

## Review Article

### The Risk of Malnutrition as Moderator in Functional Recovery of Older Adults Hospitalized

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#### Abstract

**Introduction:** Increased life expectancy produces more dependency and deterioration in the population. One of the most frequent causes reduced the quality of life in the elderly is the same hospitalization for acute suffering some pathology. The loss of independence sometimes associated with increasing number of drugs, comorbidity complications during the hospital stay or some of the chronic diseases that have the elderly person as cardiac arrhythmias or artery hypertension. In this context, a little studied issue has been the relationship between the risk of malnutrition and the level of dependency of the hospitalized elderly.

**Objective:** The objective of this research was to find out if the risk of malnutrition could be a good predictor of functional recovery in hospitalized older adults. The starting hypothesis is that there will be a significant association between the risk of malnutrition and functional recovery at the time of hospital discharge as well as in 3 months after.

**Results and conclusion:** We have found a significant association between the risk of malnutrition and the categories at the different levels of dependency measured before, during and after hospitalization. Furthermore, we also find significant associations between BMI and dependency levels prior to admission, at admission, at discharge and at three months after discharge. These results show that the increase in dependency suffered by the hospitalized elderly is related by the nutritional status prior to hospitalization. We think that controlling and detecting the risk of malnutrition in the elderly who

live at home can reduce the loss of functionality caused by events that require hospitalization and therefore prevent worsening during hospitalization.

**Keywords:** BMI; Dependency; Older adults; Risk of malnutrition

#### Introduction

Life expectancy and increased medical treatments have made the number of elderly people increases progressively. At the same time, disease and functional impairment associated with aging entail a need for care that has been steadily increasing in developed countries. Therefore, there is great interest in knowing what are the factors that influence this deterioration in order to ensure that older people remain active and independent for as long as possible, and therefore maintain their quality of life. A specially significant phenomenon in gerontology research is the loss of independence suffered by older people hospitalized for bone fractures, sometimes associated with the lack of mobility [1-3], an increasing number of drugs, comorbidity complications during the hospital stay or some of the chronic diseases typical of the elderly population, such as cardiac arrhythmias or artery hypertension [4].

In the studies that have analyzed variables related to cognitive and functional decline associated with hospitalization and recovery thereafter, several authors have found higher functional loss associated with variables such as age [5,6], prolonged rest [7], decubitus [8], pain produced by the surgery [9], presence of other illnesses [10] and the number of hospitalization days prior to the surgery [11]. Other authors associate functional loss with prior deterioration [12,13] and a low level of social activity [14].

However, few studies analyze the influence of these variables and the most frequent complications during hospitalization, in the elderly functional gain during the 3-month period after discharge. Therefore, we carried out a study whose objective was to analyze to what extent biomedical and clinical factors (complications, morbidity and polypharmacy and chronic diseases) are moderating variables in the functional recovery of hospitalized older adults [15]. Our results indicated that the functional gain was negatively associated with cardiac arrhythmias ( $r = -0.167, p < 0.05$ ), a number of complications ( $r = -0.289, p < 0.01$ ), confusional syndrome ( $r = -0.138, p < 0.05$ ), pressure ulcers ( $r = -0.173, p < 0.05$ ), IQCODE ( $r = -0.425, p < 0.01$ ), and exitus ( $r = -0.168, p < 0.05$ ). The IADL gain was negatively associated with cardiac arrhythmias ( $r = -0.145, p < 0.05$ ), Chronic Obstructive Pulmonary Disease (COPD) ( $r = -0.184, p < 0.01$ ), confusional syndrome ( $r = -0.133, p < 0.05$ ) and IQCODE ( $r = -0.365, p < 0.01$ ). Moreover, the analysis showed that the IQCODE and pressure ulcers explained 20.30% of the variance in functional gain, in the sense that the absence of UPP and less deterioration measured by IQCODE predicts greater functional gain. This result coincides with the study by Pedraja-García [16], which states that the degree of deterioration (functional and cognitive) found can be explained by the average age, in addition to the permanent state of cerebral hypoperfusion caused by heart failure.

