BRIEF COMMUNICATION

AG-2021-114
doi.org/10.1590/S0004-2803.202200001-24

Agreement between nutritional screening instruments in hospitalized older patients

Antonio Alberto Rodrigues **ALMENDRA**[1], Vânia Aparecida **LEANDRO-MERHI**[2] and José Luis Braga de **AQUINO**[2]

Received: 23 May 2021
Accepted: 9 August 2021

ABSTRACT – Background – The prevalence of hospitalized elderly patients has grown substantially and has impacted the hospital health services. Thus, it is believed that an investigation of the nutritional status associated with different clinical situations in elderly patients could contribute to multidisciplinary hospital intervention and nutritional care actions suitable for this population. **Objective –** To investigate the relationship between two nutritional screening instruments in hospitalized older patients and to compare clinical variables between these two instruments. **Methods –** Retrospective study with hospitalized older patients (n=277), investigating the agreement between two nutritional screening instruments. The data were analyzed using the McNemar, chi-square, Fisher, Mann-Whitney tests and the kappa coefficient for the agreement assessment. **Results –** There was a significant difference (P=0.0002) between the nutritional risk classifications of the two nutritional screening instruments and moderate agreement (k=0.5430) between them. The association between nutritional risk screening and age (P=0.0255), length of hospital stay (P<0.0001), gender (P=0.0365) and illness (P=0.0001) were assessed. There was an association between Mini Nutritional Assessment and length of stay (P<0.0001), illness (P=0.0001) and body weight evolution (P=0.0479). **Conclusion –** The nutritional risk screening and Mini Nutritional Assessment showed moderate agreement in the assessment of elderly patients.

Keywords – Hospitalized elderly patients; nutritional screening; agreement.

INTRODUCTION

There is currently a high increase in the number of hospitalized elderly patients (HEP) and, accordingly, nutritional management[1] of these patients continues to be the object of clinical investigations as evidenced in the literature. Several parameters and models of nutritional diagnosis are still being studied for this purpose[1,2], both alone and in combination[3], as well as comparison and correlation analysis[4] among the nutrition screening tools (NSTs). Some studies also illustrate the impact of the nutritional status and nutritional support on the clinical outcome of HEP[5].

In a recent prospective study with hospitalized elderly patients[6], the priority to be given at identifying the patients' nutritional status using nutritional tracking instruments in clinical practice was confirmed with the aim to reduce morbidity and mortality rates. A prospective study on the application of the Mini Nutritional Assessment (MNA) instrument in hospitalized elderly patients[7], identified 77% malnutrition or malnourishment risk cases. The study also showed a statistically significant association between low albumin, cholesterol and vitamins A and D plasma levels with malnutrition or risk of malnutrition[7].

It is known that there is no single elderly patients' nutritional investigation method; this is why it may be necessary to apply together more than one instrument or indicator to assess the nutritional status in order to better identify the nutritional status of these patients[8,9]. Many studies[10-13], conducted with elderly patients whether hospitalized or not, have carried out a comparison between the different methods and indicators to diagnose already established malnutrition or even an initial depletion of the condition, in order to implement measures or intervention actions to avoid unfavorable clinical outcomes. This is the case of a recent study[12] that also assessed the nutritional status of patients aged ≥65 years, comparing the agreement of the MNA instrument and the nutritional risk screening (NRS 2002) in relation to malnutrition or malnutrition risk. In the study in question[12], the authors reported that no agreement was found between the short-form (MNA-SF) version of the MNA instrument and the (NRS- 2002) (k=-0.12, P<0.001).

As the prevalence of hospitalized elderly patients has grown substantially and impacted hospital health services, it is believed that an investigation of the nutritional status, associated with different clinical situations of elderly patients, could contribute to multidisciplinary hospital interventions and adequate nutritional care for this population. Since the tools for assessing the nutritional status and risk, such as the MNA and the NRS are easily applicable in clinical practice, the interest in the investigation of these screening instruments in hospital clinical practice arose. Thus, the aim of this study was to investigate the relationship between two NSTs in HEPs and to compare clinical variables between the instruments.

