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Screening for Nutritional Status in the Outpatient Setting Across Different Clinical Specialities in Turkiye: A Cross-Sectional NutritionDay Awareness Survey

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ABSTRACT

Objective: To screen the nutritional status and determine the prevalence of malnutrition (MN) or MN risk among newly diagnosed and follow-up patients in different outpatient speciality clinics across Turkey

Methods: A total of 3521 patients from 52 outpatient speciality clinics across Turkiye were included in this cross-sectional study. MN risk and/or MN were evaluated using Nutritional Risk Screening 2002 (NRS 2002) and Mini Nutritional Assessment (MNA) tools. Time of diagnosis (new admissions vs. follow-up patients) was compared with the nutritional status.

Results: Overall, 652 (18.7%) of 3492 patients were at risk of MN according to NRS 2002, while 381 (40.9%) of 931 geriatric patients assessed by MNA were either malnourished (scores <17, 14.7%) or at risk of MN (scores 17-23.5, 26.2%). MN risk was more prevalent in medical oncology patients (44.1%), as well as in new vs. follow-up patients (23.1% vs. 19.0%, *P* = .007), particularly in radiation oncology (30.5% vs. 15.7%, respectively), medical oncology (47.2% vs. 41.6%, respectively) and geriatric (69.6% vs. 46.5%) clinics. In geriatric outpatient clinics, NRS 2002 showed MN risk in 35.3% of the patients those were at MN risk according to MNA, which was only 45.9% for those with MN (MNA score lower than 17)

Conclusion: In conclusion, this screening study in the outpatient setting across different clinical specialities revealed poor nutritional status in 1 out of every 5 patients overall, and nearly 1 out of 2 patients admitted to medical oncology and geriatrics clinics, respectively. In geriatric patients, NRS 2002 seems to underestimate MN risk compared to MNA. Given the higher MN risk prevalence in cancer and geriatric patients, it is important to screen nutritional status in those patients, especially during the first admission.

Keywords: Malnutrition, nutritional assessment, outpatient care, medical oncology, radiation oncology

INTRODUCTION

Malnutrition (MN) is a serious health problem with major adverse health outcomes such as frequent infections, poor wound healing, impaired quality of life, and increased morbidity and mortality in addition to prolonged length of hospital stay (LOS) and increased healthcare costs.[1,2]

Malnutrition is considered to be prevalent across several healthcare settings, particularly in hospitalized patients,

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in elderly patients, and in patients with chronic comorbid conditions.[1-3]

The hospital studies reported that 30%-50% of adult inpatients were malnourished or at risk upon admission, particularly the older adults and those with complicating health conditions.[3,4] The prevalence of MN or risk of MN in the community setting was reported to range from 20% to 30%, while much higher rates (up to 70%) were considered in older adults.[5-7]

Malnutrition is a preventable condition through early identification of poor nutritional status via validated screening tools and timely provision of appropriate nutritional intervention tailored to the individual needs of at-risk or malnourished patients.[1,8-10] Nonetheless, MN remains an under-recognized and under-diagnosed condition with detrimental consequences in the clinical practice, due to insufficient awareness of clinicians and lack of uniform screening tools and diagnosis protocols.[2,9,11]

In this regard, the NutritionDay initiative, an annual worldwide cross-sectional multicenter audit promoted by the European Society for Clinical Nutrition and Metabolism (ESPEN) in 2006, has become performed annually as a single-day screening to determine the prevalence of MN in hospitalized patients via a simple nutritional screening tool.[12-14] Many NutritionDay audits have been conducted in the inpatient setting across 8000 hospital wards in nearly 300 000 patients globally, improving the knowledge and awareness of MN among hospitalized patients.[12-14]

However, issues related to the nutritional screening for systematic identification of MN risk and the provision of nutritional intervention in the ambulatory outpatient setting have been less extensively addressed and not as well documented as in the inpatient setting.[15]

Main Points

- This screening study in the outpatient setting across different clinical specialties revealed poor nutritional status in 1 out of every 5 patients overall, and nearly 1 out of 2 patients admitted to medical oncology and geriatrics outpatient clinics based on Nutritional Risk Screening 2002 and MNA screening tools, respectively.
- Given the higher prevalence of malnutrition risk in new vs. follow-up patients, screening for nutritional risk in every cancer patient and geriatric patient during the time of initial diagnosis seems crucial to achieve the improved long-term health outcomes via timely provision of appropriate multimodal nutritional intervention.
- In this regard, efforts to increase awareness among clinicians regarding the appropriate and timely use of nutritional screening tools are crucial to be able to recognize the malnutrition risk at an earlier and more responsive phase and to improve patient outcomes through appropriate nutritional support.

