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Addressing malnutrition in cancer care: Where do postgraduate oncology students stand?

Lidia Santarpia [a,*], Michela Zanetti [b,d], Federico Bozzetti [c]

[a] Internal Medicine and Clinical Nutrition, Department of Clinical Medicine and Surgery, Federico II University, Naples, Italy
[b] Geriatric Clinic, Maggiore Hospital of Trieste, Azienda Sanitaria Universitaria Integrata Giuliano Isontina, Trieste, Italy
[c] Residenza Querce, Milanodue, 20054, Segrate, Italy
[d] Department of Medical, Surgical and Health Sciences, University of Trieste, Trieste, Italy

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SUMMARY

Background & aims: Disease-associated malnutrition and cachexia affect a high percentage (between 30 % and 80 %) of cancer patients; appropriate diagnosis and intervention can improve clinical outcomes. We investigated opinions and knowledge of oncology residents towards nutritional care in cancer patients.

Methods: Following mapping post-graduate schools in oncology, an invitation was sent to the directors with a link to be transferred to residents willing to participate to the survey anonymously. The survey consisted in a questionnaire including 42 questions related to nutrition in cancer patients exploring the didactic component, the clinical daily activities in the oncology department, attitude and cultural background.

Results: 135 residents from 17 universities (54.8 % of total) completed the survey (49 responders were attending the 1st year, 26 the 2nd, 23 the 3rd, 30 the 4th and 7 the 5th or had just finished the specialty). Only 25.9 % of residents reported receiving specific lessons on clinical nutrition during their training, while malnutrition and sarcopenia were covered in 60 % and artificial nutrition in 48.9 %. Nutritional status assessment was routinely performed in 34.3 % of oncology departments, while in 63.5 % it was carried out only if the patient was already (or clearly) malnourished and in 2.2 % it was not performed at all. When performed, the assessment was conducted by oncologists in 53.7 % of cases, whereas 43.4 % relied on the nutritional team. Oral nutritional supplementation was prescribed by oncologists in 41.9 % of cases, and parenteral nutrition in 53 %.

However, significant gaps in residents' nutritional knowledge emerged: only 13.3 % of residents correctly answered more than 66 % of nutrition-related questions. A majority (84.5 %) achieved scores between 34 and 66 %, while 2.2 % scored below 33 %. Widespread misunderstanding was observed regarding key nutritional concepts such as routes of nutritional support, metabolic needs in cancer, and malnutrition criteria. Despite these deficiencies, nearly all participants (98.5 %) agreed on the importance of oncologists acquiring basic nutritional competencies.

Conclusions: The results of this survey indicate that malnutrition in cancer patients remains an undervalued clinical condition and the teaching of clinical nutrition in oncology residency programs remains inadequate and needs to be strengthened. These findings underscore the urgent need to integrate comprehensive nutritional education into oncology curricula and promote interdisciplinary collaboration to ensure early identification and management of malnutrition in cancer patients.

1. Introduction

Cancer-associated malnutrition results from a combination of anorexia and metabolic dysregulation, caused by the tumour itself and the employed treatments.

* Corresponding author.
E-mail address: lidia.santarpia@unina.it (L. Santarpia).

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If not diagnosed and corrected in time, these conditions can lead to cachexia, a multifactorial syndrome characterized by severe, involuntary loss of skeletal muscle mass, increased systemic inflammatory response [1] and increased protein catabolism [2,3].

Weight loss is usually the presenting symptom of malnutrition in oncologic patients [4,5] from 30 % to more than 80 % of patients, depending on the involved organs [6]; for example, colorectal, lung, head and neck, upper gastrointestinal and haematological malignancies are usually associated with a greater malnutrition risk [7,8].

Research over the past two decades has consistently demonstrated that the progressive loss of muscle mass in cancer patients is associated with chemotherapy-related toxicity, diminished response to chemotherapy and biologic agents (antineoplastic) treatments, poor function and quality of life and higher health care costs [9–11]. Moreover, this loss of muscle mass has been identified as an independent and significant predictor of overall survival [6].

