

High prevalence of malnutrition among hospitalized patients in a tertiary care hospital by using malnutrition universal screening tool

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Background

Estimating the prevalence of malnutrition among the hospitalized patients is challenging. Malnutrition is associated with a variety of poor outcomes including long hospital stay and mortality as well as increased hospital costs.

Aim

The study aims to assess the risk of malnutrition in hospitalized patients and to identify the main factors and clinical parameters associated with the risk of malnutrition.

Materials and methods

The researchers conducted a cohort study to screen for the risk of malnutrition following hospital admission in a population of adult patients recently admitted to a tertiary care hospital in Egypt using the malnutrition universal screening tool (MUST) and simplified nutritional appetite questionnaire and to assess the effect of malnutrition on duration of hospital stay.

Results

The study included 1000 patients with a mean age of 49±13.7 years. The median duration of hospitalization was 5 (4–7) days, with a range of 2–30 days. All those included in the study presented a risk for malnutrition (1.0% medium risk and 99.0% high risk). High risk malnutrition was most common among those with diabetes ($P=0.001$) and renal problems ($P=0.03$), and in patients who had been admitted for longer hospital stay ($P=0.037$). A statistically positive correlation was seen between the age of the patients ($P=0.031$, $r=-0.031$), length of stay ($P=0.353$, $r<0.001$), and MUST score. However, there was a statistically significant negative weak correlation between simplified nutritional appetite questionnaire (appetite) ($P=0.003$, $r=-0.094$), BMI ($P<0.001$, $r=-0.120$), albumin ($P<0.001$, $r=-0.117$), and MUST score. Malnourished patients had a longer hospital stay than those who are well nourished ($P=0.002$).

Conclusion

We have identified an overall malnutrition risk of 100% among the hospitalized patients and ascertained that malnutrition is a risk of prolonged length of hospital stay. MUST questionnaire should be implemented to screen and early recognize the malnourished hospitalized subjects for better intervention.

Keywords:

malnutrition, malnutrition universal screening tool, nutrition screening, prolonged hospital stay, tertiary care hospital

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Introduction

Disease-related malnutrition is a crucial public health problem in health-care settings as stated by the European Society for Clinical Nutrition and Metabolism and the European Nutrition for Health Alliance [1]. The prevalence of malnutrition among hospitalized patients ranges from 10 to 60%, depending on the definition used and the way of assessment [2,3].

The adverse impact of malnutrition on the patient's outcome is well established; malnutrition is an independent risk factor for late recovery, mortality, and morbidities, delayed wound healing, hospitalization, and increased health-care costs [4].

Many studies have found that the length of hospital stay is significantly longer in malnourished patients, with an increase of 40–70% in undernourished patients [5]. Therefore, the European Society for Clinical Nutrition and Metabolism has recommended the implementation of nutritional screening programs in hospitals, and further nutritional assessment of patients identified to be at risk of malnutrition for the sake of both patients and health-care systems [6].

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Malnutrition in hospitalized patients is an underdiagnosed and undertreated problem [7]. Also, few studies have been conducted in Egypt to explore the current research topic. Therefore, the primary objective of the study was to assess the risk of malnutrition in patients recently admitted to a tertiary care level hospital and to identify the main factors and clinical parameters associated with the malnutrition risk.

Materials and methods

Study design and population

A prospective cohort of hospitalized patients of internal medicine department, which has a capacity of 350 beds. All consecutive patients who had chronic illness aged greater than or equal to 18 years admitted to internal medicine wards at Cairo University Hospital during the study period were screened for malnutrition and were followed up to measure the duration of hospital stay. Pregnant women, clinically unstable and mentally noncooperative (unconscious) patients, not able to give informed consent, could not be weighed, and those who had an expected length of hospital stay of fewer than 3 days were excluded.

Sample size and the sampling technique

A consecutive sampling technique was used to recruit patients accepted to participate in the study. The researchers interviewed a total of 1000 adults during the study period starting from October 2016 through July 2017.

Data collection tools

A pretested, anonymous, structured interview questionnaire was used to collect the data. All questions were close ended and were precoded before data collection to facilitate data entry and analysis. The questionnaire included questions about the following data.