Therefore, this cross-sectional screening study aimed to determine nutritional status among newly diagnosed and follow-up patients in multiple outpatient speciality clinics across Turkey in collaboration with Turkish Society of Clinical Enteral and Parenteral Nutrition (KEPAN) as an awareness-raising project within the context of World Nutrition Day.

METHODS

Study Population

A total of 3521 adult patients who were evaluated for nutritional status via Nutritional Risk Screening 2002 (NRS 2002) and Mini Nutritional Assessment (MNA) during their admission to 52 outpatient speciality clinics across Turkiye were included in this cross-sectional study conducted between September 25, 2019, and October 25, 2019.

All of the participating centers were hospitals. Primary care centers were not included in the study. The study was performed in the surgery, medical oncology, radiation oncology, geriatrics, and neurology clinics of 32 different hospitals. Of these 20 were university hospitals, 8 were state hospitals, and 4 were private hospitals.

Written informed consent/assent was obtained from each patient. The study was conducted in accordance with the ethical principles stated in the "Declaration of Helsinki" and approved by Hacettepe University Non-interventional Clinical Research Ethics Committee (Date of Approval: September 17, 2019, Protocol No: 2019/22-21).

Assessments

Cancer type (in oncology patients), time of diagnosis (newly diagnosed patients, follow-up patients), and prevalence of MN risk and/or MN using the NRS 2002 and MNA tools were recorded. NRS score ≥3 indicated the risk of MN.[16] Mini Nutritional Assessment was used only in elderly patients in the geriatric clinics, with consideration of the absence of MN, risk of MN, and the presence of MN for scores over 23.5, between 17 and 23.5, and <17, respectively.[17]

Statistical Analysis

Statistical analysis was done using IBM Statistical Package for Social Sciences (IBM SPSS Corp., Armonk, NY, USA) Statistics for Windows, version 20.0 (PASW statistics 20). Descriptive statistics were reported including percentages for categorical variables. Chi-square ($\chi 2$) test and Fisher's exact test were used for the comparison of categorical data including the MNA and NRS 2002 results in

subgroups of outpatient clinics and time of diagnosis as well as their cross-classification. $P < .05$ was considered statistically significant.

RESULTS

Participating Clinics, Time of Diagnosis, and Assessment Tools

Of the 52 centers participated in the study, 21 were geriatrics clinics comprising 1006 (28.6%) of 3521 patients in the overall study population. NRS 2002 and MNA scores were not available in 29 and 75 geriatric patients, respectively, while data on time of diagnosis were not available in 561 patients (Table 1).

Overall, 40.1% of the patients were new, while 59.9% of patients were chronic follow-up patients. The percentage of follow-up patients was higher in geriatrics (91.9%), neurology (67.1%), and medical oncology (55.9%) clinics, whereas general surgery (67.0%) and radiation oncology (61.9%) clinics were associated with higher percentage of first admission patients ($P < .001$) (Table 1).

Nutritional Risk Screening 2002 and Mini Nutritional Assessment Scores According to Outpatient Clinics and Time of Diagnosis

Overall, 652 (18.7%) of 3492 patients had MN risk according to NRS 2002, while 381 (40.9%) of 931 geriatric patients indicated MN (14.7%) and/or MN risk (26.2%) according to MNA (Table 2).

Based on NRS 2002 results, medical oncology (44.1%) and radiation oncology (25.0%) clinics had higher MN risk prevalence ($P < .001$). Normal nutritional status was less prevalent in new admission patients than in follow-up patients according to both NRS 2002 (76.9% vs. 81.0%, $P = .007$) and MNA (30.4% vs. 53.5%, $P < .01$) assessments (Table 2, Figure 1).

Poorer nutritional status in new vs. follow-up patients was particularly noted for radiation oncology (30.5% vs. 15.7%, respectively) and medical oncology (47.2% vs. 41.6%, respectively) patients, as well as in geriatric patients assessed by MNA (69.6% vs. 46.5%, respectively) (Tables 2 and 3, Figure 1).