The European Society for Clinical Nutrition and Metabolism (ESPEN) [12] recommends to regularly screen patients affected by cancer for the risk or presence of malnutrition, to early detect and promptly provide an effective treatment.

A parallel pathway approach, where oncology and clinical nutrition work in synergy, beginning from the diagnosis of the disease and during its complete development, provides cancer patients a chance to prevent or delay cancer cachexia onset [2,13].

Despite the widespread evidence demonstrating the importance of nutrition in oncology, malnutrition is frequently undervalued and overlooked [9,14].

Several recently carried out surveys revealed an inadequate management of this comorbidity by health professionals [15–18].

2. Aim of the study

This study aims to explore whether the limited involvement of oncologists in the nutritional care of cancer patients is related to insufficient training during their years of specialization. To this end, an *ad hoc* questionnaire was distributed to postgraduate students at Italian schools of oncology, assessing their knowledge of the principles of nutritional care in oncology. Furthermore, three complementary aspects were examined: the content of the didactic programs, the nutritional activities implemented within departments, and the residents' opinion on these issues.

3. Materials and methods

3.1. Setting

Postgraduate schools in oncology in Italy. A list of all Italian postgraduate schools in oncology was obtained from the website of the Italian Ministry of University (www.gov.it). Afterwards an e-mail was sent on behalf of the Italian Society of Artificial Nutrition and Metabolism (SINPE) to school directors, illustrating the aims of the survey and requesting their participation.

3.2. Participants

Oncology residents participated in the study.

3.3. Interventions

Participants willing to take part anonymously could register and access the survey via a dedicated link. The written questionnaire included 42 questions, starting with an initial section requesting the university of origin (question 1) and the year of specialization (question 2), followed by 3 yes/no questions, and concluding with 37 multiple-choice questions.

The questionnaire focused on four main topics: 1) the existence of a clinical nutrition curriculum within postgraduate school programs; 2) the inclusion of nutritional therapy prescriptions in the trainees' routine clinical activities; 3) the residents' basic knowledge regarding nutritional status screening, assessment, and nutritional support; 4) the residents' opinions on various aspects of nutritional care.

Participating oncology residents completed the questionnaire electronically between January 2023 and July 2024, and the responses were directly recorded in the study database. Questions 13–37, which specifically address knowledge in nutrition, are detailed in Table 1.

4. Results

Thirty-one Italian oncology postgraduation school directors were called to participate to the survey and distribute the questionnaire to their residents. Questionnaires were distributed between January 2023 and July 2024.

Seventeen of the 31 Universities (54.8 %) participated with at least one completed questionnaire. Institutes which responded by region are reported in Table 2 showing that percentage which accepted to fill the questionnaire was about 55 %, except Southern Italy and the Islands where it exceeded 70 %.

Overall, 135 residents responded to the invitation. The distribution of responders by level of seniority is reported in Table 4. The highest participation (36.3 %) was recorded among first year residents.

Regarding the first exploratory area (didactic component, q 3, 4 and 5) only 25.9 % of responders referred the presence of specific lessons on clinical nutrition during their specialization course (q 3), while topics as malnutrition and sarcopenia were in some way addressed in 67.4 % (q 4) and artificial nutrition (q 5) in 59.3 % (Table 1).

The answers to the questions belonging to the area of the oncological department daily activity showed that the evaluation of the nutritional status of the patient (q 6) was regularly carried out according to 34.1 % of the respondents and the nutritional evaluation (q 7) was performed by the nutritional team in 43.7 % and by the oncologist in the remaining 54.1 %, while in 2.2 % it was not done.

The prescription of an oral nutritional therapy (q 8) to the patient was made in 56.3 % by the nutritional team and in 41.5 % by the oncologist, while in 2.2 % it was not done. Finally, the decision to prescribe a parenteral nutrition therapy (q 9) was made by the oncologist and by the nutritional team in 54.1 % and 43.7 %, respectively, while in 2.2 % it was not done.

The third part explored the area of the residents' cultural background about the nutritional screening and assessment of the nutritional status (Table 3).

