	4	5	
Is there enough awareness about the importance of nutrition in the integral treatment of cancer patients?	3 (5.9)	16 (31.4)	13 (25.5)	15 (29.4)	4 (7.8)	3.0 (1.1)
Does my center have the capacity and resources necessary to offer a comprehensive nutritional treatment to the patient with cancer?	1 (2.0)	8 (15.7)	9 (17.6)	21 (41.2)	12 (23.5)	3.7 (1.1)
Implementation of the necessary measures to offer an integral nutritional treatment to the patient with cancer is complex and implies a great cost	5 (9.8)	23 (45.1)	16 (31.4)	5 (9.8)	2 (3.9)	2.5 (0.9)
The model of nutritional care for the patient with cancer in my center could be an example of efficiency and good implementation for other centers	6 (11.8)	18 (35.3)	12 (23.5)	13 (25.5)	2 (3.9)	2.7 (1.1)
It is necessary to promote the implementation of actions among health care personnel aimed at preventing malnutrition in cancer patients with positive screening or at risk of malnutrition?	0	0	2 (2.0)	8 (15.7)	42 (82.4)	4.8 (0.4)
Nutritional support contributes to improve survival in certain patients receiving active anticancer therapy	0	4 (7.8)	6 (11.8)	18 (35.3)	23 (45.1)	4.2 (0.9)
Nutritional support improves patient's adherence to anticancer treatment	0	1 (2.0)	2 (3.9)	30 (58.8)	18 (35.3)	4.3 (0.6)
Nutritional support improves quality of life of cancer patients	0	0	3 (5.9)	16 (31.4)	32 (62.7)	4.6 (0.6)
Nutritional support may reduce adverse effects of anticancer treatments	0	2 (3.9)	10 (19.6)	27 (52.9)	12 (23.5)	4.0 (0.8)
It is necessary to inform appropriately the patient and their caregivers regarding the prescribed nutritional support to make them involved and to improve adherence	0	0	0	11 (21.6)	40 (78.4)	4.8 (0.4)
The use of CaVEN type questionnaires should be strengthened during nutritional assessment of cancer patients	0	3 (5.9)	8 (15.7)	25 (49.0)	15 (29.4)	4.0 (0.8)
Malnutrition of cancer patients should be an indicator of the quality of care in the hospital setting	1 (2.0)	0	4 (7.8)	19 (37.3)	27 (52.9)	4.4 (0.8)
Malnutrition of cancer patients should be integrated in the strategic plans of the different Autonomous Communities	1 (2.0)	0	4 (7.8)	19 (37.3)	27 (52.9)	4.4 (0.4)

CaVEN nutritional status-related quality of life

<sup>a</sup>Total valid responses 51; Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree

recommendations for the management of venous access in cancer patients requiring parenteral nutrition in the hospital or at home.

## Discussion

This study presents the results of a Delphi survey to assess the current status of nutrition in cancer patients in a national sample of Spanish health care professionals. Regarding the specialty of participants, there was some disbalance in the percentage of oncologists (medical and radiotherapeutic), which was lower than expected in favor of endocrinology and hospital pharmacy accounting for 61.5% of all specialties. However, all participants were experienced professionals in their centers for the management of clinical nutrition, with a mean of 17.7 years of practice. Most of them were not specialized in a particular tumor type and cared for patients with advanced cancer (94% of cases).

An interesting finding of the study was the high percentage of patients with malnutrition before starting anticancer therapy, during treatment, and at the end of therapy. A total

of 27% of responders considered that malnutrition was present in more than 50% of patients, and 71% in more than 30% of patients at the end of treatment, which was similar to 35 and 75% of responders for the presence of malnutrition during anticancer therapy. Chemotherapy was recognized as the main factor involved in malnutrition. Therefore, we found that nutritional support in cancer patients is insufficient, which is in agreement with previous claims of inadequate nutritional management in patients with cancer [23]. In an exploratory national survey conducted by the Italian Society of Medical Oncology (AIOM) and the Italian Society of Artificial Nutrition and Metabolism (SINPE), the rate of nutritional assessment or support integrated into patient care was only of 28% [24]. Moreover, among 2375 AIOM members only 135 (5.7%) participated in the survey. This low response rate may reflect the lack of awareness and consideration of nutritional issues among Italian oncologists [24]. In a questionnaire answered by 357 UK specialists oncological trainees [25], it was shown that although nutritional status and intervention were considered important to outcome in patients receiving active therapy for malignancy, there is an inability to identify patients at risk of