METHODS

After approval by the Institution's Research and Ethics Committee of the Pontifical Catholic University of Campinas,

Declared conflict of interest of all authors: none
Disclosure of funding: no funding received
[1] Pontifícia Universidade Católica de Campinas, Faculdade de Medicina, Bolsista de Iniciação Científica, Campinas, SP, Brasil. [2] Pontifícia Universidade Católica de Campinas, Programa de Pós-Graduação em Ciências da Saúde, Campinas, SP, Brasil.
Corresponding author: Vânia Aparecida Leandro-Merhi. E-mail: valm@puc-campinas.edu.br

São Paulo, Brazil (reference number: 3.587.982, CAAE 150277 19.0.0000.5481), a retrospective study was carried out with 277 HEP (≥65 years). Patients with complete medical records and nutritional assessment carried out within the first 48 hours of hospitalization were included. Patients hospitalized only for diagnostic investigation were excluded.

The variables gender, age, kind of disease, length of hospital stay, evolution of body weight during hospitalization, death, NSTs such as the MNA[14] (classifying as eutrophic, risk of malnutrition or malnutrition) and the NRS[15] (classifying as with or without nutritional risk) were investigated.

MNA[14] is a nutritional assessment tool that includes aspects of specific interest for the elderly and addresses issues related to food consumption, changes in body weight, mobility, arm and calf circumference and disease. This instrument consists of 18 questions and a 30 points maximum score, allowing the classification of the patient's nutritional status as malnourished (<17 points), risk of malnutrition (17–23.5 points) and eutrophic (≥24 points)[14].

NRS[15] is a valid method recommended by the European Society for Clinical Nutrition and Metabolism (ESPEN). This instrument addresses issues such as body mass index, weight loss, reduced food intake, disease severity, plus an adjustment factor for people ≥70 years old. The total score of the NRS allows classifying patients by a numerical score namely with nutritional risk (score ≥3) and without nutritional risk (score <3)[15].

The nutritional screening instruments were applied by properly trained and qualified nutritionists for this type of assessment.

To assess agreement between the NSTs, the kappa coefficient was applied. The magnitude of this coefficient indicated excellent agreement for values greater than or equal to 0.75; for values between 0.75 and 0.40: good agreement and values less or equal to 0.40: no agreement. To compare the classifications between the NSTs, the McNemar test was used. To compare proportions, the chi-square or Fisher's exact test was used, when necessary. To compare the numerical measures between the outcomes, the Mann-Whitney test was used. The significance level was 5%[16,17].

RESULTS

The study was conducted with 277 patients, with a mean age of 72.37±5.85 years, 70% (n=194) being male and 30% (n=83) female. The average hospital stay was 7.64±6.83 days. The most frequent diseases were neoplasms of the digestive tract (33.2%, n=92), diseases of the digestive tract (24.2%, n=67), renal and urological neoplasms (23.1%, n=64) and renal and urological diseases (19.5%, n=54). Upon admission, it was found that 45.8% (n=127) of the patients were at nutritional risk by the NRS and 56.7% (n=157) were at risk of malnutrition or malnourishment by the MNA. It was observed that 18.8% (n=52) of the patients lost weight, 63.5% (n=176) maintained their weight and 17.7% (n=49) gained weight during hospitalization. Death occurred in 3.6% (n=10) of the patients.

There was a significant difference (P=0.0002) between the nutritional risk classifications of the two NSTs (MNA and NRS). The MNA showed a higher percentage of malnutrition risk or malnourishment than the NRS. Using the Kappa coefficient, there was moderate agreement (k=0.5430) between the screening instruments (TABLE 1).

A significant association between NRS and age (P=0.0255), length of stay (P<.0001), gender (P=0.0365) and illness (P=0.0001) was observed. There was a significant association between the MNA and length of stay (P<.0001), illnesses (P=0.0001) and evolution of body weight (P=0.0479) (TABLE 2).