Sociodemographic characteristics

Age, sex, education, occupation, and residence.

Anthropometric measures

Anthropometric measurements (namely weight, height, and accordingly the BMI) were conducted for the enrolled patients.

Nutrition screening

The nutrition screening was carried out using a validated clinical screening tool: the malnutrition universal screening tool (MUST). MUST is a five-step screening tool to identify adults, who are

malnourished, at risk of malnutrition, or obese. It also includes management guidelines which can be used to develop a management plan. Three independent criteria are used: (a) current weight status using BMI, (b) unintentional weight loss, and (c) acute disease with no nutritional intake for greater than 5 days. Each criterion can be rated as 0, 1, or 2. The overall risk for malnutrition is established as low (score=0), medium (score=1) or high (score ≥ 2) [8]. The number of MUST scores was undertaken by experienced clinical nurses on patients within 6 h of admission.

Simplified nutritional appetite questionnaire

Simplified nutritional appetite questionnaire (SNAQ) is a four-item single-domain questionnaire that is used to assess the appetite among the enrolled participants as poor appetite is common among chronic patients. Responses are scored by using a 5-point scale that is based on the following numerical scale: (a) 1, (b) 2, (c) 3, (d) 4, (e) 5 points verbally labeled. The total SNAQ (appetite) score is the sum of scores on the four items, with less than or equal to 14 indicating poor appetite and a significant risk of at least 5% weight loss within 6 months [9].

Patient's files

A separate sheet was generated to collect the required data from the patient's medical record:

- (1) Medical history: length of hospital stay duration and outcomes (mortality or discharge). Length of stay (LOS) was categorized as prolonged based on a median of 9 days as the cutoff point [10].
- (2) Laboratory data: hemoglobin (g/l) and serum albumin (g/l).

Hypoalbuminemia in an adult is defined if albumin is less than 3.5 g/dl [11].

Hemoglobin levels to diagnose anemia at sea level if hemoglobin is less than 12 g/dl [12].

Statistical analysis

The data were coded, entered, and analyzed using the Statistical Package SPSS version 21 (SPSS Inc., Chicago, Illinois, USA) [13]. Data were cleaned and double checked. Number and percentage were used to summarize qualitative variables. Mean, SD, median, and interquartile range were used to synthesize quantitative variables. Mann-Whitney test was used to compare the differences between two independent groups. Chi square test for qualitative variables. Spearman's ρ nonparametric correlation was used to test the association between variables. A *P* value less

than or equal to 0.05 was considered as statistically significant.

Ethical consideration

The Medical Research Committee in the Internal Medicine Department at the Faculty of Medicine Cairo University revised and approved the study protocol. Informed consent from each participant was obtained after proper orientation of them regarding the study objectives. Only those who agreed were included, and those who refused were excluded from the study. All procedures for data collection were treated with confidentiality according to the Helsinki Declaration of Biomedical Ethics [14].

Results

The researchers screened 1000 patients with a mean age of 49 ± 13.7 and the range was 18–89 years, with more than half being men (52.2%). About three-quarters of them (74.4%) were uneducated. The median (interquartile range) duration of hospital stay was 5 (4–7) days, with a range of 2–30 days. The mean BMI was 26.5 ± 5.2 . The more prevalent comorbidities were renal disease 321 (32.1%), followed by hepatic disease 214 (21.4%), as shown in Table 1. Malnutrition high risk was more frequent among those with diabetes ($P=0.001$), followed by renal disease ($P=0.03$), and in patients who had been admitted for a longer time ($P=0.037$) as shown in Table 2.

Patients with MUST score ≥ 2 had a longer hospital stay than those whose MUST score < 2 (6.5 ± 3.8 vs. 4.4 ± 0.8 days; $P=0.03$). A statistically positive correlation was seen between the age of the patients ($P=0.031$, $r=-0.031$), LOS ($P=0.353$, $r<0.001$), and MUST score. However, there was a statistically significant negative weak correlation between SNAQ (appetite) ($P=0.003^*$, $r=-0.094$), BMI ($P<0.001^*$, $r=-0.120$), albumin ($P<0.001^*$, $r=-0.117$), and MUST score Table 3.

