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Hospital and homecare malnutrition and nutritional therapy in Brazil. Strategies for alleviating it: a position paper

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ABSTRACT

Introduction: Malnutrition in hospitalized patients is not evaluated frequently. However, it is a critical issue given that it has been related to a high rate of infectious complications and increased mortality rates. There is a high prevalence of patients with nutritional impairment in the home environment, which favors their clinical worsening, the increase of re-hospitalizations and, consequently, the increase in public health expenditures.

Objective: Nutrition experts have thoroughly discussed and written this positioning paper on hospital and homecare malnutrition to describe the prevalence of malnutrition in Brazil. Best practice recommendations for nutrition therapy of patients in hospital and homecare, in particular the use of oral nutritional supplements (ONS), to those who are at risk of malnutrition or malnourished were evaluated, and the impact on clinical and economic data were assessed. In addition, they emphasize that investments in oral nutritional supplementation are also important in the homecare environment (home or nursing homes).

Materials and methods: Selected scientific articles on disease-related malnutrition, especially those carried out in Brazil, were assessed. Data on prevalence, clinical outcomes, and economic burdens were reviewed.

Conclusion: Several studies have shown the importance of in-hospital nutritional assessment for early detection of malnutrition and early intervention with nutrition therapy, in particular with oral nutritional therapy. Unfortunately, hospital malnutrition remains high in Brazil, with severe consequences for patients. The implementation of universal nutritional screening and diagnosis as well as the therapeutic approach of malnutrition, particularly with the use, when possible, of oral nutrition supplements as the first step to address this condition is still low, and demands the investment in educational resources to change practices. Routine use of nutritional therapy in hospital and homecare settings improves clinical outcomes, is cost effective, and would be expected to help reduce healthcare costs.

Key words: Hospital malnutrition. Homecare malnutrition. Nutrition assessment. Enteral nutrition. Oral nutritional supplements.

RESUMEN

Introducción: la desnutrición en pacientes hospitalizados no se evalúa con frecuencia. Sin embargo, es un problema crítico dado que se ha relacionado con una alta tasa de complicaciones infecciosas y con el incremento de la mortalidad. Se observa una alta prevalencia de pacientes desnutridos en el entorno domiciliario, lo que favorece su deterioro clínico, el aumento de las rehospitalizaciones y, como consecuencia, el aumento del gasto sanitario público.

Objetivos: expertos en nutrición realizaron una revisión detallada de los estudios para redactar un posicionamiento sobre la situación en Brasil respecto a la prevalencia de la desnutrición hospitalaria y domiciliaria. Se identificaron las mejores prácticas recomendadas para la terapia nutricional de los pacientes hospitalarios y en domicilio en riesgo de desnutrición o desnutridos y se evaluó la utilidad de los suplementos nutricionales orales (SNO) a través de datos clínicos y económicos. Adicionalmente, se evidenció que las inversiones en suplementos nutricionales orales son también importantes en el entorno domiciliario (domicilio o residencia).

Materiales y métodos: se evaluaron artículos científicos seleccionados, especialmente los realizados en Brasil, sobre la desnutrición relacionada con enfermedades. Se revisaron los datos sobre la prevalencia, los resultados clínicos y las cargas económicas.

Conclusión: varios estudios han demostrado la importancia de la evaluación nutricional en el hospital para la detección precoz de la desnutrición y la intervención temprana con terapia nutricional oral, siempre que sea posible, como estrategia inicial para abordar el problema. Desafortunadamente, la desnutrición hospitalaria continúa siendo elevada en Brasil, con consecuencias graves para los pacientes. La identificación del estado nutricional deficiente a través del cribado y el inicio de la terapia nutricional, particularmente con el uso, cuando es posible, de suplementos nutricionales orales, como primera etapa para combatir la desnutrición no está aún establecida y requiere una inversión en recursos educativos para cambiar las prácticas actuales. El uso rutinario de la terapia nutricional en el entorno hospitalario y domiciliario mejora los resultados clínicos y tiene un impacto positivo en la disminución de los costes asociados y, de esta forma, se espera que contribuya a la reducción de los costes de atención sanitaria.