DISCUSSION

We investigated the relationship between two NSTs in HEP and our data showed a high percentage of nutritional risk and malnutrition, with more patients malnourished according to the MNA. The findings showed moderate agreement between the two instruments, which may indicate that both could continue to be used routinely in clinical and nutritional hospital practice. Relevant findings were also observed in the association of these instruments with age, gender, length of stay, illness and the evolution of body weight during hospitalization.

These results are in line with other studies published in recent literature[4,5,18]. In a cross-sectional study carried out in Iran with elderly hospitalized patients[4] to detect malnutrition, anthropometric measures such as arm, calf, waist circumference, body mass index, skinfold thickness, laboratory exams as well as nutritional screening tools such as Full MNA (full-MNA) and short MNA (MNA-short form) were used. The authors showed that the full-MNA scores were significantly correlated with the measure of arm, calf, waist circumference and body mass index, and serum albumin was weakly correlated with both nutritional screening tools used in the study[4] in this study the full version of the MNA proved to be more appropriate for tracking malnutrition in hospitalized elderly patients[4]. Such findings are in line with the results found in the present study, where the MNA was also adequate for tracking malnutrition. These instruments were also used in another study conducted in China[5] indicating longer hospital stay in patients at nutritional risk. The authors also showed that nutritional support reduced the length of hospital stay in patients at nutritional risk and with malnutrition[5]. This study was carried out with elderly hospitalized patients[5] and evaluated the impact of nutritional status and nutritional support on clinical outcomes, using the MNA-short form and the NRS for nutritional screening at the beginning of hospitalization. It was shown in the study that in patients at nutritional risk and with malnutrition,

TABLE 1. Agreement between MNA and NRS nutritional screening instruments.

	Mini nutritional assessment		Total
	MR + M N (%)	Eutrophic N (%)	MR + M Eutrophic N (%)
Nutritional risk screening			
With risk	110 (39.71)	17 (6.14)	127 (45.85)
No risk	47 (16.97)	103 (37.18)	150 (54.15)
Total	157 (56.68)	120 (43.32)	277 (100.00)

MR: malnutrition risk, M: malnutrition. P=0.0002 (McNemar test). Kappa = 0.5430, 95%CI (0.4770; 0.6390).

TABLE 2. Descriptive analysis of variables and comparisons with NRS and MNA.

Variables	NRS		*P*-value	MNA	MNA	*P*-value
	With risk (N=127)	No risk (N=150)		E (N=120)	MR+M (N=157)	
Category						
Age						
mean ± SD	73.9 ± 6.35	71.51 ± 5.27	0.0255*	71.84 ± 5.20	72.78 ± 6.30	0.4334*
median	73.00	70.00		71.00	72.00	
LHS						
mean ± SD	9.87 ± 8.41	5.75 ± 4.31	<.0001*	5.65 ± 3.84	9.16 ± 8.11	<.0001*
median	7.00	5.00		5.00	7.00	
Gender						
Male	46 (36.2)	37 (24.7)	0.0365**	29 (24.2)	54 (34.4)	0.0656**
Female	81 (63.8)	113 (75.3)		91 (75.8)	103 (65.6)	
Diseases						
DTD n (%)	28 (22.0)	39 (26.0)	<.0001**	31 (25.8)	36 (22.9)	<.0001**
RUD n (%)	18 (14.2)	36 (24.0)		35 (29.2)	19 (12.1)	
RUN n (%)	19 (15.0)	45 (30.0)		33 (27.5)	31 (19.7)	
NDT n (%)	62 (48.8)	30 (20.0)		21 (17.5)	71 (45.2)	
Weight evolution						
WG n (%)	24 (18.9)	25 (16.7)	0.0525**	16 (13.3)	33 (21.0)	0.0479**
WM n (%)	72 (56.7)	104 (69.3)		86 (71.7)	90 (57.3)	
WL n (%)	31 (24.4)	21 (14.0)		18 (15.0)	34 (21.7)	
Death						
No n (%)	120 (94.5)	147 (98.0)	0.1944***	118 (98.3)	149 (94.9)	0.1950***
Yes n (%)	7 (5.5)	3 (2.0)		2 (1.7)	8 (5.1)	