Discussion

The current study revealed that the malnutrition risk among the enrolled patients admitted to Kasr Al Aini Internal Medicine Department was 100.0% as defined by the MUST screening tool. The study ascertained that the main factors associated with a higher risk of malnutrition are age, prolonged length of hospital stay, and the presence of comorbidities. The high malnutrition risk prevalence might be attributed to overall poor health, poor appetite as revealed in the current study by the SNAQ appetite assessment tool among about three-quarters of the enrolled participants, or closely linked comorbidities hindering adequate

Table 1 Background and clinical characteristics of the enrolled chronic patients

Variables	N=1000 [n (%)]
Age (years)	
Range	18.0–97.0
Mean \pm SD	49.0 \pm 13.7
Sex	
Male	552 (55.2)
Female	478 (47.8)
Weight (kg)	
Range	37.0–120.0
Mean \pm SD	73.6 \pm 13.8
Height (cm)	
Range	130.0–187.0
Mean \pm SD	167.0 \pm 9.5
BMI (kg/m ²)	
Range	13.8–45.2
Mean \pm SD	26.5 \pm 5.2
Comorbidities	
Renal	321 (32.1)
Hypertension	142.0 (14.2)
Diabetes mellitus	141.0 (14.1)
Hepatic	214.0 (21.4)
Cardiac	61.0 (6.1)
Respiratory	44.0 (4.4)
Neoplasm	95.0 (9.5)
Other comorbidities ^a	14 (1.4)
Hemoglobin (g/dl)	
Range	5.0–15.0
Mean \pm SD	10.1 \pm 2.0
Albumin (mg/dl)	
Range	1.5–5.5
Mean \pm SD	3.3 \pm 0.7
Hospital stay (days)	
Range	2.0–30.0
Median (IQR)	5.0 (4.0–7.0)
Prolonged HS ≥ 9 days	159.0 (15.9)
Nonprolonged	841.0 (84.1)
MUST score	
< 2	10 (1.0)
≥ 2	990 (99.0)
SNAQ (appetite)	
≤ 14	705 (70.5)
> 14	295 (29.5)

^aInfection, bed sores, fractures. HS, hospital stay; IQR, interquartile ratio; MUST, malnutrition universal screening tool; SNAQ, simplified nutritional appetite questionnaire.

nutritional intake and absorption, increased the requirements [15]. In addition, malnutrition high risk was more frequent among those with diabetes ($P=0.001$), followed by renal diseases ($P=0.03$), and all the hospitalized patients under study were suffering from one or more chronic illnesses.

The revealed prevalence was higher than the reported rates of earlier studies conducted among hospitalized patients [7,16]. The variation between the current study figures and those revealed from other hospitals

Table 2 Distribution of the enrolled patients by malnutrition risk as revealed by malnutrition universal screening tool and different backgrounds and clinical characteristics

Variables	At high risk of malnutrition by MUST [n (%)]		P value
	Yes (N=990)	No (N=10)	
Sex			
Male	516 (52.1)	6 (60.0)	0.75
Female	474 (47.9)	4 (40.0)	
Comorbidities			
Diabetes mellitus	135 (13.6)	6 (60.0)	0.001 S
Hypertension	140 (14.1)	2 (20.0)	0.64
Renal	321 (32.4)	0 (0.0)	0.03 S
Hepatic	214 (21.6)	0 (0.0)	0.13
Cardiac	61 (6.2)	0 (0.0)	1.00
Respiratory	44 (4.4)	0 (0.0)	1.00
Neoplasm	95 (9.6)	0 (0.0)	0.61
Other comorbidities	140 (14.1)	4 (40.0)	0.04 S
Malnutrition (anemia or hypoalbuminemia)	857 (86.6)	6 (60.0)	0.03 S
Mortality	222 (22.4)	0 (0.0)	0.12
Age (mean±SD)	49±13.7	52.1±15.2	0.47
BMI	26.5±5.1	30.1±4.9	0.02 S
SNAQ (appetite)	11.8±4	13±4.3	0.17
Hospital stay	6.5±3.8	4.4±0.8	0.03 S

MUST, malnutrition universal screening tool; SNAQ, simplified nutritional appetite questionnaire.

as previously mentioned could be explained by the difference between various hospital settings, different ethnicity, types, the severity of the illness, and different instruments used for the classification of malnutrition as well as different disease spectra. Also, the studied hospital is a university hospital that functions as a referral hospital and generally admits patients requiring extensive care.