According to our results (2016), we could say that although the effect size models predict medium-high in all cases, they can only

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explain about 20% of the variation in the dependent variables. There are other variables not considered in the previously mentioned study which may also be related to the state of dependency of the elderly and its evolution, and that are involved in the health status of the elderly [17]. One of them, BMI, is an important indicator of anthropometric parameters, as it is a good prognostic marker in the elderly [18]. Therefore, the objective of this research was to find out if the risk of malnutrition could be a good predictor of functional recovery in hospitalized older adults. The starting hypothesis is that there will be a significant association between the risk of malnutrition and functional recovery at the time of hospital discharge as well as in 3 months after.

## Methods

### Participants

A total of 259 elderly people, 78,4% women and 21.6% men, admitted to the Hospital Neutraumatológico in Jaén, Spain, were selected to participate in the study. Ages ranged between 65 and 105 (M=80.37, SD=8.35). The inclusion criteria were: age 65 or over, length of hospital stay more than 5 days, and not suffering from an acute disabling disease or a terminal condition.

### Instruments

The Barthel Index (BI) [19,20] were used to measure level of dependency. The BI consists of 10 items that score a person's capacity to perform certain activities without help. It assesses feeding, moving from a chair to bed, personal hygiene, transferring to and from a toilet, bathing, walking, going up and down stairs, dressing and continence of bowels and bladder. It scores from 1 to 100, 1 being completely dependent and 100 being completely independent.

The Mini Nutritional Assessment (MNA) [21] was administered to assess nutritional risk. This test consists of 18 questions grouped into four sections: anthropometric data, global evaluation, dietary intake and subjective evaluation. If the score obtained in the first 6 items is less than 11, it is considered that there is a risk of malnutrition and the rest of the questionnaire is completed. Otherwise, its administration is not continued. It has a sensitivity of 96% and a specificity of 98% in the elderly population.

### Design and procedure

The design was a case-series longitudinal study with repeated follow-up assessment. The dependent variables were the measurements obtained with the instruments described. The BI was given at four temporal moments: (1) prior to admission, through the primary caregiver, who was told to inform about the activities done by the participants 24 hours prior to hospitalization (Barthel previous); (2) at the time of hospital admission, related to the activities done during the first 24 hours in the hospital (Barthel admission); (3) at discharge, always after the fifth day of admission and, in any case, the same day of surgery (Barthel discharge); and (4) post discharge, three months after hospital discharge, when the participant was already living at home (Barthel at home).

Once approved by the Ethics Committee of the Hospital, we established a system for communicating daily admissions with the clinic staff. We explained the aim of the study to the patients as well as what was expected from their participation, giving them written informa-

tion and requesting their informed consent (Declaration of Helsinki 2004) as a requirement to be included in the study. All the participants included in this study were able to give their written consent to participate in the study. Once the participant's consent was provided, the first interview took place within 24 hours of hospital admission, provided that the patient's physical condition allowed it.

### Statistical analysis

We calculated non-parametric correlations between the different variables considered using as dependent variables the scores in the BI in order to check whether the risk of malnutrition is good predictors of these measures. The analyses were performed using the SPSS statistical software package (v. 19), and statistical decisions were taken at a level of significance of .05 or lower.

### Results

The descriptive statistics for the BI are show in table 1. The values in the MNA are in a range from 6 to 15, with a mean of 11.80 (SD=1.609). A score in this variable less than 11 indicates risk of malnutrition. Only 19.3% of the elderly presented a risk of malnutrition according to this screening.

Variable	BI Previous	BI Admission	BI Discharge	BI At Home
M	80.03	36.47	46.69	67.97
SD	23.13	24.73	24.35	26.12

Table 1: Means and standard deviations for the Barthel Index.

Likewise, a significant positive association ( $p < 0.01$ ) was found between the risk of malnutrition and dependency levels before ( $r_{xy} = 0.255$ ), at admission ( $r_{xy} = 0.257$ ), at discharge ( $r_{xy} = 0.265$ ). No significant association was found with the level of dependency at home three months after discharge (at home). We also found significant associations ( $p < 0.01$ ) between BMI and dependency levels prior to admission ( $r_{xy} = 0.329$ ), at admission ( $r_{xy} = 0.252$ ), at discharge ( $r_{xy} = 0.236$ ) and at three months ( $r_{xy} = 0.248$ ). In this case, there is a significant positive association between BMI and dependency assessed at home, three months after discharge (at home).