Main findings are the following: 88.9 % of residents felt to be able to identify an at risk/malnourished patient (q10), however only 41.2 % knew the difference between nutritional screening and nutritional assessment (q11), 35.1 % reported they acquired fundaments and skills for a nutritional screening during their postgraduate course and 58.2 % declared not to be able to perform a nutritional screening because their postgraduate course did not provide them the basics. Finally, 6 % believed that it was not the oncologist's competence to carry out the procedure of the nutritional screening (q12).

Lastly, questions 13 to 37, are pertinent to the fourth area that aimed to explore the level of knowledge of the participants.

Table 1
The survey questionnaire: questions and answers, total number and percentage. The questionnaire is divided in four parts: 1) (q 3–5) regarding the didactic component; 2) (q 6–9) daily activity in the oncology department; 3) (q 10–37) attitude and cultural background; 4) (q 38–42) the resident opinion on different aspects of the nutritional care.

QUESTION (n.)	QUESTION	ANSWERS	n (%)
1	University of the postgraduate school	Cagliari	1
		Catanzaro	2
		Firenze	2
		Genova	1
		Messina	12
		Modena e Reggio Emilia	1
		Napoli Federico II	21
		Napoli Vanvitelli	32
		Padova	1
		Parma	2
		Pavia	9
		Perugia	1
		Politecnico delle Marche	3
		Roma- Cattolica	4
		Roma–La Sapienza	2
		Udine	2
		Verona	4
2	Year of postgraduate school	I	49 (36.3 %)
		II	26 (19.3 %)
		III	23 (17.0 %)
		IV	30 (22.2 %)
		V Or postgraduation terminated	7 (5.2 %)
DIDACTIC COMPONENT			
3	Are/have been lessons in clinical nutrition carried out in your specialization course?	Yes	35 (25.9 %)
		No	100 (74.1 %)
4	In your specialization course, are/have been topics such as “malnutrition/sarcopenia” addressed?	Yes	91 (67.4 %)
		No	44 (32.6 %)
5	Is/has been the topic “artificial nutrition” (i.e: Indications/ contraindications, etc.) covered in your specialization course?	Yes	80 (59.3 %)
		No	55 (40.7 %)
ACTIVITY IN THE DEPARTMENT			
6	In the department where you work, how is the assessment of the nutritional status of a cancer patient carried out?	It is done routinely	46 (34.1 %)
		It is never done	3 (2.2 %)
		It is only done if the patient appears malnourished	86 (63.7 %)
7	In the department where you work, who assesses the nutritional status of a cancer patient?	The oncologist always	19 (14.1 %)
		The oncologist sometimes	54 (40.0 %)
		The nutritional team	59 (43.7 %)
		No one	3 (2.2 %)
8	In the department where you work, who prescribes the oral nutritional therapy to a cancer patient:	The oncologist always	12 (8.9 %)
		The oncologist sometimes	44 (32.6 %)
		The nutritional team	76 (56.3 %)
		No one	3 (2.2 %)
9	In the department where you work, who makes the decision of prescribing a parenteral nutritional therapy to a cancer patient?	The oncologist always	19 (14.1 %)
		The oncologist sometimes	54 (40.0 %)
		The nutritional team	59 (43.7 %)
		No one	3 (2.2 %)
ATTITUDE AND CULTURAL BACKGROUND			
10	Are you able to identify an at risk/malnourished patient?	YES, because I received the notions to do it	(62) 45.9
		YES, because I autonomously studied this topic	(58) 43.0
		NO because it is not an oncology competence	(2) 1.5
		DO NOT KNOW I think it is not important for my postgraduation	(13) 9.6
11	Do you know the difference between nutritional screening and assessment?	Yes	(56) 41.5
		No	(53) 39.2
		do not know	(26) 19.3
12	In your daily experience, do you feel you have acquired the	YES, because I received the notions to do it	(47) 35.1
		NO because I feel it is not important for the patient outcome	(1) 0.7

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Table 1 (*continued*)

