

Evaluation of Nutrition, Pressure Ulcer and Fall Risk Status and Related Factors in Individuals Receiving Home Health Care Services

Yağmur Gökseven Arda^{ID}, Güzin Zeren Öztürk^{ID}, Saliha Büşra Aksu^{ID}

Health Sciences University, Şişli Hamidiye Etfal Training and Research Hospital, Department of Family Medicine, İstanbul, Türkiye.

Correspondence Author: Saliha Büşra Aksu

E-mail: drsalihabusra@gmail.com

Received: 21.03.2024

Accepted: 04.09.2024

ABSTRACT

Objective: In this study, the aim is to evaluate the factors associated with nutrition, pressure ulcers, and fall risks in individuals receiving home health care.

Methods: A retrospective study was designed by examining the files of the patients registered in the Home Health Care. Mini Nutritional Assessment Short Form, Modified Norton Scale and Itaki Fall Risk Scale scores were recorded.

Results: The study included 334 patients. 197 (59%) of them were female and the mean age was 74.15±16.12 (min: 18, max: 101). The most common chronic diseases was hypertension (HT) (n=167, 50%), whereas the two most common comorbidities were DM and HT (n=77, 23.1%). Patients receiving home health care were found to be at risk for malnutrition, pressure ulcers and falls. Being semi-bedridden and wheelchair bound were found to be predictors for the risk of developing pressure ulcers according to regression analysis results. Also it was identified that the age and dependency levels of the patients receiving home health care explained 12% of the falling behaviours of the older people.

Conclusion: Necessary warnings should be given at every visit, so that receiving home health care should not be neglected in terms of risks and preventive measures should be taken for this patient group.

Keywords: Home care services, falls, malnutrition, pressure ulcer.

1. INTRODUCTION

Home health care (HHC) services are defined as a service model that ensures examination, treatment, follow-up, and rehabilitation services provided by a professional team in the homes of individuals who cannot maintain their daily care independently. It also provides the necessary emotional and physical assistance to these individuals and their families (1). HHC services support individuals with chronic, malignant, congenital diseases, or those in recovery, relieving the burden on family members and serving as a bridge between the patient and hospital services. It plays a critical role in the management and treatment of common chronic diseases such as hypertension (HT), and diabetes mellitus (DM). Regular monitoring, correct medication use, lifestyle changes, and patient education help health professionals control disease progression and improve patients' quality of life (2).

Home health care services can serve patients of all ages, and the patient population generally consists of adults of advanced age (1). Today, developing technology and increasing treatment options have led to a prolongation of human life and an increase in the proportion of the older adults in the total population. According to the Turkish

Statistical Institute, the older people population constituted 9.1% of the total population in 2019 and is predicted to reach 12.9% by 2030 and 22.6% by 2060 (3). This demographic shift is associated with a higher incidence of chronic diseases, disability, and dependency, thereby increasing the demand for health services, including HHC.

Malnutrition is a crucial health problem that causes gradual weight loss, especially with a decrease in lean body mass, as a result of inadequate food intake, may impair physical and/or cognitive functions, and may occur as a result of aging or a disease (4). Since early diagnosis and treatment of malnutrition improves the patients' quality of life, nutritional screening is a critical step in patients at risk (5). Studies on malnutrition in the literature have generally focused on older adults, with prevalence rates varying widely (5,6).

Pressure ulcers are localized tissue damage on the skin and subcutaneous tissues caused by pressure on bony prominence regions or friction. Risk factors include advanced age, being bedridden, malnutrition, and chronic diseases (7). Falls, defined as an unintentional descent to a lower level than the person, can occur at any age and are independent

of acute events like presyncope, syncope, and seizures (8). Factors increasing fall risk include age, medication, chronic diseases, immobility, and unconsciousness (9). Patients receiving HHC services often have multiple factors increasing their fall risk.

Malnutrition, pressure ulcers and falls may affect mortality and morbidity in patients receiving HHC, but complications can be prevented with early diagnosis or preventive measures. Thus, regular screenings are performed for malnutrition, pressure ulcers and risk of falling in our HHC unit.