On the other hand, the risk of malnutrition and dependency levels were categorized. Participants were assigned to one of two groups depending on whether or not they were at risk of malnutrition, based on the MNA screening score. In addition, with the scores obtained in the BI, three dependency level categories were elaborated Shah, Vanclay and Cooper [22]: independence (100 points); mild dependency (between 61 and 99 points) and severe dependency (less than 60 points).

Using the categories described, an analysis was carried out using contingency tables for each of the moments in which the BI was measured. We found that a significant positive association was produced with risk of malnutrition and dependency levels, prior to admission ( $c^2 = 38.23$ ,  $p < 0.001$ ), at admission ( $c^2 = 19.14$ ,  $p < 0.001$ ), at discharge ( $c^2 = 25.61$ ,  $p < 0.001$ ) and at three months (at home) ( $c^2 = 48.06$ ,  $p < 0.001$ ).

Table 2 shows the standardized residuals from the contingency tables. As can be seen in the levels of severe dependency, both measured before hospitalization, at admission or at home, there is a significantly lower proportion ( $p < 0.01$ ) of elderly people without risk of malnutrition than there should be in case of independence between the variables and more people at risk of malnutrition. This pattern is

reversed when it comes to mild dependency or independence, on admission, discharge and at home. In these cases, there is a significantly higher proportion of elderly people without risk of malnutrition and a lower proportion of subjects with risk of malnutrition.

		Previous Dependence			Total 1
		Severe	Mild	Independ	
No Risk of Malnutrition	Frequency	16	100	78	194
	Standardized residuals	-5.9**	0.9	3.6**	
Risk of Malnutrition	Frequency	24	27	9	60
	Standardized residuals	5.9**	-0.9	-3.6**	
	Frequency	40	127	87	254
		Admission Dependence			Total 1
		Severe	Mild	Independ	
No Risk Malnutrition	Frequency	145	45	5	195
	Standardized residuals	-4.4**	4.1**	1.3	
Risk Malnutrition	Frequency	60	0	0	60
	Standardized residuals	4.4**	-4.1**	-1.3	
	Frequency	205	45	5	255
		Discharge Dependence			Total 1
		Severe	Mild	Independ	
No Risk Malnutrition	Frequency	119	72	3	194
	Standardized residuals	-5.1**	4.9**	0.9	
Risk Malnutrition	Frequency	55	2	0	57
	Standardized residuals	5.1**	-4.9**	-0.9	
	Frequency	174	74	3	251
		At Home Dependence			Total 1
		Severe	Mild	Independ	
No Risk Malnutrition	Frequency	40	103	39	182
	Standardized residuals	-5.1**	4.9**	0.9	
Risk Malnutrition	Frequency	38	12	2	52
	Standardized residuals	6.9**	-4.3**	-0.29	
	Frequency	78	115	41	234

**Table 2:** Frequencies and standardized residuals between levels of dependence and risk of malnutrition.  
\*\* p<0.01

No significant association was found between the risk of malnutrition and the functional gain or loss scores. Finally, to see if there were significant associations in relation to gender, an analysis was performed using contingency tables for each of the moments in which functional dependence was measured. We found that there was a significant positive association with levels of dependency at income ( $\chi^2=6.68$ ,  $p=0.03$ ). Table 3 shows the standardized residuals of the contingency tables. We can observe that there are fewer women with a severe level of dependency and more women with medium levels of dependency, than there would be if the variables were independent.

		Previous Dependence			Total 1
		Severe	Mild	Independ	
Women	Frequency	155	41	5	201
	Standardized residuals	-2.5**	2.2**	1.2	
Mens	Frequency	50	4	0	54
	Standardized residuals	2.5**	-2.2**	-1.2	
	Frequency	205	45	5	255

**Table 3:** Frequencies and standardized residuals between levels of dependence and sex.

\*\* p<0.01

No associations were found with levels of dependency at discharge, or at home.

## Discussion

Nutritional status influences the level of dependency of the elderly who suffer hospitalization and therefore their subsequent quality of life. Protein-energy malnutrition affects approximately 3-5% of elderly people who live at home and reaches figures of up to 40-60% in institutionalized elderly people [23], in our study only 19.3% of the elderly presented a risk of malnutrition, a significantly higher figure than that presented by the elderly at home, which may be due to the fact that in our study it refers to elderly people who suffer a hospitalization process.

