LETTER TO THE EDITOR

RE: MALNUTRITION IS ASSOCIATED WITH POOR REHABILITATION OUTCOME IN ELDERLY INPATIENTS WITH HOSPITAL-ASSOCIATED DECONDITIONING: A PROSPECTIVE COHORT STUDY

In a study published in this journal Wakabayashi & Sashika (1) report that a poor rehabilitation outcome for hospital-associated deconditioning in elderly patients is associated with nutritional state, chronic disease-related malnutrition and albumin levels. Hospital-associated deconditioning, described as functional decline related to acute hospitalization, is of particular relevance, as it has a high prevalence in elderly patients (approximately 30%). In addition, hospital-associated deconditioning increases the risk of institutionalization and death (2). In this context, we regard the current results as of particular importance in generating preventive strategies for hospital-associated deconditioning. We would like to comment on this study.

In recent years, we have learnt that patient tolerance to physical or occupational therapy, cognition/ability to learn, motivation and mood are potential confounders in the outcome of rehabilitation programmes for hospital-associated deconditioning (2). Low mood, which commonly presents as depression in elderly patients, and impaired cognition may also adversely affect the dietary intake and nutritional state of this group of patients (3). However, Wakabayashi & Sashika's study excluded subjects with deconditioning secondary to specific neurological insult, and did not report any screening or clinical evaluation results for the cognitive ability and mood of participants. We suggest that inclusion of these parameters would affect the multivariate analyses.

Secondly, this study should focus on the daily calorie and protein intake of participants during the inpatient rehabilitation programme. Previous studies have shown that the protein and caloric intake of elderly and critically ill patients are frequently suboptimal during a period of hospitalization (4, 5). It has been reported in a meta-analysis that, in elderly subjects, adequate protein supplementation increases muscle mass and strength gains during prolonged resistance-type exercise training (6). The present study did not report adequate data on daily protein and calorie requirements and their management.

Wakabayashi & Sashika's study identifies relevant issues in the management of elderly inpatients; however, we suggest that future studies with a similar design should are required to address the above-mentioned methodological drawbacks.

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RESPONSE TO THE "LETTER TO THE EDITOR: RE: MALNUTRITION IS ASSOCIATED WITH POOR REHABILITATION OUTCOME IN ELDERLY INPATIENTS WITH HOSPITAL-ASSOCIATED DECONDITIONING: A PROSPECTIVE COHORT STUDY"

We would like to thank Safer et al. (7) for their comments on our paper (1). We agree that depression and impaired cognition are potentially confounding factors that could influence both the outcome of hospital-associated deconditioning rehabilitation programmes and nutritional status. In our study we did not perform screening for cognitive skills or depression, and thus could not include it in the multiple regression analysis. However, the Mini Nutritional Assessment Short Form (MNA-SF) included a question about neuropsychological problems, such as dementia and depression. The association between the MNA-SF score and the Barthel Index score may therefore suggest that both malnutrition and neuropsychological problems are linked with poor rehabilitation outcomes in elderly inpatients with hospital-associated deconditioning.

Safer et al. raise points about the adequacy and management of data on daily protein and calorie requirements. Estimating

protein and calorie requirements is very important in the nutritional management of patients undergoing rehabilitation. Basal energy expenditure was calculated using the Harris-Benedict equation (8). Total energy need is usually calculated using Long's formula as follows: *basal energy expenditure × activity factor × injury factor* (9). The activity factor for patients confined to bed was 1.2, and for those out of bed it was 1.3 (9). For example, the injury factor for patients with a mild infection was 1.2, and for a moderate infection it was 1.5 (9). However, accurately estimating the activity factor and injury factor in elderly inpatients with hospital-associated deconditioning was quite difficult and could have been subject to bias. Therefore, to reduce bias we defined starvation-related malnutrition as an energy intake inadequate to meet basal energy expenditure.

We calculated total energy need using Long's formula. The activity factors for patients who were prescribed bedside and

gymnasium physical therapy were 1.2 and 1.3, respectively. The injury factors for patients whose C-reactive protein was below 1.0 mg/dl and above 1.0 mg/dl were 1.0 and 1.2, respectively. The calculated mean total energy need was $1,488 \pm 242$ kcal. Mean total energy intake was $1,113 \pm 468$ kcal, and 123 (73%) patients did not meet total energy need. The energy intake of elderly inpatients with hospital-associated deconditioning seemed to be frequently suboptimal. However, these results should be interpreted with caution because of the biases inherent in deciding the activity factor and injury factor.

For optimal dietary protein intake in older people, a mean daily intake of 1.0–1.2 g protein per kg body weight per day is recommended (10). Most older adults who have acute or chronic diseases need more than the recommended dietary protein (1.2–1.5 g/kg body weight/day), except for older people with severe kidney disease (estimated glomerular filtration rate (GFR) <30 ml/min/1.73 m^2) who are not on dialysis (10). However, we could not speculate whether the protein intake met the protein need, because we did not collect data about protein intake during our study. Nutritional management was performed by the attending physicians and registered dieticians, with a nutrition support team, and not by the physiatrists.

We concur with Safer, et al. suggestion that similar future studies should be designed to overcome methodological drawbacks that better address factors, such as cognitive skills, depression, daily protein and calorie requirements, and nutritional management. The accurate estimation of total energy needs and optimal nutrition management of patients undergoing rehabilitation are issues that warrant future consideration. We thank Safer, et al. for their comments and for contributing to the discussion.

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