QUESTION (n.)	QUESTION	ANSWERS	n (%)
	fundaments and competence for nutritional screening?	NO because I think it is not an oncology competence NO because I did not receive the notions to do it	(8) 6.0 (78) 58.2
Questions and answers (correct ones: bold) related to specific knowledge in nutrition			
13	How frequent is malnutrition in a patient with advanced cancer?	**A ≥30 %** B 16–29 % C ≤ 15 % D Cancer patients are all malnourished	**(105) 77.2** (31) 22.8 (0) 0 (0) 0
14	What importance does nutritional therapy have in the care of cancer patients?	**A May improve treatment tolerance** B May increase the effectiveness of oncological drugs C May decrease the effectiveness of oncological drugs D Answers 1 e 3	**(119) 87.5** (5) 3.7 (1) 0.7 (11) 8.1
15	When should a nutritional screening in a cancer patient carried out?	A In all patients only at diagnosis **B Periodically repeated during treatments** C Not important, malnutrition does not affect cancer treatments	(8) 5.9 **(127) 94.1** (0) 0
16	What parameters are present to define a patient as malnourished?	**A Low BMI or weight loss** B Abnormal blood tests C All correct D All incorrect	(**8**) **6.0** (1) 0.7 (115) 85.8 (10) 7.5
17	What are the normal BMI ranges?	A 15.5–17.5 kg/m^2 B 17.5–20.0 kg/m^2 **C 18.5–25.0 kg/m^2** D 25.0–30.0 kg/m^2	(1) 0.7 (10) 7.4 **(120) 88.9** (4) 3.0
18	Is BMI alone sufficient to define nutritional status?	A Yes, always B No **C No, because it does not define body composition**	(6) 4.4 (20) 14.8 **(109) 80.8**
19	In adult patient, in normal metabolic conditions, what is the approximative caloric requirement (x Kg/day)?	A 20–25 kcal **B 25–30 kcal** C 31–35 kcal	(48) 35.6 **(75) 54.8** (13) 9.6
20	What is the energy requirement in an advanced cancer patient?	A Always increased B Always decreased **C Similar to a healthy subject**	(82) 60.7 (10) 7.4 (**43**) **31.9**
21	What is the protein requirement (x Kg/day) of an adult cancer patient?	A 0.6 g B 0.8 g **C ≥ 1 g**	(7) 5.2 (71) 53.0 **(56) 41.8**
22	How are a patient's water needs satisfied via the venous route?	A Saline solution **B Glucose 5 %** C Hypertonic saline D Distilled water E All fine F None of the above	(111) 82.2 (**10**) **7.4** (2) 1.5 (0) 0.0 (7) 5.2 (5) 3.7
23	A malnourished advanced cancer patient, has increased requirements of which nutrients?	**A Proteins** B Carbohydrates C Proteins and calories D None of the above No response	(**27**) **20.0** (5) 3.7 (97) 71.9 (5) 3.7 (1) 0.7
24	Which nutrients are better used by a cancer patient?	**A Lipids** B Carbohydrates C Proteins D The above have no difference No response	(**17**) **12.6** (49) 36.3 (59) 43.7 (9) 6.7 (1) 0.7
25	Having to feed a patient enterally or parenterally, which route is better from a "metabolic" point of view?	A Enteral B Parenteral **C Indifferent** No response	(100) 74.2 (33) 24.4 (**1**) **0.7** (1) 0.7
26	When do you think is the best time to administer oral supplements to a cancer patient?	A Before meals B Immediately after meals **C Between meals** No response	(13) 9.7 (8) 5.9 **(113) 83.7** (1) 0.7
27	What is caloric density (Kcal/mL) of the most common liquid oral supplements?	A 0.5–0.9 **B 1–1.5** C > 2.0–2.5 No response	(6) 4.4 **(89) 66.0** (39) 28.9 (1) 0.7
28	To be nutritionally adequate in a person weighting 60–70 kg,	A at least 1 L **B at least 1.5 L**	(20) 14.8 **(101) 74.8**

Table 1 (*continued*)