Cross-Classification of Nutritional Risk Screening 2002 and Mini Nutritional Assessment Scores

We performed cross-classification of NRS 2002 and MNA in 902 geriatric patients. NRS 2002 showed MN risk in 169 (18.7%) patients, while MNA revealed MN risk in 241 (26.7%) patients and MN in 122 (13.5%) patients. Of 511 patients with normal nutrition status on both tools, 94.8% (511/539) were those assessed by MNA and 69.7% (511/733) were those assessed by NRS 2002. Of 85 patients who were found to be at risk of MN on both tools, 35.3% (85/241) were those assessed by MNA and 50.3% (85/169) were those assessed by NRS 2002. In 56 patients, NRS 2002 scores indicated the risk of MN (33.1% of 169 patients), while MNA scores indicated the presence of MN (45.9% of 122 patients). Accordingly, only 35.3% of patients who were at risk of malnutrition and 45.9% of malnourished patients according to MNA were accurately identified with NRS 2002 ($P < .001$) (Table 4).

DISCUSSION

The main scope of this research was basically to define the risk of MN among different outpatient clinics and to

Table 1. Distribution of Outpatient Clinics, Time of Diagnosis, and Assessment Tools

	n[a]	Screened Patients, n (%)	Time of Diagnosis			Assessed by NRS 2002	Assessed by MNA
			Newly Diagnosed	Follow-up	Total		
Outpatient clinic							
Geriatrics	21	1006 (28.6)	58 (8.1)	659 (91.9)	717	977[b]	931[c]
General surgery	9	811 (23.0)	364 (67.0)	179 (33.0)	543	811	–
Neurology	6	748 (21.2)	245 (32.9)	500 (67.1)	745	748	–
Radiation oncology	8	552 (15.7)	341 (61.9)	210 (38.1)	551	552	–
Medical oncology	8	404 (11.5)	178 (44.1)	226 (55.9)	404	404	–
Total	52	3521 (100.0)	1186 (40.1)	1774 (59.9)	2960[d]	3492	931

[a]The number of participated centers, NRS 2002 scores, and MNA scores were not available in [b]29 and [c]75 geriatric patients, respectively; [d]data on time of diagnosis were not available in 561 patients overall.

Table 2. Nutritional Risk Screening 2002 and Mini Nutritional Assessment Scores According to Outpatient Clinics and Time of Diagnosis

	NRS 2002 Scores			
	<3 (normal)	≥3 (Malnutrition Risk)		*P*
Outpatient Clinic	**n (%)**	**n (%)**		
Geriatrics (n = 977)	801 (82.0)	176 (18.0)		**<.001**
General surgery (n = 811)	695 (85.7)	116 (14.3)		
Medical oncology (n = 404)	226 (55.9)	178 (44.1)		
Neurology (n = 748)	704 (94.1)	44 (5.9)		
Radiation oncology (n = 552)	414 (75.0)	138 (25.0)		
Total (n = 3492)	2840 (81.3)	652 (18.7)		
Time of diagnosis	n (%)	n (%)		
Follow-up patient (n = 1747)	1415 (81.0)	332 (19.0)		**.007**
Newly diagnosed (n = 1184)	910 (76.9)	274 (23.1)		
Total (n = 2931)	2325 (79.3)	606 (20.7)		
	MNA scores			
	>23.5 (normal)	17 to 23.5 (malnutrition risk)	<17 (malnourished)	*P*
	n (%)	n (%)	n (%)	
Geriatrics (n = 931), n (%)	550 (59.1)	244 (26.2)	137 (14.7)	
Time of diagnosis				
Follow-up patient (n = 622)	333 (53.5)	177 (28.5)	112 (18.0)	**.006**
Newly diagnosed (n = 46)	14 (30.4)*	17 (37.0)	15 (32.6)	
Total (n = 668)	347 (51.9)	194 (29.0)	127 (19.0)	

*$P < .01$; compared to normal nutritional status in follow-up patients (with Bonferroni corrected *P*-value: .016).

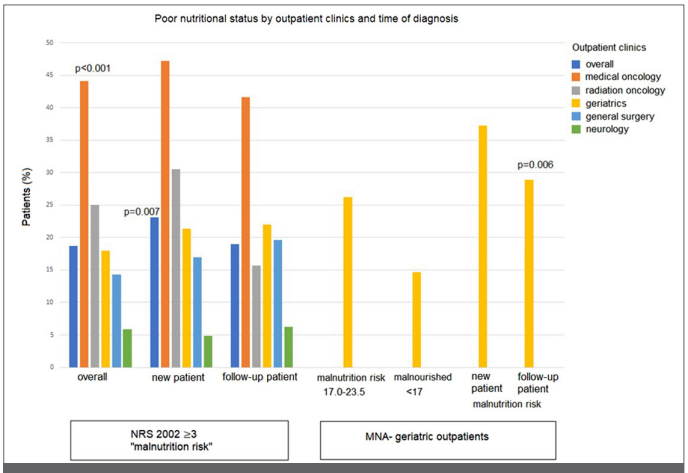

Figure 1. Poor nutritional status (NRS 2002 scores ≥3 and MNA scores 17.0-23.5 or <17) by outpatient clinics and time of diagnosis.