An involuntary weight loss greater than 10% in less than six months has clinical significance and is the best predictor of death in the elderly. In the SENECA study [24], the BMI of 27.10 kg/m<sup>2</sup> (95% CI 24.10-29.30) is the one that confers the lowest risk of mortality. In our study, we observed how BMI is associated with dependency levels at all the moments measured, before and after hospitalization, with people with higher BMI presenting higher levels of dependency.

We have also found a significant association between the risk of malnutrition and the level of dependency, total BI score, a recurring association between this risk and the categories at the different levels of dependency measured before, during and after hospitalization. These results coincide with those found in some descriptive works that mention that the risk of malnutrition is higher in subjects with more functional and cognitive impairment [25-27]. Although in our study it is observed that in the category of independent people this association is not established in the two moments measured during hospitalization, so it could be thought that there are other mediating variables during hospitalization.

When studying dependency in relation to sex in our study, it is observed that before hospital admission there are fewer women with severe dependency than men. These results do not coincide with those of Penacho-Lazaro [18], which states that women are at greater risk of suffering total dependency than men, although in this case the study refers to women institutionalized in geriatric residences.

## Conclusion

The increase in dependency suffered by the hospitalized elderly is caused by different biomedical and clinical variables. One of them is the nutritional status prior to hospitalization. We think that controlling and detecting the risk of malnutrition in the elderly who live at home

can reduce the loss of functionality caused by events that require hospitalization and therefore prevent worsening during hospitalization.