QUESTION (n.)	QUESTION	ANSWERS	n (%)
	what volume of enteral mixture should be administered?	C at least 2 L No response	(12) 8.9 (2) 1.5
29	What is the maximum osmolarity/L of a solution tolerated by a peripheral vein?	**A 800 mOsm** B 1000 mOsm C 1200 mOsm No response	**(70) 51.8** (47) 34.8 (14) 10.4 (4) 3.0
30	Catabolism:	**A Within certain limits, it is a physiological condition** B It is always a pathological condition C It is a pathological condition occurring only in severely ill patients	**(131) 97.0** (2) 1.5 (2) 1.5
31	How is catabolism measured?	A Serum Urea B Creatinine C Serum Albumin **D 24h - urea urinary output** E All correct F All incorrect	(19) 14.1 (2) 1.5 (5) 3.7 (**26**) **19.3** (80) 59.2 (3) 2.2
32	QR = 0.7 indicates what?	A Respiratory acidosis B High protein catabolism **C High consumption of endogenous fats** D All correct E All incorrect No response	(10) 7.4 (55) 40.7 (**22**) **16.4** (23) 17.0 (13) 9.6 (12) 8.9
33	In situations of high catabolism Artificial Nutrition aims to:	**A Contain the loss of nitrogen and lean mass** B Completely block the catabolic process C Fully restore muscle mass and decrease the inflammatory state D All correct E All incorrect	**(87) 66.4** (4) 3.1 (2) 1.5 (4) 3.1 (28) 21.4 (6) 4.6
34	A patient beginning Artificial Nutrition:	A Will no longer be able to return to oral feeding **B Can be orally fed at the same time** C Does not require clinical or laboratory monitoring D All correct E All incorrect No response	(3) 2.2 **(103) 76.3** (1) 0.7 (0) 0.0 (26) 19.3 (2) 1.5
35	In which of these conditions is Artificial Nutrition a priority?	**A Malnourished patients with intestinal malabsorption** B Terminal patients C Patients with severe hydro-saline retention D Hemodynamically unstable patients E All correct F All incorrect No response	**(73) 54.1** (3) 2.2 (2) 1.5 (1) 0.7 (51) 37.8 (2) 1.5 (3) 2.2
36	Artificial Nutrition in cancer patients must be:	A Always low-calorie to avoid tumour growth **B Adequate to the patient nutritional needs** C Never prescribed to an obese cancer patient D Alternated with intermittent fasting to counteract tumour growth No response	(4) 3.0 **(125) 92.7** (1) 0.7 (3) 2.2 (2) 1.4
37	Parenteral nutrition in cancer patients is:	A More effective than enteral nutrition, obtains immediate results and is more physiological B Preferable to enteral nutrition due to the lack of gastrointestinal side effects C Not indicated in patients with peritoneal carcinomatosis **D Indicated in case of severe gastrointestinal toxicity due to treatment** No response	(9) 6.7 (17) 12.6 (3) 2.2 **(103) 76.3** (3) 2.2
OPINIONS ON DIFFERENT ASPECTS OF THE NUTRITIONAL CARE			
38	Do you think the oncologist should have the basics to recognize an at risk/ malnourished patient?	Yes No do not know	(134) 98.5 (0) 0 (2) 1.5
39	What are the barriers that obstacle the oncologist in the assessment of nutritional status?	Lack of time Lack of interest Lack of preparation Evaluation is of little use	(55) 40.7 (8) 5.9 (69) 51.1 (3) 2.2
40	Do you believe that the prescription of oral nutritional supplements is the sole responsibility of a dietitian/ nutritional specialist?	Yes No do not know	(30) 22.2 (81) 60.0 (24) 17.8

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Table 1 (*continued*)

QUESTION (n.)	QUESTION	ANSWERS	n (%)
41	Do you believe that the prescription of a parenteral nutritional therapy is the sole responsibility of a dietitian/ nutritional specialist?	Yes No do not know	(49)36.3 (59) 43.7 (27) 20.0
42	Does nutritional therapy play a role in the care of cancer patients?	Yes No do not know	(51) 37.5 (6) 44.9 (24) 17.6

Table 2
Participating vs. invited postgraduate oncology schools, by Italian region.

