

ASSESSMENT OF MALNUTRITION AND NUTRITIONAL THERAPY AND SUPPORT IN PATIENTS WITH COLORECTAL CARCINOMA

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Summary

Introduction: Malnutrition is a common problem in oncological patients. Prevalence of malnutrition in patients with colorectal carcinoma ranges between 30%-50% at presentation. Nutritional status in patients with malignant tumours affects the quality of life and overall survival. Involuntary weight loss is common in these patients and is associated with poor postoperative outcome and longer hospital stay. Malnutrition is also associated with reduced tolerance and response to systemic antineoplastic therapy.

Methods and Results: We describe the results of our studies which evaluated the effects of nutritional screening in indentifying patients at risk for malnutrition, for prompt nutritive support and careful follow up. The results show that proactive intervention and correction of malnutrition in an early stage reduces patient costs, length of hospital stay, improves response to treatment and improves functional status and quality of life.

Conclusion: Early routine nutrition screening, assessment and interventions are effective in improving nutritional status and reduced complications, toxicities and improve clinical outcomes in colorectal carcinoma patients.

KEYWORDS: *malnutrition, cancer patients, nutrition screening, nutrition support*

PROCIJENA MALNUTRICIJE TE NUTRITIVNA TERAPIJA I POTPORA U PACIJENATA S KOLOREKTALNIM KARCINOMOM

Sažetak

Uvod: Pothranjenost je jedan od vodećih problema u oboljelih od karcinoma probavnih organa, pa tako u oboljelih od kolorektalnog karcinoma pojavnost joj je između 30% - 50% u novodijagnosticiranih pacijenata. Nutritivni status u karcinomskih bolesnika direktno utječe na kvalitetu života i preživljenje. Neželjeni gubitak tjelesne mase povezan je sa lošijim ishodom kirurškog liječenja i duljim poslijeoperacijskim i bolničkim liječenjem, kao i sa slabijim podnošenjem i učinkom antineoplastičke terapije.

Metode i rezultati: Evaluirali smo rezultate studija koje prate učinke ranog otkrivanja malnutricije u oboljelih od karcinoma kao i pravovremene i primjerene nutritivne potpore uz kontinuirano praćenje nutritivnog statusa u oboljelih. Rezultati pokazuju da prepoznavanjem i ranom nutritivnom intervencijom popravljamo kvalitetu života, preživljenje i smanjujemo komplikacije antitumorskog liječenja u karcinomskih bolesnika uz snižavanje troškova i skraćujemo trajanje bolničkog liječenja.

Zaključak: Rana evaluacija nutritivnog statusa i nutritivna potpora u oboljelih od karcinoma doprinosi manjoj učestalosti komplikacija i boljem ishodu liječenja u oboljelih od kolorektalnog karcinomamanjem.

KLJUČNE RIJEČI: *malnutricija, karcinom, nutritivna potpora, nutritivna procjena*

INTRODUCTION

Malnutrition can be defined as a state of altered nutritional status and it usually associated with increased risk of adverse clinical events such as complications or death. The etiologic factors of malnutrition in cancer patient, whether caused by tumor or antitumor therapies is multifactorial and can be classified into three major categories: decreased food intake, malabsorption or metabolic derangements that result in inefficient, wasteful metabolism. Malnutrition can increase the incidence of postoperative complications, such as delayed wound healing, dehiscence of anastomosis, morbidity, and mortality (1-4).

For that reason British Association for Parenteral and Enteral Nutrition (BAPEN) recommended that all patients should be routinely screened on admission to hospitals, at regular intervals throughout their stay and during outpatient and General Practitioner appointments. The BAPEN report also found that malnourished patients had more visits to general practitioner (65% increase), hospital admission rates (82% increase), over 30% of patients had a longer hospital stay and greater likelihood of admission to care homes; Fig. 1. (5,6,7).

