Internal and Emergency Medicine (2019) 14:7–9
https://doi.org/10.1007/s11739-018-1987-7

IM - COMMENTARY

Risk, prevalence, and impact of hospital malnutrition in a Tertiary Care Referral University Hospital: a cross-sectional study

Concetta Finocchiaro[1] · Giovanni Fanni[2] · Simona Bo[2]

Received: 31 October 2018 / Accepted: 14 November 2018 / Published online: 24 November 2018

Malnutrition is a high-impact condition in terms of public health. Hospital malnutrition (i.e., malnutrition in a healthcare setting) has been demonstrated to affect several major clinical outcomes, such as immune competence, wound healing, quality of life, risk of hospital infections, length of stay, risk of readmission, overall survival, and to be a striking economic burden for the health care system [1–6]. Up until the present time, hospital malnutrition has a high prevalence rate all over the world that varies from 5 to 60% according to patients' clinical conditions, geographical region, healthcare setting or hospital department and, remarkably, diagnosis criteria [1–7]. A gap between the number of patients screened and diagnosed with malnutrition, receiving nutritional recommendations and those effectively malnourished remains much higher [8]. Indeed, sparse awareness and a low attention to this issue are present among healthcare professionals and governments [9,10]. Providing nutritional care through early and appropriate nutritional assessment and intervention has been shown to improve outcomes, particularly among high-risk elderly hospitalized patients. However, recent meta-analyzes conclude that there is low-quality evidence for the effects of nutritional support on mortality and serious adverse events [11], though a reduction in healthcare costs indeed exists [12].

According to the European Society for Parental and Enteral Nutrition (ESPEN), malnutrition consists in both over- and under-nutrition; as regards undernutrition, the differences between cachexia (severe body weight loss, fat and muscle loss with increased protein catabolism due to underlying diseases), sarcopenia (loss of muscle mass and function) and malnutrition have been recently highlighted [13]. Malnutrition in hospitalized patients is often a combination of cachexia (disease-related chronic malnutrition with inflammation), acute disease-or injury-related malnutrition and inadequate nutrient consumption. Contributors to this complex interplay might be disease-related acute or chronic metabolic alterations, the reduced availability of nutrients (reduced intake, impaired absorption or increased losses) and increased energy requirements [1,13]. Therefore, the nutritional status often worsens during hospitalization.

The impact of in-hospital stay on the individual nutritional status is extremely difficult to evaluate, since the specific patient' clinical status might act as a major confounder.

An interesting insight into the problem has recently been provided by Rinninella, who studied whether the hospitalization itself could be detrimental in malnourished patients [14]. This work is a sub-group analysis nested in an Italian cross-sectional study aimed at estimating risk and prevalence as well as the impact of malnutrition in a cohort of patients from a large Italian hospital [14]. A within-patient comparison of anthropometrical measures, bioelectrical impedance (BIA) values and laboratory data was performed between admission and discharge among those receiving a nutritional assessment at both times. A significant worsening at discharge is found in values of phase angle (PA), fat-free mass (FFM), mid-upper arm circumference (MUAC), albumin and Prognostic Nutritional Index (PNI, calculated by combining albuminemia and lymphocyte count). In a multivariate regression model, PA reduction is significantly associated with PA value at admission and malnutrition diagnosis according to ESPEN criteria, but not with the length of stay or the Charlson Comorbidity Index (CCI). No significant changes in weight, BMI and FM are found.

The study by Rinninella makes us consider the worsening of the nutritional status of our patients during hospitalization, and suggests the need for greater attention and awareness by health professionals on this topic. Some methodological limitations should be recognized. The selection of the studied cohort was based on the availability of paired

✉ Simona Bo
simona.bo@unito.it

[1] Unit of Clinical Nutrition, Hospital of Turin, Città della Salute e della Scienza, Turin, Italy

[2] Department of Medical Sciences, University of Turin, c.so AM Dogliotti 14, 10126 Turin, Italy

data; the sample size was small; and the analyzed subgroup was derived from a single healthcare unit. Furthermore, it is difficult to disentangle the actual role of hospitalization on the impact of the acute or chronic comorbidities on malnutrition. Nevertheless, regardless of the possible causes, the concerns raised by many conditions, frequently occurring during in-hospital stay were well discussed, such as the poor food quality, the inadequate food quantities, the inappropriate meal timing, the insufficient number of nurses to take care of the patient's nutrition, and the relevant amount of food wasted in hospitals.

Studies performed in other countries confirmed a worsening of malnutrition during the in-hospital stay in patients with malignancies [15] or stroke [16], and find that malnutrition prevalence increases along with length of stay [17]. These data outline the importance of continuously monitoring the nutritional status, and performing a more careful assessment before discharge to give adequate nutritional support at home too.

Nutritional status can be assessed through many different feasible and validated tools, though none of them is universally accepted as a *gold standard* [18]. ESPEN recognizes the Malnutrition Universal Screening Tool (MUST), the Nutritional Risk Assessment (NRS-2002) and the Mini Nutritional Assessment (MNA) [18], and recommends the Subjective Global Assessment (SGA), which is extensively used worldwide [19,20]. These tools are based on various combinations of registered or measured BMI, weight loss, food intake, disease severity, and age. Blood biomarkers concentrations used for the assessment of nutritional risk should be properly interpreted in consideration of the fact that their variations often reflect the degree of catabolism/inflammation rather than the nutritional status [21]. The main anthropometric measures include body weight and BMI, triceps skinfold and MUAC. BIA allows the estimate of total body water, FFM, FM, and PA. This latter has recently been validated as a reliable, easy and quick tool to monitor hospital malnutrition, even if some technical and physiological limitations of this tool should be considered [22,23].

Indeed, standardized criteria rather than single nutritional status parameters should be employed in malnutrition evaluation both at admission and discharge. In addition to appropriate screening and nutritional assessment, attitude and mindset of health professionals should change. There are many aspects worth considering other than acute or chronic pathological conditions per se, such as drug-related anorexia, inappropriate *nil per os* medical prescription, dysphagia, unpalatable food, dysgeusia [1]. Furthermore, there are many issues easy to be improved that would have a favorable impact on the inpatients nutritional status, such as prolonged food avoiding for tests, staff interrupting or disturbing the patients at mealtime, patients' inability to reach meals, difficulties in opening packages or using cutlery, and tray missing [24].

The possibility of having nutritional assessments and dietary advice for all inpatients, with specific personalized dietary regimens (for example, frequently administered energy dense small size portion meals) together with a better assistance during meals would be the first step toward the solution to hospital malnutrition.

Therefore, the key word is probably *training* of health personnel and of all the people who revolve around the patient, such as relatives, volunteers or those who keep company or provide meal assistance, who are still now too little aware of the importance of ensuring a continuum of care to avoid the progressive deterioration of the nutritional status.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Statement of human and animal rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent None.

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