REGION	Postgraduate schools n. responders/n. invited
SARDEGNA	1/1
CALABRIA	1/1
TOSCANA	1/3
LIGURIA	1/1
SICILIA	½
EMILIA ROMAGNA	2/4
CAMPANIA	2/2
VENETO	2/2
UMBRIA	1/1
LOMBARDIA	¼
FRIULI	1/1
LAZIO	2/4
MARCHE	1/1
PUGLIA	0/1
ABRUZZO	0/1
PIEMONTE	0/1
Total	**17/31**

Results about the correctness of the answers by year of specialty are reported in Table 4.

The answers are divided into 3 groups: group A participants answered correctly more than 66 % (i.e: at least 16/24 questions); group B correctly answered between 34 % and 66 % (i.e. between 8 and 16 questions) and group C less than 33 % (less than 8 questions).

The main wrong answers were related to the best route, from a metabolic point of view, to feed a patient (q 25: 0.7 % of right answers), main criteria for defining malnourished a patient (q16; 6 % of right answers), which parenteral solution better satisfies the water requirement (q 22; 7.4 % of right answers), which nutrients are better metabolized by the cancer patients (q 24; 12.6 % of right answers), the significance of QR = 0.7 (q 32; 16.4 % right answers), how catabolism is measured (q 31; 19.3 % right answers), the nutrient requirements in advanced cancer patients (q 23; 20 % right answers) (Table 1).

Finally, the fourth area explored the domain of the opinion of the oncology residents about the nutritional care (q 38–42).

Ninety-eight-point five percent of participants affirmed that oncologists should be provided with the basic knowledge to recognize a malnourished patient, or a patient at risk (q 38). However, the responders identified as barriers to the assessment of nutritional status (q 39) lack of instruction (51.1 %), lack of time (40.7 %), lack of interest (5.9 %) and finally 2.2 % answered that the nutritional assessment was not a true priority.

Sixty percent of participants did not believe that the oral nutritional supplement prescription was under the exclusive competence of the nutritionist (q 40) and 43.7 % did not believe that the prescription of parenteral nutritional therapy should be exclusively done by a nutritional specialist whereas 36.3 % believed that it was a specific nutritional competence (q 41) and only 37.5 % thought that nutritional therapy had an important role on the outcome of a cancer patient (q 42).

5. Discussion

The importance of malnutrition in cancer patients seems to be still underestimated, despite the wide awareness today of its negative influence on the patient's quality of life and on the outcome of oncological therapies [19–21].

It is noteworthy to point out that only about half of the post-graduate school in oncology contributed actively to the questionnaire distribution and that only 135 Italian oncology residents (about 10 % of potential responders) participated to this survey.

The findings are in keeping with the survey by Caccialanza et al. [22,23] who reported that only 5.7 % of invited oncologists completed the questionnaire and reflects the poor interest that many oncologists deserve to the nutritional issues.

In most oncological residential courses (q3; 74.1 %) no lessons were dedicated to clinical and artificial nutrition; nonetheless, topics as malnutrition and sarcopenia, were somehow addressed during other lessons (q4; 67.4 %). These findings are further supported by the fact that while 9 out of 10 participants answered they were able to identify an at risk/malnourished patient (q10), at the subsequent questions it appeared that only one third reported having acquired fundaments and skills for a nutritional screening, mainly because their postgraduate course did not provide them

Table 3
Distributions of responses to questions 3–5 in the whole cohort and according to year of postgraduate program.

Year of specialization		I	II	III	IV	V	Total
Total n. of residents		49	26	23	30	7	135
Q3 Did you attend any lesson in clinical nutrition in your specialization course?	**Yes**	17 (34.7 %)	5 (19.2 %)	6 (26 %)	4 (13.3 %)	3 (42.8 %)	35 (25.9 %)
	No	32 (65.3 %)	21 (80.8 %)	17 (74 %)	26 (86.7 %)	4 (57.2 %)	100 (74.1 %)
Q4 Was the topic "malnutrition/sarcopenia" addressed in your specialization course?	**Yes**	26 (53 %)	16 (61.5 %)	10 (43.5 %)	23 (76.7 %)	6 (85.7 %)	81 (60 %)
	No	23 (47 %)	10 (38.5 %)	13 (56.5 %)	7 (23.3 %)	1 (14.3 %)	54 (40 %)
Q5 Was the topic "artificial nutrition" (i.e.: Indications/contraindications, etc.) been covered in your specialization course?	**Yes**	21 (42,8 %)	13 (50 %)	11 (47.8 %)	18 (60 %)	3 (42.8 %)	66 (48.9 %)
	No	28 (57,2 %)	13 (50 %)	12 (52.2 %)	12 (40 %)	4 (57.2 %)	69 (51.1 %)