determine the differences between NRS and MNA to measure the MN risk in older adults in different sites of Turkey cross-sectionally. Our findings revealed poor nutritional status and the need for nutritional intervention in 1 out of every 5 patients overall, and nearly 1 out of 2 patients admitted to medical oncology and geriatrics outpatient clinics.

Previous cross-sectional NutritionDay studies in the inpatient setting revealed that 27%-40% of hospitalized patients were at risk for MN, and MN prevalence differed depending on the screening tool, hospital unit, and age of the patient.[12,13,18,19] A high prevalence of MN risk in the current study emphasizes that nutritional screening for early identification and multimodal intervention of poor nutritional status is also important in the outpatient setting, particularly among cancer patients and elderly.[2,15,20]

Table 3. NRS 2022 Scores According to Time of Diagnosis for Each Outpatient Clinic

Outpatient Clinic		NRS 2002 Scores	
		<3 (Normal Status)	≥3 (Malnutrition Risk)
		n (%)	n (%)
Geriatrics (n = 977)	Newly diagnosed (n = 56)	44 (78.6)	12 (21.4)
	Follow-up patient (n = 632)	493 (78.0)	139 (22.0)
	Total (n = 688)	537 (78.1)	151 (21.9)
General surgery (n = 811)	Newly diagnosed (n = 364)	302 (83)	62 (17.0)
	Follow-up patient (n = 179)	144 (80.4)	35 (19.6)
	Total (n = 543)	446 (82.1)	97 (17.9)
Medical oncology (n = 404)	Newly diagnosed (n = 178)	94 (52.8)	84 (47.2)
	Follow-up patient (n = 226)	132 (58.4)	94 (41.6)
	Total (n = 404)	226 (55.9)	178 (44.1)
Neurology (n = 748)	Newly diagnosed (n = 245)	233 (95.1)	12 (4.9)
	Follow-up patient (n = 500)	469 (93.8)	31 (6.2)
	Total (n = 745)	702 (94.2)	43 (5.8)
Radiation oncology (n = 552)	Newly diagnosed (n = 341)	237 (69.5)	104 (30.5)
	Follow-up patient (n = 210)	177 (84.3)	33 (15.7)
	Total (n = 551)	414 (75.1)	137 (24.9)
Total (n = 3492)	Newly diagnosed (n = 1184)	910 (76.9)	274 (23.1)
	Follow-up patient (n = 1747)	1415 (81)	332 (19.0)
	Total (n = 2931)	2325 (79.3)	606 (20.7)

Table 4. Cross-Classification of NRS 2002 and MNA Scores (n = 902)

		MNA Scores			
		Normal Status (n = 539)	At Risk of Malnutrition (n = 241)	Malnourished (n = 122)	*P*
NRS 2002 scores					
At risk of malnutrition (n = 169)	n	**28**	**85**	**56**	**<.001**
	% within NRS 2002	16.6	50.3	33.1	
	% within MNA	5.2	35.3	45.9	
Normal status (n = 733)	n	**511**	**156**	**66**	
	% within NRS 2002	69.7	21.3	9.0	
	% within MNA	94.8	64.7	54.1	

Indeed, oncology inpatients are considered to have at least 1.5 times higher rate of MN diagnosis compared with other hospitalized populations.[10,21] Medical oncology and radiation oncology patients in the present study were also at higher risk of MN than other patient populations, along with the further increase in the MN risk among newly diagnosed vs. follow-up patients. Similarly, in a multicenter NRS 2002–based screening study by KEPAN among 29 139 patients, the MN risk at the time of hospital admission (15% overall) was reported to increase up to 43.4% in medical oncology (19.5% in radiation oncology) clinics.[22] In another cross-sectional NRS 2002-based NutritionDay screening study by Turkish Society of Radiation Oncology, 33.8% patients including 36.0% of newly diagnosed patients were reported to be at risk for MN, indicating a need for nutritional intervention in 2 out of every 5 patients with newly diagnosed cancer.[10]