Palabras clave: Desnutrición hospitalaria. Desnutrición en domicilio. Evaluación nutricional. Nutrición enteral. Suplementos nutricionales orales.

INTRODUCTION

Malnutrition is a disease state resulting from nutrient deficiencies that leads to a body composition with an abnormally low lean body mass. In patients in a

malnutrition state, deficiencies in body cell mass lead to diminished physical and mental functioning and a compromised ability to manage disease. Malnutrition may be the result of starvation, a precipitating disease or, in elderly individuals, social isolation; these factors can occur in isolation or be combined (1).

In hospitalized patients, comorbid malnutrition increases the medical care burden because it is usually associated with increased morbidity, increasing hospital stay, and costs, as well as increased mortality (2). Besides, malnourished patients are at risk of re-hospitalization, which also increases medical care needs and cost. In the home/community setting, malnutrition, especially if recurrent, is also associated with increased health care expenses. In homecare patients, nutritional risk and/or malnutrition are highly prevalent (3). Available literature shows that for every three patients at home or in a nursing home, one is malnourished (3). Suominen et al. (2009) (4) complement, through the evidence published in a Finnish study, that 40.7% of the 1,043 institutionalized patients presented nutritional risk while 56.7% were malnourished.

Taking this facts into consideration, a group of Brazilian nutrition experts and the Brazilian Society of Parenteral and Enteral Nutrition (BRASPEN), concerned with the overwhelming malnutrition situation in Brazil, have tried to address important aspects related to the prevalence and consequences of in-hospital and out-patient malnutrition. The economic burden of this syndrome, the resources to address it, as well as the potential available interventions to overcome malnutrition with a particularly emphasis on oral nutrition supplements are the focus of this position paper.

METHODS

We have conducted a non-systematic literature search to identify Brazilian and international studies reporting the prevalence and the consequences of malnutrition as well as the pharmacoconomics of malnutrition. In addition, oral, enteral and parenteral nutrition therapy manuscripts indexed in the Ovid MEDLINE, LILACS, SciELO, and CAPES databases were reviewed. The following search terms were used, with the search syntax varying according to the database: “malnutrition: hospital, home care, prevalence, energy, protein, cancer, severe”; “undernutrition: hospital,

elderly, nursing home”; “oral nutrition: supplement, support, therapy, supplementation”; “enteral nutrition: feeding, guidelines, tube feeding”; “parenteral nutrition”; “nutrition and cost effectiveness”. Manuscripts in English, Portuguese, Spanish and French were reviewed.

RESULTS AND DISCUSSION

In a large multicenter epidemiological study conducted in 2001 known as IBRANUTRI, Waitzberg et al. found that malnourished patients are common in Brazilian hospitals, with a reported prevalence of 48.1%, and a 12.5% prevalence of severe malnutrition. The IBRANUTRI data were obtained from surveys conducted in 14 Brazilian cities evaluating 4,000 patients over 18 years old. The IBRANUTRI survey instrument was the subjective global assessment (SGA), a diagnostic tool designed to identify and classify malnourished patients. The prevalence of malnutrition was particularly elevated in oncologic patients (66.3% vs 42.9%; odds ratio [OR] = 2.69; 95% confidence interval [CI] = 2.28-3.18; $p < 0.005$), in patients over 60 years old (52.8% vs 44.7%; OR = 1.39; 95% CI = 1.21-1.58; $p \leq 0.005$), and in patients with infections (61.4% vs 38.8%; OR = 2.56; 95% CI = 2.24-2.93; $p < 0.005$). The prevalence of malnutrition was particularly high in hospitals located in the northern and northeastern regions of the country where the per-capita income is lower. Notably, in Belem, 78.8% of the surveyed patients were considered to be malnourished. Furthermore, the IBRANUTRI data has demonstrated that malnutrition prevalence increased with increasing hospitalization duration: malnutrition rates were 33.2% within two days after admission, but 61% when hospital stay was greater than or equal to 15 days after admission. Despite the high prevalence of malnutrition, the authors found that oral nutritional therapy was being used in only 7.3% of patients, 6.1% were receiving enteral nutrition and 1.2% were receiving parenteral nutrition (5).