Table 4
Distribution of the correctness of the answers by year of specialty. **Group A**: more than 66 % of correct answers (i.e: at least 16/24 questions); **group B:** between 34 % and 66 % of correct answers (between 8 and 16 questions); **group C** less than 33 % (less than 8 questions). * Percent of total respondents per year of specialty.

Year of specialty	Group A, n, (%*)	Group B, n (%*)	Group C, n (%*)	Total responders
I	6 (12.2)	41 (83.7)	2 (4.1)	**49 (100)**
II	2 (7.7)	23 (88.5)	1 (3.8)	**26 (100)**
III	2 (8.7)	21 (91.3)	0	**23 (100)**
IV	5 (16.7)	25 (83.3)	0	**30 (100)**
V Or finished	3 (42.9)	4 (57.1)	0	**7 (100)**
Total	**18 (13.3 %)**	**114 (84.5 %)**	**3 (2.2 %)**	**135 (100)**

the basics. As a matter of fact, more than half of participants did not know the difference between nutritional screening and nutritional assessment (q11). Similar findings were shown in a previous Italian analysis [1].

The basic knowledge of some notions concerning sarcopenia, malnutrition, nutritional requirements and nutritional supplementation was explored through 24 questions and only 13.3 % of participants correctly answered more than 66 % of them.

It especially worrying the finding that the vast majority of participants were unable to correctly answer some basic questions as the best metabolic route to feed a patient (q25; 99.3 % wrong answers), the main criteria for defining malnourished a patient (q16, 94 % wrong answers), which intravenous solution better satisfies the water requirements of a patient (q22; 92.6 % wrong answers), the nutrients which are better utilized in cancer patients (q24; 87.4 % wrong answers), the increased macronutrient requirement in a malnourished cancer patients (q 23; 80 % wrong answers), etc (Table 2). Since the percentage of correct answers seems did not significantly change with the years of the post-graduate course, it is likely that no substantial contribute to the knowledge of nutrition was provided to the students during the full oncologic curriculum. It is also noteworthy that the highest percentage of students who accepted to respond to the questionnaire (36.3 %) was recorded among first year of course and then the interest appeared to decline.

These findings open a nebulous scenario on the clinical use of the nutritional support in our hospitals: the lack of some practical information about the nutritional status and the nutritional support carries the risk of scotomizing the presence of malnutrition (and its potential deleterious consequences) and/or planning a nutritionally poor regimen. It is noteworthy that the practice of evaluating the nutritional status (q6) was regularly performed in only one third of the units of oncology.

The alternative of always relying on the constant presence of a nutritional team fails to consider that the prevalence of malnutrition is overwhelming in the cancer patient population and more than one third of the Italian oncologists lacks a specialist in nutrition in their unit [22].

This lack of interest by the oncologists appears to be spread in all Europe [23–36] with the potential exception of Switzerland [37] and specialists in head and neck cancer [38]. An analysis of 153 consecutive publications in 3 major oncology US journals from 2022 related to systemic oncologic therapies showed that 90 % failed to report any nutrition status data such as the presence of malnutrition and pretreatment weight and, when reported, data were limited to either body mass index at trial enrolment or pretreatment weight changes [39].

A large multinational survey found that a third of the oncologists would wait for a weight loss of 15–20 % before considering any nutritional intervention [12].

If the oncologists do not realize the relevance of assessing and maintaining the nutritional status, how can they involve their students? The interplay among nutrition/nutritional status, inflammation, sarcopenia and cachexia and their impact on the oncologic therapies are the core of the modern oncologic practice and young oncologists carry the risk to be devoid of the adequate background to face these issues.