**Table 3** Multidisciplinary team and nutritional screening

Items of the questionnaire	5-point Likert scale <sup>a</sup>					Mean (SD)
	1	2	3	4	5	
<b>Multidisciplinary team</b>						
It is necessary and important that one of the members of the tumor committee should be an expert in clinical nutrition who leads the nutritional approach of the patient from diagnosis to discharge	0	3 (6.0)	7 (14.0)	15 (13.0)	25 (50.0)	4.2 (0.9)
The multidisciplinary team of tumor committees should establish and define the method of screening to be used in cancer patients from diagnosis of malignancy for early detection and treatment of malnutrition	1 (2.0)	2 (4.0)	5 (10.0)	20 (40.0)	22 (44.0)	4.2 (0.9)
The multidisciplinary team of tumor committees should establish and promote the communication to the remaining health care professionals of the center involved in the care of cancer patients of the algorithm of nutritional measures according to results of nutritional screening	1 (2.0)	2 (4.0)	3 (6.0)	17 (34.0)	27 (54.0)	4.3 (0.9)
<b>Nutritional screening</b>						
Should be considered as a minimum variables of nutritional screening: body mass index (BMI < 18.5 g/km <sup>2</sup> ), involuntary weight changes (weight loss > 5% in 3 months or > 10% in 6 months), and modifications in the usual food intake in the last month?	0	0	3 (6.0)	12 (24.0)	35 (70.0)	4.6 (0.6)
Nutritional screening should also consider treatment-related nutritional risk	1 (2.0)	0	1 (2.0)	17 (34.0)	31 (62.0)	4.5 (0.7)
Nutritional screening in cancer patients should be compulsory and performed by nurses	0	6 (12.0)	9 (18.0)	17 (34.0)	18 (36.0)	3.9 (1.0)
Nutritional screening in cancer patients should be compulsory and performed by health care personnel	3 (6.0)	13 (26.0)	18 (36.0)	10 (20.0)	6 (12.0)	3.1 (1.1)
Oncology nurses should be trained in the use of the nutritional screening method selected by the center	0	1 (2.0)	4 (2.0)	16 (32.0)	31 (62.0)	4.5 (0.7)
Nutritional screening should be performed in the first days following diagnosis of malignancy	0	1 (2.0)	2 (4.0)	17 (34.0)	30 (60.0)	4.5 (0.7)
A process for rapid evaluation of patients with positive screening of risk of malnutrition should be established	0	0	0	14 (28.0)	36 (72.0)	4.7 (0.4)
Cancer patients with initial negative nutritional screening should be reevaluated (at least at each visit)	0	1 (2.0)	8 (16.0)	21 (42.0)	20 (40.0)	4.2 (0.8)
Automated nutrition alert filters would be useful for facilitating generalized screening of cancer patients	2 (4.0)	4 (8.0)	17 (34.0)	11 (22.0)	16 (32.0)	3.7 (1.1)

<sup>a</sup>Total valid responses 50; Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree

malnutrition and to refer those who may benefit from early nutritional intervention.

Experts agreed on the positive effect of nutritional support on improvement of quality of life and tolerability and adherence to anticancer therapy, which has also been emphasized in previous reports [8, 26], in particular the importance of achieving  $\geq 80\%$  adherence to ensure efficacy of treatment [27]. The fact that 67% of surveyed professionals rated the quality of nutritional support in their centers as medium–low together with the absence of quality indicators of nutritional care in 77% of the cases and deficient nutritional screening policies prevents implementation of early and effective nutrition support therapies. In addition, nutritional interventions are mostly based on oral dietary supplements or food reinforcement, with a low penetration of specialized nutritional support. It should be noted that use of parenteral nutrition and mixed enteral and parenteral nutrition in less than 5% of patients was reported by 77 and

81% of responders, respectively. Also, 73% manifested the use of enteral nutrition in less than 20% of cancer patients. This finding should be emphasized as enteral route is by far the most commonly used route of access.