In 2011, Brito et al. (6) carried out another multicenter study with the SGA in Brazil to assess the relationship between pressure ulcers and nutritional status. Hospitals were enrolled if they were classified as general institutions and had more than 100 beds. In their study, Brito et al. found that 30.2% of the surveyed patient populations were classified as suspected malnutrition or moderately malnourished, and 22.4% as

severely malnourished. Among the 473 patients, 184 (38.9%) were elderly and 111 (23.5%) had cancer (6).

Subsequent Brazilian population studies have confirmed the alarming results of IBRANUTRI. Employing the malnutrition screening tool (MST), García et al. (7) found that 130 (23%) of 565 hospitalized surgical patients at the University Hospital in Pelotas, RS, presented with a moderate risk of malnutrition and that 40 (7%) were at high risk of malnutrition (7). In a multicenter study of 350 adult surgery patients in Campinas, SP, using the SGA, Leandro-Merhi et al. reported that 19.3% were moderately malnourished and 0.8% were severely malnourished (8). However, in a subset of patients 60 years of age and older assessed with the Mini Nutritional Assessment, 32.9% were considered to be at risk of malnourishment, and 11.0% were considered to be malnourished (8). Employing the Mini Nutritional Assessment and a serum albumin assay, in a study with 200 hospitalized elderly patients (mean age, 72.6 ± 8.3 years) at a university hospital in Erechin, RS, Brock et al. (2016) (9) found that 87% of the assessed patients had hypoalbuminemia, 43% were at risk of malnutrition, and 21.5% were malnourished (9).

Alarmingly, malnutrition was identified with the patient-generated SGA instrument in 45.1% of Brazilian cancer patients, including 55.6% of elderly cancer patients, in the Brazilian Survey of Nutrition Oncology, a multicenter study carried out in 2013 with 4,822 cancer patients from 45 Brazilian institutions (10). In the Luso-Brazilian Elderly Oncology Survey, carried out with the Mini Nutritional Assessment, 33.2% of 3,257 elderly cancer patients in Brazil and Portugal were found to be malnourished and 39.8% were identified as at risk of malnutrition (11). Furthermore, more than half of patients reported weight loss in the last three months, with 34% experiencing a loss of more than 3 kg (11).

Chronic or acute disease states can reduce food intake through multiple pathways (12). Furthermore, in-hospital medical treatments including drug therapies, surgery, chemotherapy, and radiation therapy can be related with nutrition-challenging adverse secondary effects such as loss of appetite and gastrointestinal dysfunctions, including nausea, vomiting, and compromised macro/micronutrient absorption (12,13). Patients may also be challenged with metabolic, inflammatory, and immunological derangements that influence the secretion of growth factors,

cytokines, glucocorticoids or peptides, and may elevate metabolic demands. Such changes can stimulate the mobilization of body reserves, suppress appetite, and impair nutrient absorption (12,14). Importantly, psychosocial conditions, including advanced age, inability to feed oneself, depression, and dementia can also hinder food intake (14).

Malnutrition has many physiological consequences, most notably the following seven types of sequelae:

1. *Depletion of body muscle and fat tissues, including intra-organ tissues.* Muscle mass atrophy is the most visible sign of malnutrition. However, it can be missed in inflamed obese patients because body composition changes may have non-substantial effects on total body weight (13).

2. *Changes in muscle function and performance.* Such changes can occur before changes in muscle mass, and suggest that nutrient intake disorders may impact muscle function, regardless whether muscle mass changes are detectable (14). Conversely, nutritional therapy can promote improvement in muscle function faster than an increase in muscle mass.

3. *Depletion of bone mass.* Bone mass loss is of particular concern when calcium, magnesium, and/or vitamin D intake are insufficient (14). Bone reformation is a slow process during which patients are at increased risk of fractures.