To the best of the authors' knowledge, most studies determining the risks associated with malnutrition, pressure ulcers, and falls have focused on healthy older individuals living in the community (10), those attending outpatient clinics (11), those hospitalized in nursing homes (6). Despite the small number of research on nutrition, pressure sores, and the risk of falls in HHC patients, these studies highlighted the high incidence of the concerns described and the importance of comprehensive and protective interventions to reduce these risks (2).

The objective of this research is to look into the prevalence of malnutrition, pressure ulcers, and fall risk in people receiving home health care services, as well as the relationship between these risks. Furthermore, it seeks to assess how chronic diseases and older age influence these health issues. The study's goal is to highlight the need of early detection of these hazards and preventive measures in those receiving home health care services. Therefore, it is planned to test the following hypotheses;

1. Malnutrition percentage, pressure ulcer prevalence and fall risk are high in individuals receiving home health care services.
2. Malnutrition, pressure ulcers and fall risk are interrelated.
3. Chronic diseases and advanced age are the main factors that increase the prevalence of these three health problems.

2. METHODS

2.1. Study Design, Population and Sample

A single-centered, retrospective and descriptive study was designed by examining the files of the patients registered in the HHC unit of the Hassa State Hospital. The files of 556 patients who were assessed in HHC services of Hassa State Hospital between 01/02/2020 and 31/01/2021 were examined.

The files of patients aged 18 years and over, who were followed up by HHC for at least 6 months and whose data that planned to be analysed in the study were complete were included in the study. Due to the different clinical characteristics and care needs of the paediatric patient group, files of patients under 18 years of age were excluded. Furthermore, the files of patients whose need for home health care services lasted

less than 6 months were excluded from the study since it was believed that sufficient data could not be obtained during this time and long-term results could not be assessed. Patients with missing data in their patient files were also excluded from the study because the necessary information for analysis could not be obtained. The files of 222 patients who did not match the inclusion criteria were excluded from the study.

Data of 334 patients who met the inclusion criteria were included in the study. Ethics committee approval was obtained from Hatay Mustafa Kemal University with the decision no. 15 on 24/09/2020.

2.2. Data Collection Tools

Data on socio-demographic characteristics, chronic diseases, medical history, state of consciousness, nutritional information, mobility and use of assistive devices (walker, cane, air mattress, etc.) were recorded by retrospective examination of the diagnosis-treatment and follow-up forms prepared by the Ministry of Health for the evaluation of patients receiving HHC.

Mini Nutritional Assessment Short Form (MNA-SF), Modified Norton Scale (MNS) and Itaki Fall Risk Scale (IFRS) scores were recorded.

Although the air mattress is a protective method that prevents the development of pressure ulcers, it has been accepted as an assistive device in the study because it was included in the assistive device class, not as a protective method in the file data.

2.2.1. Mini Nutritional Assessment Short Form (MNA-SF):

Mini Nutritional Assessment (MNA) was developed by Guigoz in 1994 (12). It is a valid nutritional screening tool for older populations which can be completed in 10-15 minutes. As MNA is used infrequently in some care settings due in part to the time needed to complete it to reduce this short time burden further, Rubenstein and colleagues developed a six question MNA short-form (MNA-SF) by identifying a subset of questions from the full MNA that had high sensitivity, specificity and correlation to the full MNA (13). MNA-SF consists of six questions including anthropometric measurement (body mass index), appetite, weight loss during the last 3 months, mobility, whether the patients are suffering from psychological stress of acute disease in the past 3 months and neuropsychological problems. Each question gets a certain point based on the answer. The points from 12 to 14 are considered as normal nutritional status, from 8 to 11 points as risk of malnutrition and from 0 to 7 as malnourished. The Turkish validity and reliability study of the MNA short form was performed (14).

2.2.2. Modified Norton Scale (MNS):

The patients' risk for developing pressure ulcers assessed by modified Norton scale (15) comprising 7 subscales with four items each (mental condition, physical activity, mobility, food intake, fluid intake, incontinence, and general physical condition).

Each component receives a score ranging from 1 to 4, with 1 indicating no function and 4 indicating typical function.

