NUTRI-ONCOCARE: Nuevo modelo integral de atención nutricional para prevenir y tratar la desnutrición en pacientes con cáncer

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Resumen
Objetivo: La máxima expresión de la desnutrición en los pacientes oncológicos es la caquexia cancerosa, siempre vinculada a un pronóstico desfavorable. Dado su carácter evolutivo se recomienda detectar y actuar precozmente en aquellos pacientes con riesgo nutricional. El objetivo es definir un algoritmo de actuación para el abordaje nutricional de pacientes con tumores sólidos.

Método: Mediante la técnica de grupo nominal se reunió a especialistas en farmacia hospitalaria, nutrición y oncología que establecieron una priorización de temas relacionados con el estado nutricional y su abordaje en pacientes con tumores sólidos. Su discusión y análisis permitieron diseñar un algoritmo de actuación.

Resultados: El algoritmo diferencia dos grupos de pacientes según la localización del tumor y su impacto en el estado nutricional. Los tumores de alto riesgo (grupo 1) incluyen cánceres de cabeza y cuello, del tracto digestivo superior y colorectal, y los tumores de bajo riesgo (grupo 2) engloban el resto de neoplasias. Los pacientes del grupo 1 (a excepción de aquellos con cáncer colorectal) son directamente valorados nutricionalmente y tratados precozmente en el comité de tumores, iniciando el soporte nutricional requerido en ese momento. Los pacientes del grupo 2 y los diagnosticados de cáncer colorectal son cribados (mediante NUTRISCORE) tras su presentación en el comité, derivándose a consulta si presentan riesgo nutricional.

Palabras clave: Desnutrición; Nutrición; Nutrición oncología; Caquexia; Caquexia cancerosa.
without nutritional risk are periodically re-evaluated. Follow-up is planned according to cancer therapy, with continuous monitoring in each treatment cycle or during the perioperative period.

**Conclusions:** From the nominal group technique, agreements were reached to propose an algorithm of nutritional approach of the cancer patient. The adoption of the proposed algorithm could reduce variability in institutional clinical practice, promoting a timely and adequate nutritional approach in cancer patients.

### Introduction

Malnutrition is a common problem in patients with cancer. At the time of diagnosis of the tumor, the occurrence of malnutrition stands at between 15-20%, increasing as the illness progresses, so that it may affect up to 80% of patients at the advanced stage. The malnutrition rate is higher both in patients with head and neck tumors and in those with digestive system tumors. Segura et al. evaluated the prevalence, in Spain, of malnutrition in cancer patients and found that more than 50% present moderate or severe degrees of malnutrition. Hubelet et al. analyzed the use of nutrition support in cancer patients in 154 French hospitals wards and they found that only 28% of non-malnourished patients and 58% of malnourished patients received nutrition support.

The prevalence of malnutrition varies considerably depending on the neoplastic strain. Gastric and pancreatic cancers are associated with figures of malnutrition above 80%, whilst lymphomas and acute leukemias present prevalence below 30%. Regardless the nutritional impact that the cancer itself may have, the prevalence of malnutrition is influenced by the type of treatment applied, with nutritional complications being typical in patients with digestive carcinomas.

It has been shown that nutritional deterioration has a negative impact on the evolution of cancer patients: reducing the tolerance and efficacy of their treatment, increasing the risk for clinical and surgical complications and length of hospital stay with a concomitant increase in health care costs. Malnutrition in these patients is also associated with poorer quality of life (QoL).

The etiology of malnutrition in patients with cancer is multifactorial. In addition to the influence that the anatomical location of the tumor has on the intake and absorption of nutrients, we have to take into consideration both the nutritional and metabolic alterations associated with the inflammatory response and the impact of the side effects derived from the surgical and radio-chemotherapy treatments applied. The maximum expression of malnutrition in the oncologic patient is the anorexia-cachexia syndrome, defined as a multifactorial syndrome characterized by a progressive loss of skeletal muscle, associated or not with a loss of adipose tissue. It is responsible either directly or indirectly for the death of a third of patients with cancer.

The cancer cachexia syndrome can develop progressively through various stages: pre-cachexia to cachexia and to refractory cachexia. The focus by this definition is put on a minimum degree of body weight loss. Even before diagnosis and treatment, weight loss is common. In one series of more than 3,000 cases, the frequency of weight loss ranged from 31% to 87% (patients with non-Hodgkin’s lymphoma and those with gastric cancer respectively).

