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Brief report

Similar health economic outcomes in low-risk and high-risk malnourished inpatients as screened by the Malnutrition Screening Tool after delivery of oral nutritional supplements

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ABSTRACT

Objective: The aim of this study was to determine whether modified low- and high-risk Malnutrition Screening Tool (MST) scores (2 versus >2, respectively) were independently predictive of health economic outcomes.
Methods: We analyzed data from a recent nutrition-based quality improvement program (QIP) that prescribed daily oral nutritional supplements for all hospitalized adults at risk for malnutrition. In the original study, an electronic medical records–based MST was administered at the time of admission, and patients were classified as "low risk" or "high risk" for malnutrition based on MST scores (2 versus ≥2). We compared health economic outcomes for patients at low or high risk for malnutrition based on a modified score (MST = 2 versus >2, respectively), looking for between-group differences in length of stay (LOS) and unplanned 30-d readmissions. Analyses were additionally stratified by age (<65 versus ≥65 y of age).
Results: Of the 1269 patients enrolled in the QIP, 413 (32.5%) had MST of 2 and 856 (67.5%) had MST >2. Mean LOS was 5.19 d (±4.78) for patients with MST 2 and 4.49 d (±4.69) with MST >2 (non-statistically significant between-group difference; $P = 0.277$). There were no significant differences in unplanned 30-d readmission rates (14% for low-risk and 17.1% for high-risk patients; $P = 0.171$). These findings remained statistically insignificant when the low- and high-risk MST score groups were further stratified by age.
Conclusions: Outcomes of hospitalized patients with MST 2 were not significantly different from those with an MST >2. This suggests that patients at both lower and higher risk for malnutrition (based on MST scores of 2 versus ≥3) were similar in terms of LOS and 30-d readmission rates. To avoid overlooking cases of malnutrition risk, the validated cutoff scores for the MST should be consistently implemented. Training that is consistent with the validated MST is recommended rather than attempting to reduce the case burden by "raising the bar" and attempting to classify patients with an MST = 2 as "low risk."

Introduction

Up to half of adults are at risk for malnutrition upon hospital admission. To optimize patient outcomes, nutrition screening must be included as a key component of a quality care plan. Nutrition screening is intended to be a simple procedure that uses a validated instrument to identify patients who are at risk for malnutrition. In turn, positive identification of malnutrition risk prompts the nutrition care process, which begins with a complete nutrition assessment and can lead to diagnosis and treatment of malnutrition.

Validation of a nutrition screening tool must assess its ability to accurately assess what it is designed to measure (nutritional status, particularly malnutrition) and to predict risk for adverse nutrition-related outcomes (longer hospital stays, more unplanned readmissions, and decreased survival). The Malnutrition Screening Tool (MST) was first validated in a mixed population of hospitalized adults; malnutrition risk was defined as an MST score of ≥2 [1]. Since it was initially validated, the MST has been validated for use in a wide range of populations, including people of older age in hospitals, nursing homes, and

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rehabilitation facilities; adults with cancer; and adults in the community, especially those with chronic health conditions [2–4].

Concerns are sometimes expressed about excessive staff burden when a screening tool finds low-risk (false-positive) cases that prompt superfluous follow-up nutrition assessments. Such concerns may reflect resource constraints within health care systems. However, we must also consider the health and economic costs of overlooking—and not treating—people with disease-related malnutrition who may be incorrectly classified as "low risk." This is important to note because the MST loses sensitivity when a higher cutoff score of ≥3 is used (instead of ≥2, as designed and validated) [1].

The objective of the present study was to compare health economic outcomes for patients at low or high risk for malnutrition (MST 2 versus >2, respectively), to quantify any between-group differences in length of stay (LOS) and unplanned 30-d readmissions.

Methods

For this analysis, we used data collected for a Quality Improvement Program (QIP) study reported previously [5]. The study was conducted in a four-hospital health care system in the Chicago area (Advocate Health Care [AHC]) and was registered with clinicaltrials.gov. It tested the effects of a nutrition-focused QIP on readmission rates and LOS of hospitalized adult patients at risk for malnutrition as defined by MST scores [5]. The current data analysis compared health economic outcomes (30-d unplanned all-cause readmission and hospital LOS) for patients classified as being at low or high risk for malnutrition (MST = 2 versus >2, respectively). Our analysis further stratified patients by age <65 and ≥65 y.