2.2.3. Itaki Fall Risk Scale (IFRS): In 2011, a fall risk scale specific to our country, understandable and easy to apply and to be used in adult patients was developed by Department of Health Productivity, Quality and Accreditation under the Ministry of Health of the Republic of Türkiye (16). There are 11 minor and 8 major risk factors in the scale consisting of a total of 19 risk factors. As minor factors age, state of consciousness (unconsciousness), history of falling, chronic diseases (hypertension, diabetes mellitus, neurological diseases etc.), urinary-fecal incontinence, visual status, need for physical support while walking, number of medications, use of less than 3 patient care equipment (drain, pacemaker, intravenous infusion, etc.) and physical obstacles in the walking area are evaluated. As major factors state of consciousness (conscious but uncooperative), balance problems while standing/walking, dizziness, orthostatic hypotension, visual impairment, physical disability, use of 3 or more patient care equipment and risky drug use in the last 1 week (antidiabetic, benzodiazepine, anticoagulant, etc.) are questioned. Each minor factor is scored as 1 point and each major factor is scored as 5 points. If the total score is below five, the risk of falling is considered low, and if it is five or more, the risk of falling is considered high (16).

2.3. Statistical Analysis

All statistical analyses were carried out using SPSS statistical software version 25.0. Descriptive statistics of the evaluation results were given as numbers and percentages for categorical variables, and mean, standard deviation, minimum and maximum values for numerical data. Pearson Chi-Square test was used to compare independent groups and to investigate differences between participants; in cases where Pearson Chi-Square test could not be applied, Fisher's Exact Chi-Square test was applied. Statistical relationship between continuous and discrete numerical variables was investigated using Spearman's correlation test. Multivariate logistic regression analysis was performed. The statistical significance of the alpha level was accepted as $p < .05$.

3. RESULTS

3.1. Sociodemographic Data

The study included 334 patients. 197 (59%) of them were female and 137 (41%) of them were male. The mean age was 74.15 ± 16.12 (min: 18, max: 101). Figure 1 shows the age distribution histogram of the patients. The age characteristics of the patients did not follow a normal distribution. Because health and care demands vary with age, the patients were separated into three age groups and examined. According to the results in Table 1 there were 63 patients (18.9%) between the ages of 18-64, 114 people (34.1%) between the ages of 65-79, and 157 people (47%) aged 80 and over. 120 (35.9%) of the patients had previously worked as blue-collar workers. 199 (59.6%) were primary school graduates.

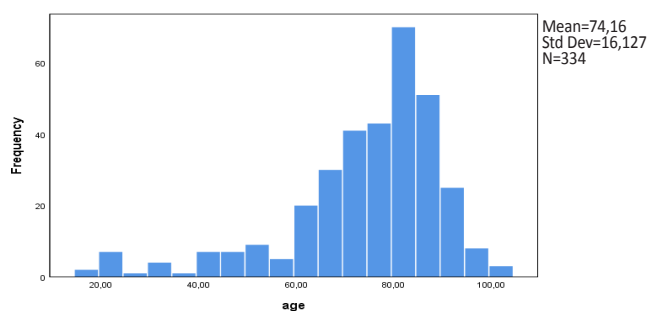


Figure 1. Histogram graph of age distribution of patients

Table 1. Descriptive characteristics of patients in the study

		n (%)
Gender	Woman	197(59)
	Man	137(41)
Age	18-64	63(18.9)
	65-79	114(34.1)
	80 and above	157(47)
Occupation	Blue Collar	120(35.9)
	None	212(64.1)
Educational Status	Illiterate	199(59.6)
	Below primary school	75(22.5)
	Primary school and above	60(18)
State of consciousness	Conscious	313(93.7)
	Confused /lethargic	14(4.2)
	Mental Retardation	7(2.1)
Bed Dependency	Bedridden	125(37.4)
	Semi-bedridden	195(58.3)
	Independent	14(4.2)
Assistive device use	None	144(43.1)
	Wheelchair	18(5.4)
	Walker	37(11.1)
	Air mattress	26(7.8)
	Walking stick	81(24.3)
	Other	28(8.3)

3.2. Characteristics of Patients and Their Diagnoses

In this study, 'bedridden' refers to patients confined to bed and unable to perform daily activities independently. 'Semi-bedridden' patients are those with significant mobility limitations who are not entirely confined to bed but require assistance for some activities. These patients can move their upper limbs and support their weight with help from another person or by using walls or furniture.