Tumor-related disease processes, host response and cancer-related treatments such as chemotherapy, radiotherapy, and surgery all culminate in the end point of under-nutrition.

Pre-chemotherapy weight loss correlated with shorter overall survival and decreased response rate, QoL and performance status. Given the incidence of nutritional risk in cancer and the fact that the management of cachexia remains a challenge in clinical practice, a multidisciplinary approach is vital to define efficient strategies that can improve quality of care in cancer patients.

According to the reviewed data and guidelines, nutritional intervention should be complementary to any antineoplastic treatment and should be included in the multidisciplinary approach mandatory in oncology.

### Methods

A multidisciplinary group formed by five specialists in Hospital Pharmacy, one nutritionist and one oncologist, working in collaboration, has developed an algorithm to fully integrate the prevention and nutritional treatment of cancer patients throughout their illness. The medical oncologist made a review to have her feedback and devise the algorithm with onward experience. A Hospital Pharmacist with big experience in oncology patients was chose coordinator.

At the first meeting, held on March 13, 2018, by nominal group technique (NGT), each participant individually wrote the ideas that arise on the paper. A Hospital Pharmacist with big experience in oncology patients reviewed to have her feedback and devise the algorithm with onward experience. After the obtaining the statistical results of the scores given to the questions asked by the coordinator (Table 1), and then there is an exhaustive presentation of all the ideas generated.

Each idea or item was numbered and written on a panel after which a discussion about them is generated, explaining the logic that sustains it. The next step was the preliminary vote. Each group member individually selected nine items and wrote them down on a card that was ordered according to the importance given. They assigned 9 points to the most important item, one point less to the next and so on until the last item scored 1 point. After this, the moderator added the points of each response and listed all the items that resulted with scores greater than 6 points.

Finally, the members of the group (through an anonymous and individual vote) scored on a scale of 0 to 100, the score given to each of the selected items.

After the obtaining the statistical results of the scores given to the questions of the questionnaire, the most conflicting points are submitted for further

### Table 1. Questions asked by the coordinator in nominal group technique

<table>
<thead>
<tr>
<th>Question</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>What elements should be applied to improve the effectiveness of nutritional treatment?</td>
<td></td>
</tr>
</tbody>
</table>
discussion. At the end of this meeting, the proposals are re-scored, and the most voted are defined as agreed by the panel. In each response the value of the median or other percentiles is used to measure the central tendency of the scores to each question and the arithmetic means of the agreement and disagreement, previously defined numerically.

Finally, the panel laid down a list of items and pathways the algorithm had to include.

At the second meeting, held on May 5th, 2018, a literature review was made and each item was discussed to reach a common site.

An initial document with the algorithm was drafted.

At the third and fourth meetings, the panel discussed the designed structure and wording algorithm written in the previous phases. After collecting the corresponding suggestions and modifications, it was finished with the elaboration of the final text of the algorithm (Figure 1).

Results

List and agreement on the proposal and the reconstructed priorities obtained after analyzing the contributions of the experts who participated in the nominal group were:

- Different approaches according the risk of malnutrition of different types of cancer, considering different pathways to high and low risk tumors.
- Different pathways to manage the patients considering the impact on the nutritional state of the cancer therapies.
- When the screening tool should be implemented according the patient’s nutritional risk?
- Surveillance that must be done patients to avoid nutritional deterioration depending on their nutritional risk.
- Timing to assess the effectiveness of nutritional interventions.

An algorithm is proposed starting with early evaluation of the patient (with solids tumors) within the Tumor Multidisciplinary Committee, where the situation of oncologic patients is exposed at the outset of their process.

The multidisciplinary approach algorithm differentiates two groups of patients in accordance with the location of the tumor and its impact on the nutritional state: Group 1) head and neck and gastrointestinal (GI) tumors, including colorectal cancer (CRC), named high risk tumors, and Group 2) the rest of tumors, named low risk tumors (Figure 1).

It is considered that high risk cancer cohort (group 1) have to receive directly a complete nutritional assessment and early treatment if is necessary.