The presence of MN risk in nearly half of our newly diagnosed cancer patients is also notable given that MN prevalence ranges from 40% at cancer diagnosis to 70%-80% in advanced disease stages, and the anti-cancer treatments contribute to an additional deterioration of the nutritional status.[9,10,22-24] Besides, the early recognition of MN is also important since the clinical nutrition is considered more effective during earlier phase before the emergence of advanced cachexia.[9,10,25,26]

The presence of poor nutritional status in 40.9% (MN risk in 26.2% and MN in 14.7%) of geriatric patients in our study is in line with the prevalence of MN risk (24.0%-36.0%) and MN (13.0%-19.0%) among geriatric patients reported in previous studies using the MNA tool.[20,27] In a systematic review and meta-analysis of studies on the nutritional screening via the MNA tool in older adults across different healthcare settings, the prevalence of MN was reported to range from 3% (in the community setting) to 30% (in

rehabilitation and subacute care).[28] In a systematic review of studies including 22 MN screening tools validated for use in elderly population, the prevalence of MN risk was reported to range from 8.5% (in the community setting) to 28.0% (in the hospital setting) across screening tools.[3]

In general, the prevalence of MN is considered to be high in older adults and to further increase with age and the number of comorbidities, contributing also to the development of the geriatric syndromes in these patients.[5,29] Hence, nutritional screening at regular intervals is strongly recommended in older adults at initial diagnosis and hospital admission as well as during outpatient follow-up since early identification and management of poor nutritional status can lead to improved outcomes and quality of life.[3,5,6,8,20,28,29]

The NRS 2002 is the ESPEN-recommended screening tool for hospitalized patients with high sensitivity and specificity, particularly in critically ill patients, and its association with morbidity, mortality, and LOS was reported in many studies.[2,16,30,31] Our findings support the consideration of NRS 2002 as a suitable tool for screening nutritional risk in cancer patients at the time of initial diagnosis, which enables planning the appropriate nutritional care as an essential component of multimodal therapy in oncology practice.[2,9,10,32,33]

Considering elderly outpatients, while there are no uniform tools for assessing the risk of MN in this population, there is a range of recommended simple and validated comprehensive screening tools, such as NRS 2002 (a high sensitivity, negative predictive value) and MNA (a high clinical sensitivity and specificity).[2,5,32,34-36] However, NRS 2002 tool was able to identify the MN risk in only one-third of our geriatric patients who were at risk of MN on MNA and half of those who were malnourished on MNA. In this regard, the use of MNA as a screening tool in geriatric population seems to be more appropriate in terms of accurate identification of poor nutritional status which otherwise may easily be overlooked if screening is based solely on NRS 2002. Nonetheless, it should also be noted that the specificity of the MNA has been questioned in terms of a potential risk of "over-diagnosing" MN in the older adults.[29,37]

Hence, since none of the current screening tools per se is considered sufficiently reliable to determine the nutritional status in varying clinical situations and the prevalence of MN risk varies considerably depending on the screening tools, complementary use of more than 1 nutritional screening tool is suggested.[2,29,38,39] Accordingly, complementing MNA with the Global Leadership Initiative on MN (GLIM) criteria is suggested to provide more accurate prevalence of MN and more reliable data on prediction of the incident sarcopenia in older adults.[29,40,41] Also, in an analysis of the NutritionDay database in the inpatient setting, traditional screening tools (such as NRS 2002, Malnutrition Screening Tool [MST], and Malnutrition Universal Screening Tool [MUST]) applied at admission and repeatedly during hospitalization are considered to fail to identify a group of patients at risk due to reduced intake during hospitalization since these tools do not include monitoring for current food intake.[18] In a cross-sectional study in cancer outpatients, the prevalence of MN was reported to be higher with use of GLIM criteria (46.7%) compared to using the ESPEN criteria (21.2%), and the authors considered the association of new GLIM criteria with a greater sensitivity in early diagnosis and thus early intervention of MN in cancer patients.[42]

The prevalence of MN risk (14.3%) in our general surgery patients, similarly in new and follow-up patients, seems in line with the previous studies indicated the prevalence of MN to range from 14% to 25% in the medical and surgical gastroenterology patients with no difference between new and follow up patients.[43,44] Although the neurology clinics were associated with lowest MN risk prevalence in our study, MN in the neurology outpatient setting has been reported to differ significantly (0.8%-32%) with respect to underlying disease (higher for stroke, CNS infections and movement disorders than polyneuropathy, demyelinating diseases, epilepsy, or pseudotumor cerebri) as well as the presence of co-morbid diabetes.[45,46]