NRS: Nutritional Risk Screening; M: male; F: female; LHS: length of hospital stay; MNA: Mini Nutritional Assessment; E: eutrophic; MR: malnutrition risk; M: malnutrition; DTD: digestive tract disorders; RUD: renal and urological disorders; RUN: renal and urological neoplasia; NDT: neoplasm of the digestive tract; WG: weight gain; WM: weight maintenance; WL: weight loss. *Mann-Whitney, **Chi-square test, ***Fisher's exact test.

nutritional support reduced the length of hospital stay, and patients experienced a lower incidence of infectious complications[5]. These observations suggest the relevance of assessment and tracking of the nutritional status and malnutrition early during hospitalization, since such measures could contribute to the prevention of unfavorable clinical outcomes in hospitalized elderly patients.

A prospective study[18] with geriatric patients investigated the instruments we actually used in our study with patients of the same age range, but considering prediction of mortality risk[18]. The authors reported that both instruments can predict mortality in hospitalized geriatric patients, but that only the NRS 2002 score was an independent predictor of mortality risk[18].

Other studies carried out with elderly hospitalized patients showed a high risk of malnutrition associated with reduction of muscle mass[19], and malnutrition in this population contributed to the development of frailty[20]. Other studies have also reported that a decline in nutritional status assessed by subjective global assessment and by weight loss was associated with prolonged hospital stay, regardless of other risk factors[21]. Weight loss and other anthropometric indicators are still widely used in hospital clinical practice[22]. Another study[23] that investigated the nutritional risk of hospitalized patients using the tool (NRS 2002) showed 29% of nutritional risk, with different prevalence in different clinical situations and with older age, in addition to the prevalence of malnutrition in those patients with greater morbidity and infections. However, it was noteworthy that nutritional risk was evidenced in patients with normal BMI or overweight[23]. These reports are in line with the need to detect the nutritional status of older patients upon admission. Such actions by hospital health professionals could contribute to the reduction of unfavorable clinical outcomes.

It was not the object of this investigation to identify which was the best nutritional tracking instrument for elderly patients, but to assess whether there was agreement between the two instruments considered. Since both instruments are adequate and easy to apply in hospital clinical practice, they can be applied by health professionals and there is no gold standard for the identification of malnutrition in hospitalized patients; we can consider that each institution could select the tool or other instruments and/or indicators that best apply to each reality, thus contributing to the prevention of unfavorable clinical outcomes. It is important to highlight that both screening tools take into account dietary, clinical and anthropometric aspects[14,15] and studies show that a nutritional

intervention could interrupt weight loss in malnourished elderly people, being also associated with improvements in MNA scores[24].

CONCLUSION

The findings in this study allowed us to conclude that NRS and MNA show moderate agreement for the assessment of hospitalized elderly patients.

ACKNOWLEDGMENTS

The authors are grateful to the patients who participated in the study and to the Pontifical Catholic University of Campinas, SP-Brazil for their support.

Authors' contribution

Leandro-Merhi VA: developed the methodological design of the study. Almendra AAR: performed the collection and tabulation of the data. AARA and VALM performed the analysis and interpretation of the data. Almendra AAR and Leandro-Merhi VA: wrote the original draft of the manuscript. Almendra AAR, Leandro-Merhi VA and Aquino JLB: performed a critical review, wrote and revised the final version of the manuscript. All authors approved the final version of the manuscript.

Orcid

Antonio Alberto Rodrigues Almendra: 0000-0002-0949-8330.
Vânia Aparecida Leandro-Merhi: 0000-0002-2623-6471.
José Luis Braga de Aquino: 0000-0002-0604-9054.

Almendra AAR, Leandro-Merhi VA, Aquino JLB. Concordância entre instrumentos de triagem nutricional em idosos hospitalizados. Arq Gastroenterol. 2022;59(1):145-9.