4. *Changes in cardiovascular and respiratory systems secondary to muscle mass loss* (13). Weakening of respiratory muscles (diaphragm and intercostal muscles) reduces cough effectiveness and secretion expectoration, potentially delaying recovery (14). Meanwhile, malnutrition-related weakening of the cardiovascular system can raise in-hospital mortality risk, particularly in cardiac patients (15), reduce glomerular filtration rate, and result in electrolyte deficiencies.

5. *Gastrointestinal disorders, probably due to changes in enzymatic secretions.* Lactose intolerance and pancreatic dysfunction with severe clinical consequences such as intestinal malabsorption, diarrhea and steatorrhea may occur (2,13).

6. *Impaired immune function* (common) (2). Dampened cellular immune responses and cytokine production are associated with an increased risk of infection and difficult wound healing (14). Critically ill malnourished individuals exhibit changes in the expression of genes that encode immune response molecules (16).

7. *Reduction/interruption of endocrine functions.* Production of T3 and T4 are decreased, as well as the production of testosterone and estrogen, which may cause amenorrhea in women. Insulin secretion may also be decreased (14).

It is important to point out that the malnutrition-derived consequences to the organism are observed both in hospitalized patients as well as in homecare patients (12).

There are many clinical and economic consequences associated to malnutrition. Although malnutrition diagnosis may have improved following the publication of the IBRANUTRI study, accompanying improvements in malnutrition prevention or treatment have not been evidenced. When Norman et al. (12) reviewed the results of various international studies of patients with chronic or severe diseases and assessed the prognostic implications of disease-related malnutrition, they observed increased morbidity, represented by increased wound healing time and a high rate of infections. They also found that these conditions in malnourished patients were associated with significantly greater mortality, hospital length of stay (LoS), and hospital treatment costs (12). Consequently, they have emphasized malnutrition negative impact on outcomes, particularly in surgical patients, who present a higher rate of postoperative complications strongly associated with malnutrition (12). A recent systematic review of 66 hospital nutritional assessment studies conducted in Latin America yielded results similar to those of Norman et al. Briefly, Correia et al. found malnutrition prevalence rates in the range of 40-60% at admission and increasing thereafter in correlation with longer LoS (17). Disease-related malnutrition was associated with increase in both infectious and non-infectious clinical complications, LoS, and treatment costs (17).

Correia and Waitzberg (18) conducted a major study of 709 adult patients covered by the Brazilian Public Health System aimed at analyzing how the nutritional status, provided by the SGA, of hospitalized patients associates with morbidity, mortality, LoS, and costs. They found that 26.3% of the patients were moderately malnourished and 7.4% were severely malnourished at hospital admission (18). Furthermore, they found that the incidence of complications among malnourished patients was high (27.0% vs 16.8%; relative risk [RR] = 1.60, 95% CI = 1.20-2.14; $p < 0.01$) (18), and that well-nourished patients had shorter hospital stays than

malnourished patients (average of six days vs nine days) (18). Hospital mortality was also found to be strongly influenced by nutritional status, with 14.4% of malnourished patients, but only 4.7% of well-nourished patients, dying while admitted (RR = 2.63; 95% CI = 1.55-5.27; $p < 0.05$) (18). Regarding medical care costs, Correia and Waitzberg found that the longer LoS by malnourished patients increased costs by 60.5% alone, and that malnourished patients care, considering drug and diagnostic tests costs used to manage respiratory infections, was associated with a 308.9% increase in costs relative to well-nourished patients (18).

In surgical patients, the impact of malnutrition is particularly worrisome. Malnourished surgical patients in Brazil have been reported to present with increased risk factors associated with LoS (RR = 2.55; 95% CI = 1.13-5.75; $p = 0.023$) (8). Among malnourished patients, men over 60 years old and those with cancer remained hospitalized longer (8). In the multicenter study performed by Brito et al., including 473 hospitalized individuals in seven Brazilian cities, it was found that malnutrition status increased the risk of pressure ulcers and associated risk factors 10-fold (overall prevalence = 16.9%) (OR = 10.46; 95% CI = 3.25-33.69; $p < 0.005$) (6). Likewise, the findings of the Luso-Brazilian Oncology Elderly Nutrition Survey indicated that being at risk of malnutrition was associated with a longer hospital stay (11).