The major strength of this screening study seems to be the inclusion of 52 outpatient speciality clinics across Turkey and comprehensive analysis of MN risk or MN with use of standardized screening tools across centers. However, certain limitations to this study should be considered. First, due to the cross-sectional design, it is impossible to establish any cause-and-effect relationships. Secondly, nutritional screening was based on single-point assessment with no data on follow-up status with respect to multimodal cancer treatment or provision of nutritional support. Third, lack of detailed data on patient and treatment characteristics is another limitation which otherwise would extend the knowledge achieved in the current study. Nevertheless, this was a screening study conducted as an awareness-raising project within the context of World Nutrition Day, providing a snapshot of the nutritional status in outpatient setting across Turkey.

In conclusion, this screening study in the outpatient setting across different clinical specialties revealed poor nutritional status in 1 out of every 5patients overall and nearly 1 out of 2 patients admitted to medical oncology and geriatric outpatient clinics based on NRS 2002 and

MNA screening tools, respectively. In this regard, efforts to increase awareness among clinicians regarding the appropriate and timely use of nutritional screening tools are crucial to be able to recognize the MN risk at an earlier and more responsive phase and to improve patient outcomes through appropriate nutritional support.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Hacettepe University Non-interventional Clinical Research Ethics Committee (Date: September 17, 2019, Number: 2019/22-21).

Informed Consent: Written informed consent/assent was obtained from each patient following a detailed explanation of the objectives and protocol.

Peer-review: Externally peer-reviewed.

Author Contributions: OA contributed to conception/design of the research and acquisition, analysis and interpretation of the data; drafted the manuscript and critically revised the manuscript; other members of the KEPAN NutritionDay Study Group contributed to conception/design of the research and contributed to acquisition, analysis and interpretation of the data. OA agrees to be fully accountable for ensuring the integrity and accuracy of the work. All authors read and approved the final manuscript.

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REFERENCES

1. Barker LA, Gout BS, Crowe TC. Hospital malnutrition: prevalence, identification and impact on patients and the healthcare system. *Int J Environ Res Public Health*. 2011;8(2):514-527. [CrossRef]
2. Serón-Arbeloa C, Labarta-Monzón L, Puzo-Foncillas J, et al. Malnutrition screening and assessment. *Nutrients*. 2022;14(12):2392. [CrossRef]
3. Leij-Halfwerk S, Verwijs MH, van Houdt S, et al. Prevalence of protein-energy malnutrition risk in European older adults in community, residential and hospital settings, according to 22 malnutrition screening tools validated for use in adults ≥65 years: a systematic review and meta-analysis. *Maturitas*. 2019;126:80-89. [CrossRef]
4. Sauer AC, Goates S, Malone A, et al. Prevalence of malnutrition risk and the impact of nutrition risk on hospital outcomes: results from nutritionDay in the U.S. *JPEN J Parenter Enter Nutr*. 2019;43(7):918-926. [CrossRef]
5. Agarwal E, Miller M, Yaxley A, Isenring E. Malnutrition in the elderly: a narrative review. *Maturitas*. 2013;76(4):296-302. [CrossRef]
6. Sheean P, Farrar IC, Sulo S, Partridge J, Schiffer L, Fitzgibbon M. Nutrition risk among an ethnically diverse sample of community-dwelling older adults. *Public Health Nutr*. 2019;22(5):894-902. [CrossRef]
7. Sauer AC, Li J, Partridge J, Sulo S. Assessing the impact of nutrition interventions on health and nutrition outcomes of community-dwelling adults: a systematic review. *Nutr Diet Suppl*. 2018;Volume(10):45-57. [CrossRef]
8. Bauer JM, Kaiser MJ, Sieber CC. Evaluation of nutritional status in older persons: nutritional screening and assessment. *Curr Opin Clin Nutr Metab Care*. 2010;13(1):8-13. [CrossRef]
9. Yalcin S, Gumus M, Oksuzoglu B, et al. Nutritional aspect of cancer care in medical oncology patients. *Clin Ther*. 2019;41(11):2382-2396. [CrossRef]
10. Akmansu M, Kilic D, Akyurek S, et al. Screening for nutritional status in radiation oncology outpatients: TROD 12-01 study. *Turk J Oncol*. 2022;37(3):321-328.
11. Mogensen KM, Malone A, Becker P, et al. Academy of nutrition and dietetics/American society for parenteral and enteral nutrition consensus malnutrition characteristics: usability and association with outcomes. *Nutr Clin Pract*. 2019;34(5):657-665. [CrossRef]
12. Correia MITD, Sulo S, Brunton C, et al. Prevalence of malnutrition risk and its association with mortality: nutritionDay Latin America survey results. *Clin Nutr*. 2021;40(9):5114-5121. [CrossRef]
13. Theilla M, Grinev M, Kosak S, Hiesmayr M, Singer P, nutritionDay Israel Working Group. Fight against malnutrition: the results of a 2006-2012 prospective national and global nutritionDay survey. *Clin Nutr ESPEN*. 2015;10(2):e77-e82. [CrossRef]
14. Cardenas D, Bermúdez C, Pérez A, et al. Nutritional risk is associated with an increase of in-hospital mortality and a reduction of being discharged home: results of the 2009-2015 nutritionDay survey. *Clin Nutr ESPEN*. 2020;38:138-145. [CrossRef]
15. Trujillo EB, Shapiro AC, Stephens N, et al. Monitoring rates of malnutrition risk in outpatient cancer centers utilizing the malnutrition screening tool embedded into the electronic health record. *J Acad Nutr Diet*. 2021;121(5):925-930. [CrossRef]
16. Kondrup J, Rasmussen HH, Hamberg O, Stanga Z, Ad Hoc ESPEN Working Group. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. *Clin Nutr*. 2003;22(3):321-336. [CrossRef]
17. Bauer JM, Kaiser MJ, Anthony P, Guigoz Y, Sieber CC. The mini nutritional assessment--its history, today's practice, and future perspectives. *Nutr Clin Pract*. 2008;23(4):388-396. [CrossRef]