RESUMO – Contexto – A prevalência de pacientes idosos hospitalizados tem crescido substancialmente e impactado os serviços de saúde hospitalar. Desta forma, acredita-se que uma investigação do estado nutricional, associado a situações clínicas variadas em pacientes idosos, poderia contribuir para ações de intervenção hospitalar multidisciplinares e de cuidado nutricional adequadas para esta população. **Objetivo –** Investigar a relação entre dois instrumentos de triagem nutricional em pacientes idosos hospitalizados e comparar variáveis clínicas entre estes dois instrumentos. **Métodos –** Estudo retrospectivo com pacientes idosos hospitalizados (n=277), sendo investigado a concordância entre dois instrumentos de triagem nutricional. Os dados foram analisados pelos testes McNemar, qui-quadrado, Fisher, Mann-Whitney e o coeficiente kappa para a avaliação de concordância. **Resultados –** Houve diferença significativa (P=0,0002) entre as classificações de risco nutricional pelos dois instrumentos de triagem nutricional e concordância moderada (k=0,5430) entre eles. Verificou-se associação entre triagem de risco nutricional e idade (P=0,0255), tempo de internação (P<,0001), sexo (P=0,0365) e doenças (P=0,0001). Houve associação entre a Mini Avaliação Nutricional e tempo de internação (P<0,0001), doenças (P=0,0001) e evolução do peso corporal (P=0,0479). **Conclusão –** Triagem de risco nutricional e a Mini Avaliação Nutricional apresentam concordância moderada para a avaliação de pacientes idosos.

Palavras-chave – Idosos hospitalizados; triagem nutricional; concordância.

REFERENCES

1. Abd Aziz NAS, Teng NIMF, Abdul Hamid MR, Ismail NH. Assessing the nutritional status of hospitalized elderly. Clin Interv Aging. 2017;12:1615-25. doi:10.2147/CIA.S140859.
2. Engelheart S, Brummer R. Assessment of nutritional status in the elderly: a proposed function-driven model. Food Nutr Res. 2018;62:10.29219/fnr.v62.1366. doi:10.29219/fnr.v62.1366.
3. Kim D, Lim H. Association between combinations of nutritional status and quality of life and food purchasing motives among the elderly in South Korea. Health Qual Life Outcomes. 2020;18:186. doi:10.1186/s12955-020-01434-9.
4. Doroudi T, Alizadeh-Khoei M, Kazemi H, Hormozi S, Taati F, Ebrahimi M, et al. Comparison of Two Validation Nutrition Tools in Hospitalized Elderly: Full Mini Nutritional Assessment and Short-form Mini Nutritional Assessment. Int J Prev Med. 2019;10:168. doi: 10.4103/ijpvm.IJPVM_132_18.
5. Lin YM, Wang M, Sun NX, Liu YY, Yin TF, Chen C. Screening and application of nutritional support in elderly hospitalized patients of a tertiary care hospital in China. PLoS One. 2019;14:e0213076. doi:10.1371/journal.pone.0213076.
6. O'Shea E, Trawley S, Manning E, Barrett A, Browne V, Timmons S. Malnutrition in Hospitalised Older Adults: A Multicentre Observational Study of Prevalence, Associations and Outcomes. J Nutr Health Aging. 2017;21:830-6.
7. Calvo I, Olivar J, Martínez E, Rico A, Díaz J, Gimena M. Mini Nutritional Assessment as a nutritional screening tool for hospitalized older adults; rationales and feasibility. Nutr Hosp. 2012;27:1619-25.
8. Santos CA, Rosa COB, Ribeiro AQ, Ribeiro RCL. Patient-generated subjective global assessment and classic anthropometry: comparison between the methods in detection of malnutrition among elderly with câncer. Nutr Hosp. 2015;31:384-92.
9. Poulia KA, Yannakoulia M, Karageorgou D, Gamaletsou M, Panagiotakos DB, Sipsas NV, Zampelas A. Evaluation of the efficacy of six nutritional screening tools to predict malnutrition in the elderly. Clin Nutr. 2012;31:378-85.
10. Zhou J, Wang M, Wang H, Chi Q. Comparison of two nutrition assessment tools in surgical elderly inpatients in Northern China. Nutr Journal. 2015;14:68. doi: 10.1186/s12937-015-0054-8.
11. Hasegawa Y, Yoshida M, Sato A, Fujimoto Y, Minematsu T, Sugama J, Sanada H. Temporal muscle thickness as a new indicator of nutritional status in older individuals. Geriatr Gerontol Int. 2019;19:135-40. doi: 10.1111/ggi.13570.
12. Christner S, Ritt M, Volkert D, Wirth R, Sieber CC, Gaßmann KG. Evaluation of the nutritional status of older hospitalised geriatric patients: a comparative analysis of a Mini Nutritional Assessment (MNA) version and the Nutritional Risk Screening (NRS 2002). J Hum Nutr Diet. 2016;29:704-13. doi: 10.1111/jhn.12376.
13. Saghafi-Asl M, Vaghef-Mehrabany E, Karamzad N, Daeiefarshbaf L, Kalejahi P, Asghari-Jafarabadi M. Geriatric nutritional risk index as a simple tool for assesment of malnutrition among geriatrics in Northwest of Iran: comparison with mini nutritional assessment. Aging Clin Exp Res. 2018;30:1117-25. doi: 10.1007/s40520-018-0892-2.
14. Guigoz Y, Garry JP. Mini nutritional assessment: A practical assessment tool for grading the nutritional state of elderly patients. Facts and Research in Gerontology 1994; Supplement (2):15-59. Available from: https://www.scirp.org/(S(oyulxb452alnt1aej1nfow45))/reference/ReferencesPapers.aspx?ReferenceID=1162062
15. Kondrup J, Rasmussen HH, Hamberg O, Stanga Z, ESPEN Working Group. Nutritional risk screening (NRS 2002): a new method based on a analysis of controlled clinical trials. Clin Nutr. 2003;22:321-36.
16. Conover WJ. (1971). Practical Nonparametric Statistics. John Wiley & Sons Inc. Nova Iorque.
17. SAS System for Windows (Statistical Analysis System), versão 9.4. SAS Institute Inc, 2002-2012, Cary, NC, USA.