It is important to point out that hospital malnutrition, though prevalent, often goes unrecognized and under-treated. Thus, there is a need to act quickly, starting immediately after hospitalization. Moreover, upon diagnosis of malnutrition, it is important that treatment strategies be implemented promptly. It is of the utmost importance that the nutritional status of patients should not be allowed to worsen during their hospitalization. Unfortunately, this is not the reality in most hospitals, as shown in a study by Waitzberg and Correia in which less than 10% of the patients, despite the high rate of malnutrition, received any type of nutrition therapy (5).

The early use of oral nutritional therapy may be an effective first action against malnutrition. The BRASPEN and international guidelines agree that all efforts should be made to provide oral diets to hospitalized patients. However, this is not always possible due to persistent anorexia or insufficient food intake. The first available alternative for patients with a functional gastrointestinal tract is the use of oral

nutritional supplements (ONS), which are high in calories, protein content, and other necessary nutrients. Currently, ONS are widely available. They can be found with a variety of caloric contents and protein densities and in a variety of formats, including beverages and powder mixes.

In this context, it is noteworthy to point out that, in a prospective, randomized trial conducted over 18 months with 101 patients recovering from gastrointestinal and vascular surgery, Beattie et al. (19) found that ONS (twelve days in hospital, then 51 days after discharge) had positive effects on several parameters in the 8-week immediate postoperative period. Specifically, they found that, relative to controls, patients given ONS had better anthropometry, grip strength, and quality of life (QoL; SF36) scores, and less need for antibiotics ($p < 0.001$). Additionally, weight loss was lower in the first four weeks, and it was gained thereafter. In a systematic review and meta-analysis of nine randomized controlled trials with adults and elderly patients, Stratton et al. observed a reduction in re-hospitalizations among those who used oral nutritional therapy (OR = 0.591; 95% CI: 0.434-0.804; $p < 0.001$) (20). Frequency of re-hospitalization was reduced by various formulations of oral nutritional supplements (caloric density range, 1-2.4 kcal/ml; daily intake provided range, 372-804 kcal) (18). Recently, Snider et al. observed that ONS use was associated with a 13.1% reduction in the probability of hospital readmission within 30 days in patients with chronic obstructive pulmonary disease (0.291 vs 0.335, $p = 0.01$) (21).

In homecare environment, it is observed that the negligence in the use of oral nutritional supplementation may contribute to the clinical worsening of the patient, as well as to an increase in hospital readmission. Guest et al. (2011) (22), in a retrospective analysis of 1,000 homecare adult patients, observed a significant increase in hospital readmission in malnourished patients (BMI $< 18.5 \text{ kg/m}^2$), with statistical significance (13% vs 5% [$p < 0.05$]).

In an 11-year retrospective study of information on 44 million adult inpatients, Philipson et al. found that, relative to patients who did not receive ONS, those given ONS had a shorter average LoS by 2.3 days (95% CI = -2.42 to -2.16), from 10.9 to 8.6 days (21.0% less), and a \$4,734 average decrease in episode cost (95% CI = \$-4,754 to \$-4,714), from an average cost of \$21,950 to \$17,216 (21.6% decline) (23). In a

systematic review, Freijer et al. also observed that the introduction of nutritional therapy shortened hospital stays and lowered costs (24). An analysis of the American Medicare database containing information about 378,419 patients over 65 years old who were hospitalized for chronic obstructive pulmonary disease showed that ONS use was associated with a 12% reduction in the cost of hospitalization (US\$10,953 vs US\$12,523, $p = 0.01$) (21). The authors observed high cost-effectiveness of oral nutritional therapy with a total care cost reduction of US\$18 for each US\$1 spent with ONS (21).

The use of ONS has also been shown to be effective in pediatric patients. A retrospective, instrumented analysis of 555,348 hospitalized American children (2-8 years old) showed that ONS prescriptions given to 1.09% of the patients reduced average LoS by 14.8% (6.4 days vs 7.5 days) and were associated with a 9.7% decrease in hospital costs (US\$16,552 vs US\$18,320; US\$1,768 [95% CI, US\$1,924-US\$1,612]) (25).