Independent patients typically do not require any assistive devices for daily activities. Semi bedridden patients require assistive devices such as a walker, walking stick, and wheelchair, whilst bedridden patients require assistive devices such as an air mattress. The goal is to improve the patient's mobility, make it easier to meet everyday demands, and avoid consequences like falls and pressure ulcers (17,18). In the study, patients who did not use assistive devices were categorised as "patients who did not use the device because

they were independent” and “bedridden/semibedridden patients who needed the device but did not use it”.

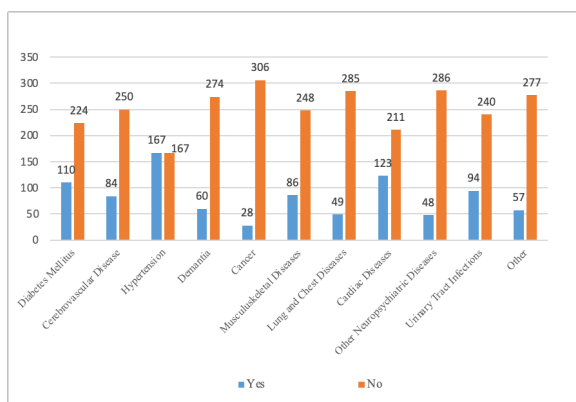


Figure 2. Chronic disease distribution of the participants

As shown in Figure 2; the five most common chronic diseases were hypertension (HT) (n=167, 50%), diabetes mellitus (DM) (n=110, 32.9%), cerebrovascular disease (CVD) (n=84, 25%), dementia (n=60, 17.9%), and cancer (n=28, 8.3%). All other diseases are classified according to systems. The most common system disease was cardiovascular system diseases (n=123, 36.8%). The two most common comorbidities were DM and HT (n=77, 23.1%)

3.3. Evaluation of MNA-SF, MNS, IFRS and Related Factors

According to MNA-SF the nutritional status of 112 people (33.6%) was normal, 137 people (41.0%) were at risk of malnutrition, and 85 (25.4%) people were found to be malnourished. 175 people (52.4%) were at risk of developing pressure ulcers with respect to MNS, while 319 people (95.5%) were in the high-risk group for falls according to IFRS.

No statistically significant relationship was found between gender, educational status and occupation and MNA-SF, MNS and IFRS (p< .05).

3.3.1. Assessment of Factors Associated with MNA-SF

A statistically significant relationship was found between MNA-SF and age, DM, HT, dementia, cancer, musculoskeletal diseases (rheumatoid arthritis, hip fractures, muscular dystrophy, etc.), state of consciousness, bedridden status and using assistive devices for mobility (p< .05). Therefore, the risk of malnutrition was found to be higher in those aged between 65 and 79 years, with DM, HT, musculoskeletal diseases and those who were semi-bedridden. Patients diagnosed with dementia, cancer and patients with impaired consciousness (lethargy, confusion, mental retardation) were found to be significantly more malnourished than conscious patients and those without dementia and cancer (Table 2).