Malnutrition risk is significantly associated with comorbidities such as diabetes and renal problems. This finding could be explained by the catabolic processes, generalized inflammation, and higher nutrient demand due to the underlying comorbidity [17]. Major comorbidity and critical states were found to be the main contributors to disease-related malnutrition. Thus, in these populations the evaluation of nutritional status must be accurate in order to optimize their clinical outcome [18], where increased energy and protein requirements, increased losses together with inflammation may play a central role. In fact, the interaction of disease and nutrition is bilateral: while disease may cause secondary malnutrition, malnutrition may adversely influence the underlying disease [19].

The negative impact of malnutrition on patient's outcome is well demonstrated. Many studies have found that the LOS of malnourished, screened patients was longer than that for well-nourished patients when assessed by MUST [20]. We also confirmed that those patients classified as at high

risk of malnutrition have a 2-day longer hospital stay than those classified moderate, supporting the importance of detecting this problem on admission to avoid important health-care-associated costs.

Unsurprisingly, the present study revealed that age was positively correlated with malnutrition risk ($r=0.068$, $P=0.031$); the increase in patient age was significantly associated with the higher nutritional risk in the sample studied here. This is broadly consistent with other studies that demonstrated the association between an increase in age and malnutrition risk [21]. The possible explanation is the physiological dysfunction occurring with an increase in age, coexistence of conditions such as dementia and dysphagia, polypharmacy, and the social denial. Also, the length of hospital stay was significantly associated with MUST score ($r=0.03$, $P<0.001$). The current finding is in line with an earlier study conducted by Lim *et al.* [5] who concluded that poor nutrition was associated with poor outcomes affecting the survival of patients, hospital costs, and length of stay. In the current study, there is a significant inverse correlation between albumin and malnutrition risk as revealed by the MUST score ($r=-0.117$ and $P<0.001$). The previous finding is logic as the mean level of albumin has been demonstrated to more reliably reflect protein-energy malnutrition among the participant's as suppression of serum albumin levels usually occur in patients with chronic illness and is attributed to many causes

such as renal loss or hepatic disease or protein-losing enteropathy [22].

One of the strengths of this study resides in the fact that MUST is a validated instrument, and its use in different geographical and clinical settings can ensure a high degree of comparability of results, as well as the study addresses an area not well explored in Egypt especially in a tertiary health-care hospital. This study also has a set of limitations. First, the cross-sectional nature of the study did not allow the assessment of associations between the presence of malnutrition risk and long-term outcomes such as the length of hospital stay. However, the current study was conducted to explore the situation in this new area of inquiry and to generate hypotheses as no information is available regarding the nutritional screening of hospitalized patients in Egypt. It was not used to infer causal relationships. Data from this study may not be generalized to other tertiary care hospitals in Egypt. The mix of patients attending the tertiary care hospital is different from the patient mix in the general population.

In conclusion, we have identified an overall malnutrition risk of 100.0% among the hospitalized, and we have ascertained the main factors associated with a higher risk of malnutrition; age, the prolonged length of hospital stay, and comorbidities. The findings of the study can serve to orient and substantiate future

studies on the importance of implementing routine screening measures for the hospitalized patients.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Table 3 Correlations between malnutrition risk as revealed by malnutrition universal screening tool and different background and clinical characteristics

Variables	MUST
SNAQ (appetite)	
<i>r</i>	–0.094
<i>P</i>	0.003 S
Age	
<i>r</i>	0.068
<i>P</i>	0.031 S
Body mass index	
<i>r</i>	–0.120
<i>P</i>	<0.001 S
Hemoglobin	
<i>r</i>	0.016
<i>P</i>	0.616
Albumin	
<i>r</i>	–0.117
<i>P</i>	<0.001 S
Hospital stay	
<i>r</i>	0.353
<i>P</i>	<0.001 S

MUST, malnutrition universal screening tool; SNAQ, simplified nutritional appetite questionnaire..

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