Results of the survey show the lack of consensus on nutritional screening and who performs it, as well as the remarkable heterogeneity in nutritional management of cancer patients, although responders agreed on the presence of an expert in clinical nutrition in the hospital tumor committees. In this respect, a specialist in clinical nutrition (independently of his/her specialty) should be integrated within the strategic cancer plan as an active part in the treatment of cancer patients, intervening in a coordinated manner with the rest of the professionals at an early stage and ideally participating in the decisions from the tumor committee of each center. This proposal would also imply super-specialization and the development of the figure of the specialist in oncological clinical nutrition.



**Table 4** Nutritional approach for specialized nutrition support

Items of the questionnaire	5-point Likert scale <sup>a</sup>					Mean (SD)
	1	2	3	4	5	
Protocols should be developed that define the prescription of nutritional care and include methods for: (1) the estimation of nutritional requirements, (2) the selection of the route of administration and the nutritional formula, and (3) the care related to nutritional therapy	0	0	2 (4.0)	21 (42.0)	27 (54.0)	4.5 (0.6)
Probably in palliative patients with weight loss and reduced intake there is a benefit with the administration of mixed nutritional support with parenteral nutrition	2 (4.0)	12 (24.0)	18 (36.0)	14 (28.0)	4 (8.0)	3.1 (1.0)
In the palliative patient with intestinal failure, parenteral nutrition should be administered if the following requirements are met: enteral nutrition is insufficient, the survival expectancy is greater than 2–3 months, parenteral nutrition is expected to improve the general condition or quality of life of the patient, the patient wants this mode of nutritional support	0	1 (2.0)	7 (14.0)	25 (50.0)	17 (34.0)	4.2 (0.7)
Although parenteral nutrition provides nutrients to the tumor, there is no evidence of a negative clinical impact. Therefore, this consideration should not affect decision to use parenteral nutrition in cancer patients when clinically indicated	1 (2.0)	0	3 (6.0)	23 (46.0)	23 (46.0)	4.3 (0.8)
Mixed nutritional support with parenteral nutrition would be recommended in patients foreseen inadequate feeding by the oral or enteral routes [ $<$ resting energy expenditure (REE)] during a period of 10 days	1 (2.0)	3 (6.0)	11 (22.0)	23 (46.0)	12 (24.0)	3.8 (0.9)
Little knowledge of oncology nursing staff regarding indication, handling, etc. in the management of catheters, such as peripherally-inserted central catheter (PICC) or central lines is a current barrier for the use of parenteral nutrition as a specialized nutrition support in patients with indication	5 (10.0)	15 (30.0)	8 (16.0)	13 (26.0)	9 (18.0)	3.1 (1.3)
It would be necessary to develop Good Clinical Practice guidelines for the management of venous access in cancer patients requiring parenteral nutrition at the hospital or at home	0	2 (4.0)	3 (6.0)	16 (32.0)	29 (58.0)	4.4 (0.8)

<sup>a</sup>Total valid responses 50; Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree

In summary, the present results provide evidence of an important variability in the management of clinical nutrition in cancer patients among the participating centers, which is also associated with absence of a national consensus on nutrition support in this population. Therefore, there is an urgent need to implement policies of nutritional intervention that include the standardization and development of clinical protocols, which should be directed to guarantee the most adequate and efficient nutrition support for each cancer patient. Furthermore, a specialist in clinical nutrition should be included in the strategic approach to cancer management at local and national level.

**Acknowledgements** The authors thank Marta Pulido, MD, for editing the manuscript and editorial assistance. This study was funded by Fresenius Kabi, Barcelona, Spain.

### Compliance with ethical standards

**Conflict of interest** The authors disclosed no conflicts of interest.

**Research involving human participants and/or animals** Not applicable.

**Informed consent** Not applicable.

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