As a matter of fact, about two third of the residents stated that nutritional therapy does not play an important role on the outcome of a cancer patient (q 42).

Similar results were found in studies aiming to determine the knowledge's levels of nurses working in palliative care units [40] or dieticians working in outpatient units [41]. Finally, patients too, complain that their care teams are not equipped to provide adequate nutrition counselling [42].

Several authors [43–45] have emphasized a mismatch between knowledge and awareness of the role of nutrition as stated in many national and international guidelines and what happens in the clinical practice where the claimed recommendations of a patient-centred care remain unattended, and others [46–48] have analysed the potential barriers to implement the nutritional care.

Common sense would suggest that each oncologist should be able to identify the status of an impending or overt malnutrition of patients and to promptly start a correct nutritional regimen, whereas specialists in nutrition might intervene in more complicated or long-term situations.

This approach appears to be shared by most respondents, who agreed that oncologists should be provided with the basic knowledge to recognize malnourished patients or those at risk (q38). Furthermore, 60 % and 44 % of participants stated that prescription of oral nutritional supplements and parenteral nutrition, respectively, could be overseen by the oncologist (q 40 and q41).

Our study highlights the need to strengthen the inadequate state of nutritional support for cancer patients in our country and in our view, two fundamental steps are required.

First, oncologists should be fully aware that malnutrition is a critical issue, both because of its high prevalence and its clinical implications, including reduced tolerance and response to oncologic therapies and an overall poorer prognosis. Therefore, it should be addressed as a clinical priority rather than systematically delegated to other professionals. However, based on our findings**,** this perspective was considered relevant by only one-third of the participants.

Second, the high prevalence of malnutrition, combined with the frequent management of patients in busy outpatient oncology settings, where prompt decisions are often required, makes it impractical to consult the nutritional team for minor issues.

For instance, nutritional status can be easily and quickly screened using one of two validated tools that take only a few minutes to complete: the MUST (Malnutrition Universal Screening Tool) [49], which includes three simple parameters (BMI in kg/m^2, unplanned weight loss over the past 3–6 months, and the presence of acute illness with reduced or absent oral intake for more than 5 days); and the MST (Malnutrition Screening Tool) [50], which relies on three questions; has the patient lost weight recently

without trying? How much weight (kg)? Has the patient been eating poorly due to a decreased appetite?

For example, the oncologist, who is well acquainted with the timing and duration of nausea, vomiting, or mucositis related to ongoing oncologic therapy, is in a privileged position to decide whether a short-term prescription of oral supplementation or intravenous fluids is appropriate, or whether the patient requires a more comprehensive nutritional assessment. More demanding interventions, such as full nutritional assessment, planning and monitoring of tube feeding or home parenteral nutrition, and the use of specialised diets, clearly fall within the expertise of the clinical nutritionist.

To reach these goals, it is essential to reform the mandatory educational curriculum and to implement postgraduate courses tailored to different oncologic areas. These should not only cover general aspects such as nutritional status, its assessment, and nutritional interventions, but also specifically address common nutritional issues related to tumour type and treatment.

More ambitious programs are currently under investigation, aiming to establish standardized, digitally supported, patient-centred care pathways developed by multidisciplinary teams. These would integrate patient-reported outcomes with linked, evidence-based management strategies [51].

In the meantime, the organization of dedicated interactive workshops on nutritional physiology and care for postgraduate oncology trainees may offer a practical solution to current training inadequacies, as previously reported in the literature [48,51]. Such initiatives could be effectively led by experts from SINPE.

6. Conclusion

The results of this survey indicate that malnutrition in cancer patients remains largely an unmet medical need. Despite the growing body of knowledge on the pathogenesis of cancer-related malnutrition, effective strategies to modify clinical practice have yet to be widely adopted.

According to current international guidelines and this study, there is an urgent need to implement strategies for the early assessment of nutritional status and to adopt a parallel, multidisciplinary approach to nutritional care.

Author contribution

LS: study design, preparation of the manuscript, data analysis; MZ: data analysis, critical review of the manuscript, FB: study design, preparation of manuscript, critical review of the manuscript.

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Conflict of interest

None.

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