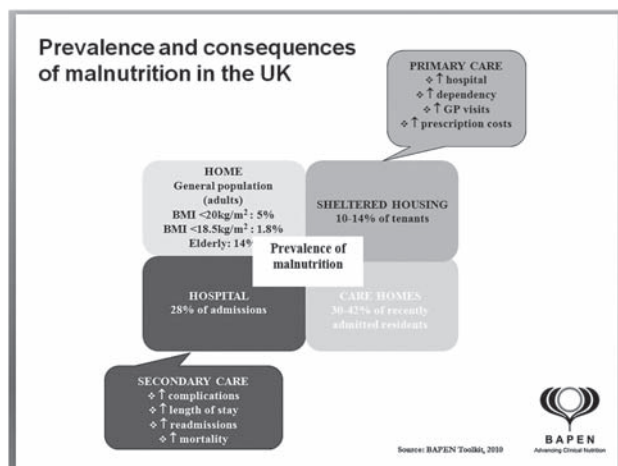


Fig 1. Prevalence and consequences of malnutrition In UK (BAPEN Toolkit, 2010)

METHODS

There are limited data in the literature on the effectiveness of nutritional screening and early treatment of malnutrition. For the purposes of this article we searched the electronic databases.

Relevant articles were identified searching Medline (through PubMed) by use of the appropriate MeSH terms for the following search items: colorectal cancer, nutritional assessment, nutritional risk, perioperative nutrition (oral, enteral and parenteral) or nutrition support, immunonutrition, AND colorectal surgery AND clinical outcome (complications, mortality, and hospital stay).

The search was limited to studies published between 1st January 2000 and 31 of December 2013.

Malnutrition: Screening and assessment tools

Nutritional care process that included nutritional assessment and therapy of cancer patients in a clinical setting is accomplished by: nutritional screening, nutritional assessment, planning and implementation of nutritional therapy, education of the patient and family, communication with multidisciplinary team and reassessment to monitor response, and change in nutritional status as evaluation of efficacy of therapy (8,9).

Screening:

Screening should be a simple and rapid process, which can be carried out by admitting nursing and medical staff. It should be sensitive enough to detect all or nearly all the patients at nutritional risk. Methods of nutritional screening should be validated in clinical trials (10).

The screening tools address four basic questions:

- Recent weight loss;
- Current body mass index;
- Disease severity;
- Recent food intake.

European society for clinical nutrition and metabolism (ESPEN) recently published guide-

lines for nutrition screening. Screening tools recommended by ESPEN are divided into community and hospital based settings (11).

In community setting a Malnutrition Screening tool (MUST) is used. When general screening in the community is needed, MUST is a good tool for rapid grading of undernutrition (Fig. 2.). The interviewer measures height and weight to determine Body Mass Index (BMI), then determines the percent of unintended weight loss over the last 6 months and estimates the effect of illness on nutrition intake. These scores are combined to derive an overall malnutrition score. A score of 1 indicates medium risk and a score of ≥ 2 indicate high risk.

In hospital setting, the best validated and nowadays most commonly used screening tool is the ESPEN-Nutritional-Risk-Screening (NRS 2002; Table 1.) This screening is currently recommended by ESPEN for nutritional screenings in European

hospitals. This a tool based on the concept that nutritional support is indicated in patients who are severely ill with increased nutritional requirements, or who are severely undernourished, or who have certain degrees of severity of disease in combination with risk for malnutrition. The goal of screening is to identify patients who present with malnutrition or, due to recent diagnosis, comorbidities, and planned treatment approaches may be at risk for malnutrition.

Assessment:

Nutrition assessment is a comprehensive approach to defining nutritional status using medical, nutrition and medication histories, physical examination, anthropometric measurements and laboratory data (ADA, 1994).

Nutritional assessment should be more detailed and done in those patients screened at risk for malnutrition. The full evaluation of the patients should include:

1. Medical and psychosocial history (gender, age, professional status, and living conditions)
2. Disease status - primary tumor (site, disease stage at diagnosis) and the management of the disease (previous and on-going treatments)
3. Functional assesment – the mental and physical dysfunction, (muscle strenght – dynamometry, FEV1. anthropometry (actual weight, body mass index [BMI], prior (healthy) body weight, unintentional weight loss since the start of the illness or during the last week, the last month, and over the last 6 months; body composition, body composition measurements, both total lean body mass (LBM) changes and total bone mineral density (BMD),
4. Laboratory tests: quantifying inflammation and disease severity, changes in minerals, serum albumin, prealbumin, total lymphocyte count, cholesterol, C reactive protein (CRP), pseudocholinesterase (PchE)
5. Clinical examination - Subjective Global Assesment (SGA) (14)
6. Fluid balance- dehydration or oedema