18. Cardenas D, Bermúdez C, Pérez A, et al. Are traditional screening tools adequate for monitoring the nutrition risk of in-hospital patients? An analysis of the nutritionDay database. *JPEN J Parenter Enter Nutr*. 2022;46(1):83-92. [CrossRef]
19. Song D, Zhang L, Zhang Y, et al. Risk factors for inpatient malnutrition and length of stay assessed by 'NutritionDay' in China. *Asia Pac J Clin Nutr*. 2022;31(3):561-569. [CrossRef]
20. Gündüz E, Eskin F, Gündüz M, et al. Malnutrition in community-dwelling elderly in Turkey: a multicenter, cross-sectional study. *Med Sci Monit*. 2015;21:2750-2756. [CrossRef]
21. Marshall KM, Loeliger J, Nolte L, Kelaart A, Kiss NK. Prevalence of malnutrition and impact on clinical outcomes in cancer services: a comparison of two time points. *Clin Nutr*. 2019;38(2):644-651. [CrossRef]
22. Korfali G, Gündoğdu H, Aydintuğ S, et al. Nutritional risk of hospitalized patients in Turkey. *Clin Nutr*. 2009;28(5):533-537. [CrossRef]
23. Arends J, Baracos V, Bertz H, et al. ESPEN expert group recommendations for action against cancer-related malnutrition. *Clin Nutr*. 2017;36(5):1187-1196. [CrossRef]
24. Ryan AM, Power DG, Daly L, Cushen SJ, Ní Bhuachalla Ē, Prado CM. Cancer associated malnutrition, cachexia and sarcopenia: the skeleton in the hospital closet 40 years later. *Proc Nutr Soc*. 2016;75(2):199-211. [CrossRef]
25. Fearon K, Strasser F, Anker SD, et al. Definition and classification of cancer cachexia: an international consensus. *Lancet Oncol*. 2011;12(5):489-495. [CrossRef]
26. Muscaritoli M, Molfino A, Laviano A, Rasio D, Rossi Fanelli F. Parenteral nutrition in advanced cancer patients. *Crit Rev Oncol Hematol*. 2012;84(1):26-36. [CrossRef]
27. Saka B, Kaya O, Ozturk GB, Erten N, Karan MA. Malnutrition in the elderly and its relationship with other geriatric syndromes. *Clin Nutr*. 2010;29(6):745-748. [CrossRef]
28. Cereda E, Pedrolli C, Klersy C, et al. Nutritional status in older persons according to healthcare setting: a systematic review and meta-analysis of prevalence data using MNA®. *Clin Nutr*. 2016;35(6):1282-1290. [CrossRef]
29. Norman K, Haß U, Pirlich M. Malnutrition in older adults-recent advances and remaining challenges. *Nutrients*. 2021;13(8):2764. [CrossRef]
30. Raslan M, Gonzalez MC, Dias MC, et al. Comparison of nutritional risk screening tools for predicting clinical outcomes in hospitalized patients. *Nutrition*. 2010;26(7-8):721-726. [CrossRef]
31. Bolayir B, Arik G, Yeşil Y, et al. Validation of nutritional risk Screening-2002 in a hospitalized adult population. *Nutr Clin Pract*. 2019;34(2):297-303. [CrossRef]
32. Skipper A, Ferguson M, Thompson K, Castellanos VH, Porcari J. Nutrition screening tools: an analysis of the evidence. *JPEN J Parenter Enter Nutr*. 2012;36(3):292-298. [CrossRef]