Figure 1. Algorithm for a nutritional approach to cancer patients.
Although malnutrition is more common in CRC than in tumors from group 2, the prevalence rate is lower than in patients with upper GI or head and neck cancer. Even if a direct nutritional assessment is not carried out as in the case of upper GI and head and neck cancer, it is necessary to identify those patients with weight loss through nutritional screening, immediately after its presentation in the committee.

The nutritional screening tool (NST) proposed is NUTRISCORE (Figure 2) which takes into account weight loss over time, appetite in the last week, tumor location, and the treatment to be applied. Because NUTRISCORE was designed to categorize oncology outpatients according to the presence of nutritional risk using a scoring system, patients who obtained ≥ 5 points were considered at risk, whereas those who scored < 5 were not.

As an additional precautionary measure, during the screening test, patients are informed of the importance of maintaining a suitable nutritional state and, at the same time, provided with training to identify and communicate warning signs and symptoms that might aggravate their nutritional situation.

The main highlight in procedure lies in the fact that an early nutritional approach is carried out in the 3-5 days subsequent to the presentation of the cases in the Tumor Committee.

**Patients with colorectal cancer and positive screening (NUTRISCORE ≥ 5 points)**

If a positive result is obtained in the NST, a nutritional evaluation is performed to define the degree of malnutrition. A positive result always entails a nutritional intervention in line with the recommendations recently published by the ESPEN on nutritional care for cancer patients.

Adherence to recommendations and effectiveness (correct intake according to prescription, absence of gastrointestinal symptoms derived, maintenance or weight gain) of the early nutritional intervention carried out is assessed.

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**Figure 2. NUTRISCORE**

A. Have you lost weight involuntarily in the last 3 months?
- No 0
- I am not sure 2

If so, how much weight (in kilograms) have you lost?
- 1-5 1
- 6-10 2
- 11-15 3
- > 15 4
- Unsure 2

B. Have you been eating poorly in the last week because of a decreased appetite?
- No 0
- Yes 1

<table>
<thead>
<tr>
<th>Location/Neoplasm</th>
<th>Nutritional risk</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head and neck</td>
<td>High*</td>
<td>+2</td>
</tr>
<tr>
<td>Upper GI tract: esophagus, gastric, pancreas, intestines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lymphoma that compromised GI tract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lung</td>
<td>Medium</td>
<td>+1</td>
</tr>
<tr>
<td>Abdominal and pelvis: liver, biliary tract, renal, ovaries, endometrial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast</td>
<td>Medium</td>
<td>+1</td>
</tr>
<tr>
<td>Central Nervous System</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Bladder, prostate</td>
<td>Medium</td>
<td>+1</td>
</tr>
<tr>
<td>Colorectal</td>
<td>Low</td>
<td>+0</td>
</tr>
<tr>
<td>Leukemia, other lymphomas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Treatment**

<table>
<thead>
<tr>
<th>YES (+2)</th>
<th>NO (+0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The patient is receiving concomitant chemo-radiotherapy</td>
<td>The patient is receiving hyper-fractionated radiation therapy</td>
</tr>
<tr>
<td>Hematopoietic stem cell trans-plantation</td>
<td></td>
</tr>
<tr>
<td>YES (+1)</td>
<td>NO (+0)</td>
</tr>
<tr>
<td>The patient is receiving chemo-therapy</td>
<td>The patient is only receiving radiotherapy</td>
</tr>
<tr>
<td>YES (+0)</td>
<td>NO (+0)</td>
</tr>
<tr>
<td>Other treatments or only symptomatic treatment</td>
<td></td>
</tr>
</tbody>
</table>

*Please repeat the screening every week for those patients at high risk.

**Total Score**

Score ≥ 5: the patient is at nutritional risk. Please refer to a dietician.
Patients with colorectal cancer and negative screening (NUTRISCORE < 5 points) and all other tumors from group 2

If a negative result in the initial NST in patients with CRC and, in general, in the rest of patients with tumors of another type, the course of action differs depending on the treatment applied:

- If the patient is going to receive chemotherapy and/or radiotherapy, the screening test is performed again at the first visit to the Oncology/Day Hospital Unit, by any professional trained in clinical nutrition (nurse, dietician, hospital pharmacist, oncologist) that has contact with the patient on the day of the treatment. In the event of obtaining a positive result, the patient should be sent to the nutrition unit. In this point the nutritional evaluation process starts, with subsequent nutritional intervention and close follow-up of the effectiveness of the intervention, as described above. When the patient is not in a nutritional risk situation, the appearance of warning signs (weight loss, lack of appetite) is monitored the first day of each chemotherapy cycle, to act immediately at the time of detection.