A nutritional screening should be performed at the time of the diagnosis, possibly before starting the specific anticancer therapy. A complete

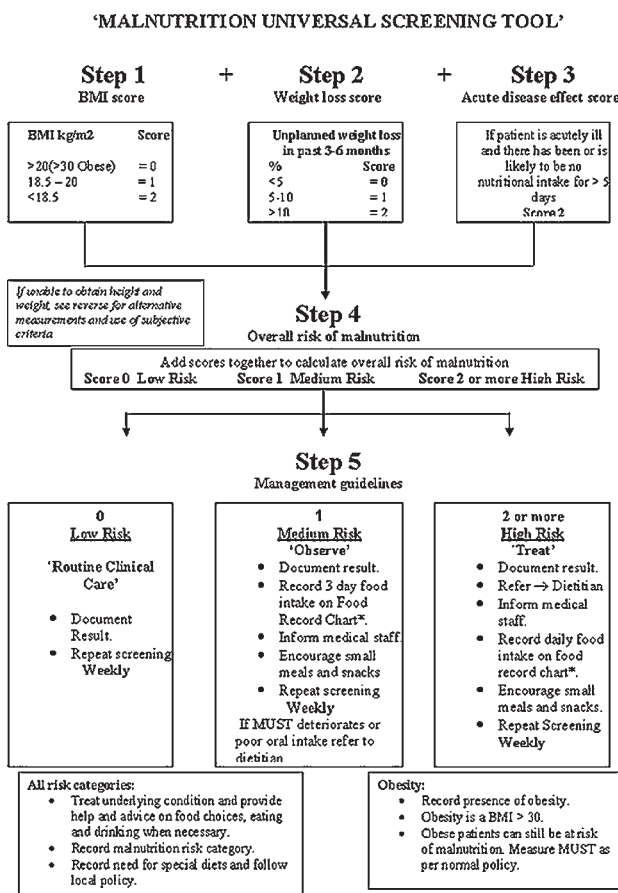


Fig. 2. Malnutrition Screening Tool (MUST)

Table I Nutritional Risk Screening (NRS)			
Initial screening			
		Yes	No
Is BMI < 20.5?			
Has the patient lost weight within the last 3 months?			
Has the patient had a reduced dietary intake in the last week?			
Is the patient severely ill? (e.g. in intensive therapy)			
Yes: If the answer is 'Yes' to any question, the screening in table II is performed.			
No: If the answer is 'No' to all questions, the patient is re-screened at weekly intervals. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.			
Final screening			
	<i>Impaired nutritional status</i>		<i>Severity of disease (E increase in requirements)</i>
Absent Score 0	Normal nutritional status	Absent Score 0	Normal nutritional requirements
Mild Score 1	Wt loss >5% in 3 mths or Food intake below 50-75% of normal requirement in preceding week	Mild Score 1	Hip fracture* Chronic patients, in particular with acute complications: cirrhosis*, COPD*. Chronic hemodialysis, diabetes, oncology
Moderate Score 2	Wt loss >5% in 2 mths or BMI 18.5-20.5 + impaired general condition or Food intake 25-60% of normal requirement in preceding week	Moderate Score 2	Major abdominal surgery* Stroke* Severe pneumonia, hematologic Malignancy
Severe Score 3	Wt loss >5% in 1 mth (>15% in 3 mths) or BMI >18.5 + impaired general condition or Food intake 0-25% of normal requirement in preceding week in preceding week.	Severe Score 3	Head injury* Bone marrow transplantation* Intensive care patients (APACHE410)
Score		Score	Total score:
Score ≥ 3: the patient is nutritionally at-risk and a nutritional care plan is initiated.			
Score < 3: weekly rescreening of the patient. If the patient e.g. is scheduled for a major operation, a preventive nutritional care plan is considered to avoid the associated risk status.			
*indicates that a trial directly supports the categorization of patients with that diagnosis.			

nutritional assessment consists of a combination of subjective and objective parameters, but up to now, no single parameter has been shown to be useful in all patients.