18. Zhang X, Zhang X, Zhu Y, Tao J, Zhang Z, Zhang Y, et al. Predictive Value of Nutritional Risk Screening 2002 and Mini Nutritional Assessment Short Form in Mortality in Chinese Hospitalized Geriatric Patients. Clin Interv Aging. 2020;15:441-9.
19. Pierik VD, Meskers CGM, Van Ancum JM, Numans ST, Verlaan S, Scheerman K, Kruizinga RC, Maier AB. High risk of malnutrition is associated with low muscle mass in older hospitalized patients - a prospective cohort study. BMC Geriatr. 2017;17:118. doi: 10.1186/s12877-017-0505-5.
20. Hong X, Yan J, Xu L, Shen S, Zeng X, Chen L. Relationship between nutritional status and frailty in hospitalized older patients. Clin Interv Aging. 201910;14:105-11. doi: 10.2147/CIA.S189040.
21. Allard JP, Keller H, Jeejeebhoy KN, Laporte M, Duerksen DR, Gramlich L,et al. Decline in nutritional status is associated with prolonged length of stay in hospitalized patients admitted for 7 days or more: A prospective cohort study. Clin Nutr. 2015;3:144-52.
22. Luma HN, Eloumou SAFB, Mboligong FN, Temfack E, Donfack OT, Doualla MS. Malnutrition in patients admitted to the medical wards of the Douala General Hospital: a cross-sectional study. BMC Res Notes. 2017;10:238. doi: 10.1186/s13104-017-2592-y.
23. Tangvik RJ, Tell GS, Guttormsen AB, Eisman JA, Henriksen A, Nilsen RM, Ranhoff AH. Nutritional risk profile in a university hospital population. Clin Nutr. 2015;34:705-11.
24. Guigoz Y. The Mini Nutritional Assessment (MNA) review of the literature-What does it tell us? J Nutr Health Aging. 2006;10:466-85; discussion 485-7.

(cc) BY-NC