Patients admitted to the hospital and enrolled in the original QIP had any primary diagnosis and were ≥18 y of age; at risk for malnutrition (MST ≥2); and able to consume food and beverages orally [5]. All hospital staff attended mandatory training on MST before QIP implementation and continuous education activities throughout the QIP period. Nursing staff conducted nutrition risk screening upon admission with an electronic medical record (EMR)–cued MST that took about 5 min per patient (Fig. 1). For each adult who screened positive (MST ≥2),

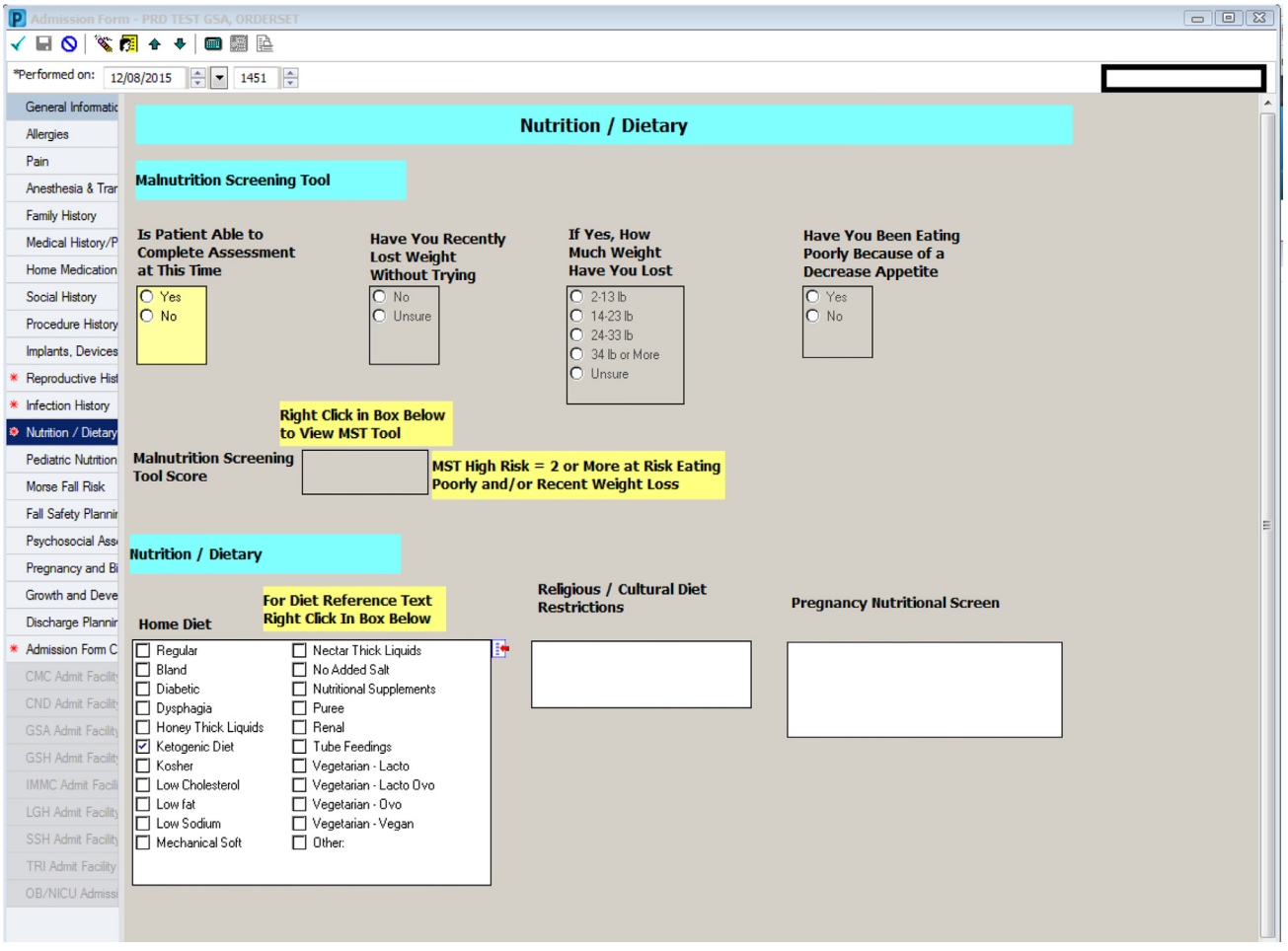

Fig. 1. Malnutrition Screening Tool [1]

1. Have you/the patient lost weight recently without trying?
(Applies to the past 6 mo)

No	0
Unsure	2

(Unsure, ask if they suspect they have lost weight, e.g., clothes are looser)
Yes, how much, kg (lb)?

1–5 (2–11)	1
6–10 (13–22)	2
11–15 (24–33)	3
>15 (> 33)	4
Unsure	2

2. Have you/the patient been eating poorly because of decreased appetite?

No	0
Yes	1

TOTAL SCORE (of weight and appetite score) _____.