Table 2.
CALCULATION OF PERCENT CHANGE FROM USUAL BODY WEIGHT

$$\% \text{ Weight change} = (\text{Usual weight} - \text{Present weight} / \text{Usual weight}) \times 100$$

Table 3.
BODY MASS INDEX CALCULATIONS AND CATEGORIES

$$\text{(BMI)} = \text{Mass (kg)} / \text{Height(cm)}^2$$

Underweight = <18.5
 Normal weight = 18.5-24.9
 Overweight = 25-29.9
 Obesity = BMI of 30 or greater

The most reliable nutritional parameters are serum albumin level and unintentional weight loss as a single parameters (15).

Techniques used in nutritional assessment

Anthropometry:

1. Body weight: BW in kg
2. Body mass index BMI kg/m² – Table 3.
3. Change from usual body weight – Table 2.

Goals of Nutrition Support

The goals of nutrition therapy in cancer patients are improvement function and outcome by

- Preventing and treating under-nutrition/cachexia;
- Enhancing compliance with anti-tumor treatments;
- Controlling some adverse effects of anti-tumor therapies;
- Improving quality of life.

In individuals with advanced cancer, the goal of nutrition therapy should not be weight gain or reversal of malnutrition, but rather comfort and symptom relief(15,16).

Nutritional support

Estimation of nutritional needs

The choice of nutritional support is dependent on function of the gastrointestinal tract, access, patient comfort and motivation, type of therapy, anticipated disease course, duration of therapy, anticipated toxicities and the patient's preference(17,18).

Energy

The first step in planning nutritional support is to calculate patient's energy requirements.

Malignancies exert a different metabolic effect on the host. The Harris – Benedict equation is the most frequently used method of calculating energy needs (19; Table 4).

Table 4.

CALCULATING ENERGY REQUIREMENTS
– HARRIS - BENEDICT EQUATION

Basal energy expenditure (BEE)
For females: $55(9.6 \times \text{wt in kg}) + (1.7 \times \text{ht in cm}) - (4.7 \times \text{age})$
For males: $66.5(13.7 \times \text{wt in kg}) + (5 \times \text{ht in cm}) - (6.8 \times \text{age})$
For weight maintenance needs: $\text{BEE} \times 1.15 - 1.3$
For weight anabolism needs: $\text{BEE} \times 1.5$
For weight anabolism needs: $\text{BEE} \times 1.5$

Protein

In contrast to simple starvation where the body attempts to spare protein, cancer produces marked losses of protein. The estimated protein requirement is determined based on the degree of protein depletion and the metabolic stress factors. For the well-nourished, mildly stressed individual, the protein needs may only be 0.8–1.0 gr/kg IBW; however, with mild to moderate depletion combined with metabolic stress, 1.5–2.0 gr/kg IBW may be required to achieve positive nitrogen balance and protein repletion. (table 2.2) Another method of estimating protein requirements is by

calculating the ratio of nitrogen to nonprotein calories. It is recommended to provide 1gr nitrogen (protein/gr divided by 6.25) per 120–150 nonprotein calories for anabolism in the moderately to severely malnourished or stressed patient (20; Table 5).

Table 5.

CALCULATING PROTEIN REQUIREMENTS.

For protein maintenance :Multiply 0.8 - 1.4gr xkg of IBW (Ideal Body Weight)
For protein anabolism: Multiply 1.5 – 2,0gr .x kg of IBW

Fats/Lipids

Fats usually account for 20-25% of total daily energy requirements and in specific needs, these ratios should be tailored to meet patient's individual needs. Recommended daily intake is 0,8 – 1,5 gr/kg TM (20).

Water and Electrolyte

Fluid and electrolyte requirements are highly variable and must be individually assessed and supplemented for each patient. A minimum schedule of 30–35 mL fluid/kg of body weight or a minimum of 1,500 mL a day is recommended (20).