Table 2. Factors associated with MNA-SF, MNS and IFRS

		MNA-sf n			p	Modified Norton Scale		p	Itaki Fall Risk Scale		p
		N (%)	Normal	Risk of Malnutrition		Malnourished	At risk		No Risk	Low Risk	
Age	18-64	24 (38.1)	20 (31.7)	19 (30.2)	.031	30 (47.6)	33 (52.4)	.621	5 (7.9)	58 (92.1)	.056
	65-79	43 (37.7)	53 (46.5)	18 (15.8)		63 (55.3)	51 (44.7)		1 (0.9)	113 (99.1)	
	80 and over	45 (28.7)	64 (40.8)	48 (30.6)		82 (52.2)	75 (47.8)		9 (5.7)	148 (94.3)	
Diabetes Mellitus	Yes	40 (36.4)	56 (50.9)	14 (12.7)	.001	50 (45.5)	60 (54.5)	.075	2 (1.8)	108 (98.2)	.157 ^a
	No	72 (32.1)	81 (36.2)	71 (31.7)		125 (55.8)	99 (44.2)		13 (5.8)	211 (94.2)	
Hypertension	Yes	69 (41.3)	74 (44.3)	24 (14.4)	.000	77 (46.1)	90 (53.9)	.021	5 (3.0)	162 (97.0)	.187
	No	43 (25.7)	63 (37.7)	61 (36.5)		98 (58.7)	69 (41.3)		10 (6.0)	157 (94.0)	
Cerebrovascular Disease	Yes	21 (25.0)	41 (48.8)	22 (26.2)	.127	58 (69.0)	26 (31.0)	.000	3 (3.6)	81 (96.4)	.769 ^a
	No	91 (36.4)	96 (38.4)	63 (25.2)		117 (46.8)	133 (53.2)		12 (4.8)	238 (95.2)	
Demantia	Yes	12 (20.0)	23 (38.3)	25 (41.7)	.003	33 (55.0)	27 (45.0)	.656	12 (4.4)	262 (95.6)	.738 ^a
	No	100 (36.5)	114 (41.6)	60 (21.9)		142 (51.8)	132 (48.2)		3 (5.0)	57 (95.0)	
Cancer	Yes	7 (25.0)	8 (28.6)	13 (46.4)	.029	20 (71.4)	8 (28.6)	.035	1 (3.6)	27 (96.4)	1.000 ^b
	No	105 (34.3)	129 (42.2)	72 (23.5)		155 (50.7)	151 (49.3)		14 (4.6)	292 (95.4)	
Musculoskeletal Diseases	Yes	38 (44.2)	36 (41.9)	12 (14.0)	.007	37 (43.0)	49 (57.0)	.043	4 (4.7)	82 (95.3)	1.000 ^b
	No	74 (29.8)	101 (40.7)	73 (29.4)		138 (55.6)	110 (44.4)		11 (4.4)	237 (95.6)	
Disordered Consciousness	Yes	110 (35.1)	131 (41.9)	72 (23.0)	.000	159 (50.8)	154 (49.2)	.024	15 (4.8)	298 (95.2)	.611 ^a
	No	2 (9.5)	6 (28.6)	13 (61.9)		16 (76.2)	5 (23.8)		0 (0.0)	21 (100)	
Bedridden Status	Bedridden	31 (24.8)	48 (38.4)	46 (36.8)	.003	91 (72.8)	34 (27.2)	.000	4 (3.2)	121 (96.8)	.017
	Semi-bedridden	74 (38.3)	84 (43.5)	35 (18.1)		78 (40.4)	115 (59.6)		8 (4.1)	185 (95.9)	
	Independent	7 (43.8)	5 (31.3)	4 (25.0)		6 (37.5)	10 (62.5)		3 (18.8)	13 (81.3)	
Assistive Device Use*	No	37 (27.8)	51 (38.3)	45 (33.8)	.000	90 (67.7)	43 (32.3)	.000	3 (2.3)	130 (97.7)	.763
	Wheelchair	9 (52.9)	6 (35.3)	2 (11.8)		5 (29.4)	12 (70.6)		1 (5.9)	16 (94.1)	
	Walker	18 (48.6)	16 (43.2)	3 (8.1)		14 (37.8)	23 (62.2)		1 (2.7)	36 (97.3)	
	Air Mattress	4 (15.4)	11(42.3)	11 (42.3)		22 (84.6)	4 (15.4)		2 (7.7)	24 (92.3)	
	Cane/Crutch	34 (42.0)	35 (43.2)	12 (14.8)		33 (40.7)	48 (59.3)		4 (4.9)	77 (95.1)	
	Other	3 (11.5)	14 (53.8)	9 (34.6)		7 (26.9)	19 (73.1)		1 (3.8)	25 (96.2)	

Pearson Chi-Square, & Fisher's Exact Test, * Independent patients who did not need assistive devices were excluded during the statistical analysis. (n=320).