Table 1
Readmission rate and length of stay by MST scores and age groups

Characteristic: MST score/n (%)	2/413 (32.5)		>2/856 (67.5)		*P*-value
Readmission rate, n (%)	58 (14)		146 (17.1)		0.171
Length of stay, mean (±SD)	5.19 (±4.78)		4.49 (±4.69)		0.277
Characteristic: age, y/n (%)	<65/151 (36.5)	≥65/262 (63.5)	<65/366 (42.7)	≥65/490 (52.3)	
Readmission rate, n (%)	18 (11.9)	40 (15.3)	67 (18.3)	79 (16.1)	>0.05
Length of stay, mean (±SD)	5.24 (±5.89)	5.15 (±4.02)	5.37 (±4.88)	5.59 (±4.54)	>0.05*

MST, Malnutrition Screening Tool.
*$P > 0.05$ for all comparisons.

the electronic medical record automatically triggered a dietitian consult and selected an appropriate oral nutritional supplement (standard or disease-specific formulation) for daily consumption.

Descriptive statistics were used for analyses. We tested differences between the two MST groups on readmission rates and LOS using χ^2 and Student's *t* test, respectively. We also compared differences between the two age groups (<65 versus ≥65 y) for each MST group. A two-tailed $P = 0.05$ was considered statistically significant.

Results

In all, 1269 eligible patients were enrolled into the original study. Of these, 413 (32.5%) had an MST score of 2 and 856 (67.5%) had an MST score ≥2. The number of participants age ≥65 was 262 in the MST 2 group (63.5%) compared with 490 (52.3%) in the MST ≥2 group (Table 1).

The rate of 30-d unplanned readmissions for patients with MST 2 was 14%, whereas the readmission rate of patients with MST ≥2 was 17.1% ($P = 0.171$). Average LOS was 5.19 d (±4.78 d) and 4.49 d (±4.69 d), respectively ($P = 0.277$). When stratified by age (<65 y versus ≥65), the differences for readmission rates and LOS within the age subgroups and between the MST groups remained small; none were statistically significant (all $P > 0.05$; Table 1).

Discussion

With resources limited in health care systems today, it is important to avoid unneeded nutrition assessment referrals to dietitians, such as those from false-positive MST referrals. The results of the present analysis showed that patients with MST scores of 2 (categorized in the present study as at low risk for malnutrition) were equally likely to experience prolonged hospitalization and to be readmitted to the hospital within 30 d after discharge as those with MST scores ≥2 (categorized as being at high risk for malnutrition). The findings collectively highlight the importance of giving equal priority to nutrition screening and care for patients at low and high risk for malnutrition. The present results showed that older adults were more likely to be at risk for malnutrition than those <65 y, but all adult patients with MST scores >2 had similar LOS and readmission rates. Taken together, our findings support the concept that best nutrition practices—nutrition screening, nutrition assessment, malnutrition diagnosis, and nutrition treatment—are appropriate to care for all hospitalized adults, regardless of their age and severity of risk.

We chose the MST for nutrition screening because it is validated for adult inpatient populations, is quick and easy to use, and has been shown to predict nutrition-related outcomes. When selecting a nutrition screening tool, it is important to choose one that is validated for the population being screened. Furthermore, a good tool has been described as one with sensitivity and specificity >80% [6]. For a mixed population of hospitalized adults, the MST had a 93% sensitivity and 93% specificity when using a malnutrition risk cutoff score of 2 [1]. However, the MST lost sensitivity if the cutoff was increased to ≥3 (sensitivity and specificity were 61% and 98%, respectively) [1]. In previous studies, a risk-positive MST score (≥2) also correlated positively with longer LOS, higher 30-d mortality, and increased cost of hospitalization [5,7,8].

In our patient sample, researchers noted that false-positive MST referrals fluctuated during the QIP period. When the relationship between MST errors and educational activities was investigated, Sriram et al. found that MST errors declined as educational activities for nutrition screening increased [5]. At a geriatric rehabilitation site in Australia, researchers found that the accuracy of MST screening was higher when screeners were trained [9]. In a recent U.S. hospital study, dietitians found a 5.5% frequency of false-positive MST scores; the most common reason for a false-positive score was a patient reporting weight loss that had already been resolved [10]. On the other hand, false negatives, as with use of a screening tool with poor sensitivity (e.g., the MST with a higher risk cut-off score of ≥ the MST with a higher risk cutoff score of ≥3), introduce risk for overlooking cases of malnutrition [1,9]. In terms of resource use, the health care costs averted through improved nutrition care reducing mean LOS and readmission rate have been reported to outweigh the cost of implementing the malnutrition screening program, thus resulting in substantial cost savings [8].

This analysis had limitations. MST values were unavailable before implementation of the QIP, thus we were unable to examine baseline differences between low- and high-risk patients for the comparison groups. Furthermore, this was a secondary analysis of a QIP study implemented in one health care system, so these results may be susceptible to bias and a lack of generalizability.

Conclusion

The present findings support the use of the original, validated MST to screen patients with the established at-risk cut-off value of ≥ 2 for malnutrition risk at hospital admission. This validated score can be used to better inform appropriate nutrition care for patients who are at risk or malnourished. To reduce MST error rates and to ensure appropriate allocation of dietitian time for follow-up nutritional assessments, we advise continuous education and training of screeners (particularly admitting nurses) on the accurate use of the MST as originally validated.

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