A 2016 systematic review of 19 randomized studies on the effectiveness of standard ONS use for controlling medical costs in the community and home care settings environment indicated that the investment in oral supplementation was fully justified: ONS represented 1-5% of the total related hospitalization costs, but reduced LoS, which accounts for 60% of the cost of hospitalization, markedly (26). The use of ONS was found to be associated with improved QoL scores, reduced rates of minor postoperative complications, fewer falls, and a decrease of functional limitations in the home environment (26). It is noteworthy that none of the studies included in this recent review (26) reported favorable results in the control groups (without ONS). Some researchers have observed trends of clinical benefits, including mortality reduction, with the use of ONS that did not reach statistical significance (26).

In a systematic review of nine hospitalized patient studies, Elia et al. found that standard ONS use was associated with cost savings and cost effectiveness (27). The sample sizes of patients with surgical, orthopedic, and medical problems and combinations of these varied from 40 to 1.16 million. Of 14 cost analyses comparing ONS with no ONS groups, twelve favored the ONS group, and among those with quantitative data (twelve studies), the mean cost saving was 12.2% (27). Cost savings

were typically associated with significantly improved outcomes, including less mortality (RR 0.650, $p < 0.05$; $n =$ five studies), fewer complications (by 35%; $p < 0.001$, $n =$ seven studies), and a 13.0% shorter average LoS (by ~2 days, $p < 0.05$; $n =$ five surgical studies) (27).

The investment in oral supplementation for homecare patients is also related to the reduction of costs in the community. Arnaud-Battandier et al. (2004) (28) followed for 12 months the prescription of 90 French doctors. They identified and randomized two groups of physicians based on their historical prescription practice: group 1, without prescription of oral nutritional supplementation, and group 2, with frequent prescription of oral nutritional supplements. In total, 378 elderly (over 70 years old) malnourished patients at home or in a nursing home were considered for the study. The health costs of group 1 patients were 929 euros, while group 2 patients' costs were 278 euros. Therefore, it was observed that the use of oral nutritional supplementation, besides adding clinical benefits, such as decreasing malnutrition, hospitalization and prevalence of pressure injury, helped to reduce health care costs. In conclusion, the literature provides convincing and consistent evidence in favor of the use of ONS, as a first step, for the prevention and treatment of health conditions sensitive to a negative nutritional impact. A recent review (29) by experts in clinical nutrition and based on the guidelines of the European Society for Clinical Nutrition and Metabolism (ESPEN) reports a high prevalence of in-hospital malnutrition, and presents a practical pathway of the best clinical measures to be adopted to prevent hospital malnutrition and decrease its impact on morbidity and mortality. Key recommendations informed by these guidelines are presented in table I (29).

With respect to cancer patients, early ONS intervention is strongly encouraged. The recent ESPEN guidelines (2016) for cancer patients underscore the difficulty in defining an ideal time to start nutritional therapy, but postponing is not recommended (30). Because reversing malnutrition associated with metabolic disorders is highly challenging, nutritional therapy should be started before patients are severely malnourished in order to stabilize or improve nutritional status. The ESPEN guidelines suggest that nutritional therapy be prescribed prophylactically to patients likely to develop anorexia or malnutrition in the course of treatment (30).

Clearly, in accordance with what has been presented, the current malnutrition

situation among Brazilian patients must and can be modified. We have presented alarming data showing the presence of malnutrition in Brazilian hospitals and its impact on QoL, treatment success, and the overall healthcare system, which is impacted negatively by malnutrition-associated costs. Importantly, the National Institute for Health and Care Excellence suggests that ONS be used within hospitals and in the community, after screening for malnutrition risk, malnutrition and ability to swallow, if dysphagia is present and in patients having surgery (31).

Recommendations

The present malnutrition situation can be addressed through better individualized patient care. The importance of patient nutritional status needs to be elevated. The nutritional status of each patient should be screened and assessed, and the responsible healthcare professional must intervene to prevent nutritional deficiencies or treat extant malnutrition. The use of ONS is an efficacious strategy to help meet patients' nutritional needs. The availability of these products and training for their proper use should be a priority in Brazilian hospitals and for public policy makers, particularly given the current overcrowding in Brazilian public hospitals. There is ample empirical evidence supporting ONS use to improve QoL and reduce LoS, which would improve bed availability and reduce medical costs.