When independent patients who do not need to use any assistive devices are excluded, the risk of malnutrition was found to be significantly higher in patients who did not use any assistive device although they needed it and in patients who used a cane/crutch (Table 2).

As seen in Table 3, a statistically significant positive correlation was found between nutritional condition and risk for pressure ulcers of patients ($r=0.437$, $p<.001$). However, no statistically significant correlation was found between nutritional condition and fall risk of patients ($r=-0.055$, $p=.313$).

Table 3. Correlation results for the relationships of MNA-SF, MNS and IFRS

		MNA-sf	IFRS	MNS
MNA-sf	r	1	-	-
	p			
IFRS	r	-0.055	1	-
	p	.313		
MNS	r	.437*	-.164*	1
	p	< .001	.003	

* Correlation is significant at the level (Spearman correlation test),

** Correlation is significant at the level (Spearman correlation test)

In Table 4, the results of multiple logistic regression analysis between various variables, including being malnourished, high-risk to develop pressure ulcers and high-risk to fall. A significant correlation was found between being malnourished and the variables used in the model, HT ($OR=0.42$, $p=.007$),

dementia ($OR=2.39$, $p=.016$) and cancer ($OR=3.47$, $p=.015$). Malnutrition rates were 0.42 times higher in patients with HT than in those without HT, 2.39 times higher in patients with dementia than in those without dementia, and 3.47 times higher in patients with cancer than in those without cancer. It was discovered that the variables in the model described 29.5% of the factors influencing the existence of malnutrition ($R^2=0.295$). This suggests that the variables in the model play a major role in determining malnutrition, although other factors influencing malnutrition may also exist.

3.3.2. Assessment of Factors Associated with MNS

A statistically significant correlation was found between the risk of developing pressure ulcers and HT, CVD, cancer, musculoskeletal diseases, state of consciousness, bedridden status and using assistive devices for mobility ($p<.05$). Accordingly, a statistically significant negative correlation was found between HT and musculoskeletal diseases and the risk of developing pressure ulcers.

Risk of developing pressure ulcers was found to be significantly higher in patients with CVD, cancer, disordered consciousness and those who were bedridden and not using any assistive device for mobility (Table 2).

As seen in Table 2, a statistically negative and significant correlation was found between MNS and IFRS ($r=-0.164$, $p=.003$).

Table 4. Multivariate logistic regression analysis results between various variables and malnutrition, pressure ulcer risk and high fall risk

Variables	MNA-sf (Malnourished)		Pressure Ulcer (At Risk)		Fall Risk (High)	
	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p
Diabetes Mellitus	0.51(0.25-1.06)	.073	-	-	-	-
Hypertension	0.42 (0.22-0.79)	.007	0.67 (0.41-1.10)	.120	-	-
Demantia	2.39 (1.18-4.86)	.016	-	-	-	-
Cerebrovascular Disease	-	-	2.10 (1.14-3.87)	.017	-	-
Cancer	3.47 (1.27-9.50)	.015	2.87 (1.09-7.55)	.033	-	-
Musculoskeletal Diseases	0.54 (0.25-1.13)	.104	0.85 (0.49-1.49)	.586	-	-
Consciousness	0.44 (0.15-1.26)	.126	0.59 (0.17-1.98)	.394	-	-
Bedridden Status		.572		.009		.033
Independent	1.00		1.00		1.00	
Semi-Bedridden	2.25 (0.48-10.45)	.298	5.74 (1.51-21.77)	.010	8.68 (1.64-45.93)	.011
Bedridden	1.88 (0.40-8.86)	.422	2.48 (0.65-9.40)	.179	5.56 (1.20-25.79)	.028
Assistive Device		.102		.014		-
None	1.00		1.00		-	
Wheelchair	0.30 (0.06-1.49)	.141	0.18 (0.05-0.56)	.003	-	-
Walker	0.29 (0.07-1.22)	.093	0.61 (0.24-1.50)	.285	-	-
Air Mattress	1.83 (0.65-5.14)	.247	1.48 (0.44-4.98)	.518		
Cane/crutch	0.61 (0.23-1.60)	.324	0.66 (0.32-1.38)	.275	-	-
Other	1.55 (0.54-4.44)	.407	0.293 (0.10-0.80)	.017	-	-
Age		.101		-		.129
18-64	1.00		-	-	1.00	-
65-79	0.54 (0.21-1.34)	.188	-	-	9.40 (1.03-85.08)	.046
80 and over	1.18 (0.52-2.67)	.678	-	-	1.27 (0.38-4.19)	.687
	$R^2=0,295 - 2 \text{ Log likelihood}=304,448$		$R^2=0,248 - 2 \text{ Log likelihood}=393,547$		$R^2=0,121 - 2 \text{ Log likelihood}=109,765$	