- When the patient requires surgical treatment or chemotherapy and/or radiotherapy after hospital discharge, the procedure is as described previously.

Discussion

Even though the health professional considers nutritional support as a key element in the treatment of cancer patients, clinical malnutrition prevention and treatment practices vary considerably and, as a result, we continue to find a high prevalence of malnutrition in this population[12,16].

The most recent recommendations on the nutritional care of cancer patients coincide in underlining the importance of detecting and acting promptly on those at nutritional risk, as one of the most effective measures to prevent the appearance of malnutrition and minimize the devastating impact this may have on the evolution of these patients[12,16]. In accordance with these recommendations, the proposed algorithm aims to address the nutritional care at the moment these patients are evaluated by the Tumor Committee, as a key starting point. The presence and participation of a health professional specialized in nutrition on this multidisciplinary committee is of vital importance for taking early action in those patients with a high nutritional risk, either by the type of tumor or by the associated cancer treatments.

The model establishes a difference right from the outset between the two groups of patients in accordance with their nutritional risk, maintaining a closer monitoring in those at greater risk in order to optimize the resources available, as Arens et al. suggest, and in line with the recommendations recently published by the ESPEN on nutritional care for cancer patients[16,17]. In the group of digestive tumors, CRC has not been excluded, even though by its location is considered as a low nutritional risk tumor. The decision is based on the fact that these patients tend to lose weight because of complications associated with cancer (stenosis, etc) and the nutritional impact of certain treatments (restrictive diets, extensive intestinal resection, adverse effects of chemotherapy on the gastrointestinal tract, etc), as well as the prevalence of sarcopenia in colorectal cancer (25-60%)[17].

There are various nutritional screening tools validated. In the model we propose the use of NUTRISCORE as the method of nutritional screening. It is a quick, straightforward tool which offers a high level of sensitivity and specificity (97.3% and 95.9%, respectively). It has been validated in the Spanish population for the detection of risk of malnutrition in oncologic out-patients, using as a reference test the Patient-Generated Subjective Global Assessment (PG-SGA), showing sensitivity and specificity levels higher than the Malnutrition Screening Tool (MST)[17].

The NUTRISCORE screening test detects the risk of malnutrition more specifically than other tests used in cancer patients, taking into consideration the nutritional impact of the treatment received and the location of the neoplasm[16,18].

Nutritional interventions are often carried out not accompanied by the necessary reassessments that allow the detection of inefficient therapies, problems of adherence and even situations of low adherence to the treatment, which determine the efficacy of such intervention[19]. In patients with malnutrition or at nutritional risk, the time elapsed between the cycles of chemotherapy or consultations with the oncologist may result too long to assess the effectiveness of the nutritional intervention performed, since in the case of failure, the nutritional deterioration continues without being aware of it until several weeks have passed. This is why the most important variable in this model is time. It has been seen that he early detection of malnutrition or the risk of having it and its correction, that may improve survival outcomes in esophageal cancer patients treated with chemoradiotherapy[20].

"Cancer cachexia gets worse with time and the longer we wait to address it, the harder will be to treat."

We propose closer follow-up intervals after performing a nutritional intervention, which allows early detection of treatment failure and, therefore, enables the nutritional care schedule to be modified in time to prevent nutritional deterioration. Silvers et al. shown the potential of a novel telephone-based early and intensive dietetic model of care for newly diagnosed upper gastrointestinal cancer patients[21].

The close follow-up allows both the patient and the team of healthcare professionals to receive information periodically on his/her nutritional state, an aspect consider a key to any model of nutritional care in this population.

One of the highlight limitations was the lack of the validation. It would be desirable to pilot the operation of the algorithm before starting it in a generalized way.

Fresenius Kabi España, S. A. U.

Conflict of interest

No conflict of interests.
Contribution to the scientific literature

Hebuterne et al. underscored the need for systematic detection and treatment of malnutrition. Taking into account the evolutionary nature of tumor-induced cachexia and the risk that the disease may become refractory, it is essential to act preemptively to detect patients eligible for nutritional therapy and get them treated as soon as possible.

Bibliography