In addition, it is important to emphasize that investments in oral nutritional supplementation are also extremely important in the homecare environment (home or nursing homes). Therefore, as reported, it is observed that there is a high prevalence of patients with nutritional impairment in the home environment, which favors their clinical worsening, the increase of re-hospitalizations and, consequently, the increase in public health expenditures. Incentive strategies can be adopted to provide adequate nutritional care through oral nutritional supplements for those patients who are outside the hospital environment, since there is scientific evidence on the reduction of health costs with this clinical practice.

Based on the convergence of the presented evidence, some key recommendations for Brazil, also applicable to other countries facing similar condition as ours, should be considered. We do encourage administrators and policy makers to tackle the prevalent problem of malnutrition in Brazilian hospitals and in homecare by

implementing nutritional screening and assessments and enabling the delivery of effective nutritional therapy. Cooperation between the government, hospital administrators, and health care professionals is needed to address this massive problem that increases morbidity and mortality, LoS, and medical costs. The government can support initiatives to overcome malnutrition, including making resources available to increase awareness, augment medical education, and provide nutritional therapy elements, including ONS, feeding tubes, and related devices. These initiatives, some of them already in full practice in other countries, have been linked to positive results in identifying and treating malnutrition, in particular when followed by aggressive and early nutritional therapy.

Future lines of investigation

Since 2013, the Brazilian Society of Parenteral and Enteral Nutrition (BRASPEN) has been conducting, in some hospitals, a yearly survey of overall nutrition care called “Nutridia Brasil”, similar to what has been done by ESPEN in Europe (Nutrition Day). The federal government could embrace and implement this important initiative in order to enroll many other hospitals. This survey could help promote a more complete overview of the complexity of hospital malnutrition as well as of nutrition practices in our country. Each individual hospital data could be used to generate guides for better commitment in improving nutrition screening and care. Also, the growing number of nursing homes, hospices, and home care patients demands a similar approach in order to assess the prevalence of malnutrition among these individuals. Considering the size of Brazil, having all these data as part of the public database registry, giving a particular opportunity to generate different kinds of research in malnutrition diagnosis and care, would be important. Furthermore, initiatives to promote clinical nutrition education to students (medical, nursing and others) as well as to all types of health practitioners should be envisioned, exploring digital platforms and social media resources. Moreover, patients’ and families’ empowerment should also be a goal, considered by the World Health Organization as a fundamental part of the overall patient’s approach (32).

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Table I. A practical pathway, based on ESPEN guidelines, to prevent hospital malnutrition and decrease its impact on morbidity and mortality

Screening methods	Nutrition risk screening (NRS-2002) should be routine in hospital wards to identify patients at risk of malnutrition and, if an NRS-2002 score is > 3, oral nutritional supplements should be prescribed
Nutrition requirements	They should be determined on an individual basis
Protein intake	It should be ≥ 1.2 g/kg to prevent or correct protein deficiencies in at-risk or malnourished inpatients. Intake of 0.8-1 g/kg is indicated for patients with acute and chronic renal failure without renal replacement therapy
Oral nutritional supplements (ONS)	They should be used in addition to hospital meals, ideally adapted to individual preferences, to meet nutritional requirements and improve outcomes of at-risk or malnourished inpatients
Strategies to increase intake	The fortification of meals and the provision of between-meal snacks should be implemented as a strategy
Enteral tube feeding	Some oral food intake should be maintained whenever possible It should be used for those patients who cannot reach 75% of their energy and protein targets within five days of oral feeding and ONS
Parenteral nutrition	Should be initiated with a minimal oral or enteral feeding when possible, if oral and/or enteral nutrition is not possible or if at least 75% of energy and protein targets have not been reached after five days following the beginning of enteral nutrition
Monitoring nutritional support	Nutrient intake should be reassessed every 24-48 hours