33. Laviano A, Seelaender M, Sanchez-Lara K, Gioulbasanis I, Molfino A, Rossi Fanelli F. Beyond anorexia -cachexia. Nutrition and modulation of cancer patients' metabolism: supplementary, complementary or alternative anti-neoplastic therapy? *Eur J Pharmacol*. 2011;668(suppl 1):S87-S90. [CrossRef]
34. Kang J, Li H, Shi X, Ma E, Song J, Chen W. Efficacy of malnutrition screening tools in China for elderly outpatients. *Asia Pac J Clin Nutr*. 2021;30(1):1-6. [CrossRef]
35. Tran QC, Banks M, Hannan-Jones M, Do TND, Gallegos D. Validity of four nutritional screening tools against subjective global assessment for inpatient adults in a low-middle income country in Asia. *Eur J Clin Nutr*. 2018;72(7):979-985. [CrossRef]
36. van Bokhorst-de van der Schueren MA, Guaitoli PR, Jansma EP, de Vet HC. Nutrition screening tools: does one size fit all? A systematic review of screening tools for the hospital setting. *Clin Nutr*. 2014;33(1):39-58. [CrossRef]
37. Cereda E. Mini nutritional assessment. *Curr Opin Clin Nutr Metab Care*. 2012;15(1):29-41. [CrossRef]
38. Skipper A, Coltman A, Tomesko J, et al. Adult malnutrition (undernutrition) screening: an evidence analysis center systematic review. *J Acad Nutr Diet*. 2020;120(4):669-708. [CrossRef]
39. Cascio BL, Logomarsino JV. Evaluating the effectiveness of five screening tools used to identify malnutrition risk in hospitalized elderly: A systematic review. *Geriatr Nurs*. 2018;39(1):95-102. [CrossRef]
40. de van der Schueren MAE, Keller H, GLIM Consortium, et al. Global Leadership Initiative on Malnutrition (GLIM): guidance on validation of the operational criteria for the diagnosis of protein-energy malnutrition in adults. *Clin Nutr*. 2020;39(9):2872-2880. [CrossRef]
41. Ozer NT, Akin S, Gunes Sahin G, Sahin S. Prevalence of malnutrition diagnosed by the global leadership initiative on malnutrition and mini nutritional assessment in older adult outpatients and comparison between the global leadership initiative on malnutrition and mini nutritional assessment energy-protein intake: a cross-sectional study. *JPEN J Parenter Enter Nutr*. 2022;46(2):367-377. [CrossRef]
42. Gascón-Ruiz M, Casas-Deza D, Torres-Ramón I, et al. GLIM vs ESPEN criteria for the diagnosis of early malnutrition in oncological outpatients. *Clin Nutr*. 2021;40(6):3741-3747. [CrossRef]
43. Kamperidis N, Tesser L, Wolfson P, et al. Prevalence of malnutrition in medical and surgical gastrointestinal outpatients. *Clin Nutr ESPEN*. 2020;35:188-193. [CrossRef]
44. Holm MO, Mikkelsen S, Zacher N, Østergaard T, Rasmussen HH, Holst M. High risk of disease-related malnutrition in gastroenterology outpatients. *Nutrition*. 2020;75-76:110747. [CrossRef]
45. Çoban E, Soysal A. The profile of a neurology clinic and malnutrition awareness. *Turk J Neurol*. 2021;27(2):128-132. [CrossRef]
46. Corrigan ML, Escuro AA, Celestin J, Kirby DF. Nutrition in the stroke patient. *Nutr Clin Pract*. 2011;26(3):242-252. [CrossRef]