Vitamins and Trace elements

About 1500 Kcal of commercial enteral feeding formulas generally contain adequate trace elements to meet daily requirements. The need for vitamins and minerals is increased in carcinoma patient population and additional supplements may be necessary (21).

Methods of Nutrition Care

Nutritional support can be delivered by the oral, enteral, parenteral or a combination of two feeding routes. The choice of route depends on the patient's capability of oral feeding and functional status of the gastrointestinal system (22).

Oral feeding

The preferred and optimal method of nutrition intervention, the least expensive and least invasive.

Nutrition therapy or supplementation is necessary if patient's food intake drops below 20-40%

of requirements. Standard formulae can be safely and effectively employed for oral supplementation.

Enteral nutrition

Enteral nutrition (EN) is optimal method of feeding if oral intake is not possible or inadequate. EN involves the nonvoluntary delivery of nutrients by tube into the gastrointestinal tract. The administration of EN protects the integrity of the intestinal mucosa, inhibits bacterial translocation and achieves better utilization of nutritional components. In all cancer patients undergoing major abdominal surgery preoperative EN preferably with immune modulating substrates (arginine, ω -3 fatty acids and nucleotides) is recommended for 5-7 days independent of their nutritional status. There are a number of enteral feeding preparations that meet the basic nutritional needs, and preparations adjusted to meet specific needs associated with functional disorders of particular body systems (22).

Parenteral nutrition

It is a method of feeding providing macronutrients, micronutrients and fluids through either a peripheral or central venous catheter. Parenteral nutrition (PN) may be indicated in those individuals who are unable to use the oral or enteral route (i.e., those who have a nonfunctioning gut), such as those with obstruction, intractable nausea and/or vomiting, short-bowel syndrome, or ileus. (23) Additional inclusive conditions common in the cancer population are severe diarrhea/malabsorption, severe mucositis or esophagitis, high-output gastrointestinal fistulas that cannot be bypassed by enteral intubation, and/or severe preoperative malnutrition. Contraindications for use of PN are a functioning gut, a need for nutritional support for a duration less than 5 days, and poor prognosis not warranting aggressive nutritional support. PN is also contraindicated if patient does not want parenteral nutrition or is hemodynamically unstable or has profound metabolic and/or electrolyte disturbances, and/or patient is anuric without dialysis (23). Commercially available 'three chamber bags' are solutions which usually used for PN. They contain only macronutrients and some may also contain electrolytes, but do not necessarily cover individual requirements.

The majority of cancer patients requiring PN for only a short period of time and do not need a special formulation. Using a higher than usual percentage of lipid (e.g. 50% of non-protein energy), may be beneficial for those with frank cachexia needing prolonged PN. Supplemental PN is recommended in patients if inadequate food and enteral intake (<60% of estimated energy expenditure) is anticipated for more than 10 days (23).

Combined enteral and parenteral nutrition

Combined PN and EN is usually administered in cases of insufficient enteral nutrition when patients can not enterally take 60% his requirements.

Immunonutrition

Immunonutrition has been shown to up-regulate host immune response, to modulate inflammatory response, to shift protein synthesis from acute-phase to constitutive proteins, to improve gut oxygenation and barrier function after injury, and to reduce septic morbidity and mortality (24).

Complications of nutritional therapy

As with other therapeutic procedures, EN or PN or nutritive support may also cause complications.

Complications of PN may be mechanical and associated with venous catheter placement (haematoma, pneumothorax, etc.), metabolic (hyperglycemia, increased triglyceride levels) or infective due to insertion of a catheter into a vein. Complications of enteral nutritive support are mostly due to tube displacement or obstruction or gastric retention of food or gastric contents like aspiration, distension, nausea or vomiting.

CONCLUSION

Nutritional support, addresses specific needs of a specific patient group and it is required to improve prognosis and reduce the consequences of cancer-associated malnutrition (25). Nutritional interventions or therapy should be considered as a complementary treatment within the multidisciplinary oncological treatment. In curative oncology, nutritional support contributes to reduced postoperative infection rate, better control of cancer-related symptoms, shortened length of hospitalization.

tal stay, and improved tolerance to treatment. In palliative care, the nutritional intervention focuses on controlling the symptoms, thus improving quality of life.

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