## References

1. Granger CV, Dewis LS, Peters NC, Sherwood CC, Barrett JE (1979) Stroke rehabilitation: Analysis of repeated Barthel index measures. *Arch Phys Med Rehabil* 60: 14-17.
2. Abizanda P, Navarro JL, Romero L, León M, Sánchez-Jurado PM, et al. (2007) Upper extremity function, an independent predictor of adverse events in hospitalized elderly. *Gerontology* 53: 267-273.
3. Ocagli H, Cella N, Stivanello L, Degan M, Canova C (2021) The Barthel Index as an indicator of hospital outcomes: A retrospective cross-sectional study with healthcare data from older people. *J Adv Nurs* 77: 1751-1761.
4. Cares LV, Domínguez CC, Fernández MJ, Fariás CR, Win-Tin Chang G, et al. (2013) Evolución de la capacidad funcional en adultos mayores hospitalizados en la unidad geriátrica de agudos del Hospital Clínico de la Universidad de Chile [Evolution of functional capacity of older people during hospital stay]. *Rev Med Chil* 141: 419-427.
5. Covinsky KE, Palmer RM, Fortinsky RH, Counsell SR, Stewart AL, et al. (2003) Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age. *J Am Geriatr Soc* 51: 451-458.
6. Varela L, Chavez H, Herrera A, Ortiz PJ, Chinge O (2004) Valoración geriátrica integral en adultos mayores hospitalizados a nivel nacional [Comprehensive geriatric assessment in hospitalized older adults nationwide]. *Diagnóstico* 43: 57-63.
7. Rodríguez JG, Rojas VD, Jaurrieta JJS (1999) Deterioro funcional secundario a la hospitalización por enfermedad aguda en el anciano. Análisis de la incidencia y los factores de riesgo asociados [Functional deterioration secondary to hospitalization for an acute disease in the elderly. An analysis of its incidence and the associated risk factors]. *Rev Clin Esp* 199: 418-423.
8. Delgado Parada E, Suárez García FM, Miñana Climent JC, Medina García A, López Gaona V, et al. (2009) [Risk factors associated with functional impairment at discharge and at three months after discharge in elderly individuals hospitalized for heart failure]. *Rev Esp Geriatr Gerontol* 44: 66-72.
9. Feldt KS, Finch M (2002) Older adults with hip fractures. Treatment of pain following hospitalization. *J Gerontol Nurs* 28: 27-35.
10. Macias-Montero MC, Guerrero-Díaz MT, Hernández-Jiménez V (2008) Valoración Mental. In: Guillen LF, del Molino Martin JP, Torregrossa RP (eds.). *Syndromes and patient care nursing home*. Elsevier, Barcelona, Spain.
11. Calero-García MJ, Ortega AR, Navarro E, Jimenez C, Calero MD (2012) Impact of admissions for bone fractures on the dependency ratio of adults over 65 years of age in Southern Spain. *Arch Gerontol Geriatr* 55: 305-309.
12. Sands LP, Yaffe K, Covinsky K, Chren MM, Counsell S, et al. (2003) Cognitive screening predicts magnitude of functional recovery from admission to 3 months after discharge in hospitalized elders. *J Gerontol A Biol Sci Med Sci* 58: 37-45.
13. Pedone C, Ercolani S, Catani M, Maggio D, Ruggiero C, et al. (2005) Elderly patients with cognitive impairment have a high risk for functional decline during hospitalization: The GIFA Study. *J Gerontol A Biol Sci Med Sci* 60: 1576-1580.
14. Hofbauer LM, Rodríguez FS (2021) Validation of a social deprivation index and association with cognitive function and decline in older adults. *Int Psychogeriatr* 33: 1309-1320.
15. Calero-García MJ, Calero MD, Navarro E, Ortega AR, Campos A (2016) The biomedical and clinical factors as moderator variable in functional and cognitive recovery of older adults hospitalized. *Annals of Gerontology and Geriatric Research* 3: 1033.
16. García ELP, González EAM, Jimenez AR, Castro AI, González MMH (2015) Evaluación funcional, cognitiva y biomédica de ancianos de 90 años y más. *Acta Médico del Centro* 9: 1-11.
17. Lynch DH, Petersen CL, Fanous MM, Spangler HB, Kahkoska AR, et al. (2022) The relationship between multimorbidity, obesity and functional impairment in older adults. *J Am Geriatr Soc* 70: 1442-1449.
18. Penacho Lázaro MÁ, Calleja Fernández A, Castro Penacho S, Tierra Rodríguez AM, Vidal Casariego A (2019) [Assessment of the risk of undernutrition in institutionalized patients under the degree of dependence]. *Nutr Hosp* 36: 296-302.
19. Mahoney FI, Barthel DW (1965) Functional evaluation: the Barthel Index. *Md State Med J* 14: 61-65.
20. Baztán JJ, Pérez del Molino J, Alarcón T, San Cristóbal E, Izquierdo G, et al. (1993) Índice de Barthel: instrumento válido para la valoración funcional de pacientes con enfermedad cerebrovascular [Barthel Index: A valid instrument for functional assessment of patients with cerebrovascular disease]. *Rev Esp Geriatr Gerontol* 28: 32-40.
21. Guigoz Y, Fasiat C, Lauque S (1994) Nutrition assessment and MNA (Mini Nutritional Assessment). *Journal of American Geriatric Society* 42: 1035-1044.
22. Shah S, Vanclay F, Cooper B (1989) Improving the sensitivity of the Barthel Index for stroke rehabilitation. *J Clin Epidemiol* 42: 703-709.
23. Ruiz MD, Artacho Martín-Lagos R, Quiles Morales JL (2017) Tratado de nutrición: Tomo IV. Capítulo 21: Nutrición humana en el estado de salud. *Nutrición del Adulto Mayor*: 433-63.
24. Moreiras O, Beltrán B, Carbajal A, Cuadrado C (2001) Nutrición y salud en personas de edad avanzada en Europa. Estudio SENECA's FINALE en España. 1. objetivo, diseño y metodología [Nutrition and health of the elderly persons in Europe. «SENECA's FINALE» study in Spain. 1. Objective, design and methodology]. *Rev Esp Geriatr Gerontol* 36: 75-81.
25. Camina Martín MA, Barrera Ortega S, Domínguez Rodríguez L, Couceiro Muíño C, de Mateo Silleras B, et al. (2012) Presencia de malnutrición y riesgo de malnutrición en ancianos institucionalizados con demencia en función del tipo y estadio evolutivo. *Nutrición hospitalaria: Organó oficial de la Sociedad Española de Nutrición Parenteral y Enteral* 27: 434-40.
26. Fernández-Viadero C, Peña Sarabia N, Jiménez-Sanz M, Ordóñez-González J, Verduga Vélez R, et al. (2016) Análisis longitudinal de parámetros nutricionales en una cohorte de ancianos con y sin demencia. *Rev Esp Geriatr Gerontol* 51: 92-95.
27. Schrader E, Baumgärtel C, Gueldenzoph H, Stehle P, Uter W, et al. (2014) Nutritional status according to Mini Nutritional Assessment is related to functional status in geriatric patients--independent of health status. *J Nutr Health Aging* 18: 257-263.



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