* $p<0.05$ is statistically significant

In Table 3, a significant correlation was found between the risk of developing pressure ulcers according to the MNS score, and the variables used in the model, such as CVD (OR=2.10, $p = .017$), cancer (OR=2.87, $p = .033$), bedridden status (OR=5.74, $p = .010$), and wheelchair bound status (OR=0.18, $p = .003$). This indicates that the rate of pressure sore development is 2.1 times higher in patients with CVD, 2.87 times higher in cancer patients, 5.74 times higher in semibedridden patients and 0.18 times higher in wheelchair bounds. It was seen that 24.8% of the factors that determine the risk of developing pressure ulcers were explained by the variables in the model ($R^2=0.248$).

3.3.3. Evaluation of Factors Associated with IFRS

A statistically significant relationship was found between the risk of falling and bedridden status and it was stated that bedridden patients had the highest risk ($p < .05$) (Table 2).

There was no statistically significant relationship between age classification and fall risk of patients ($p = .056$). As age is clinically associated with falling (19) and the p value is $< .200 - .250$ the relationship between age and falling risk was analyzed in logistic regression analysis. In Table 4, being semi-bedridden (OR = 8.68, $p = .011$), bedridden (OR = 5.56, $p = .028$), and aged between 65–79 years (OR = 9.40, $p = .046$) were found to be substantially linked with the variables employed in the model. Being semi-bedridden increases the risk of falls 8.68 times and being bedridden increases the risk of falls 5.56 times compared to independent patients, and being 65-79 years of age increases the risk of falling 9.4 times more than being 18-64 years old. The variables in the model were found to explain 12.1% of the factors indicating high fall risk ($R^2=0.121$).

4. DISCUSSION

Our study revealed that 41.0% of the patients receiving home health care services were at risk of malnutrition, 52.4% were at risk of developing pressure ulcers, and 95.5% had a high risk for falling. It has been demonstrated that malnutrition, pressure ulcers and risk of falling are common in patients receiving HHC. HT, dementia and cancer increase the risk of being malnourished, cancer and SVO increase the risk of developing pressure ulcers and being bedridden increases the risk of developing pressure ulcers and the risk of falling.

Malnutrition rates in older patients in primary care were reported to be between 2.1% and 11%, with a risk of malnutrition ranging from 5-25% (11, 20). In studies conducted in patients receiving HHC, the malnutrition rate was found to be between 28.8%-52.6% whereas the risk of malnutrition was between 30.2% and 39.3% (21, 22). The prevalence of malnutrition in patients receiving HHC was higher than in the normal population. It can be said that receiving HHC is a risk factor for malnutrition (23). Among the reasons for this, the fact that patients receiving HHC are mostly dependent on daily living activities such as nourishment increases the risk of being malnourished in this patient group (24). In addition,

as seen in our study, the fact that the majority of patients receiving HHC is older (mean age 74.15 ± 16.12 years) and the negative effects of old age on nutrition (decreased sense of taste and smell, dental problems, chewing and swallowing difficulties, etc.) may be another reason (5).

The prevalence of malnutrition is increasing with the increase in chronic diseases. In one study, it was found that the most common chronic diseases in patients receiving home health care (HHC) were HT, cardiovascular diseases, DM, and dementia. In addition, the risk of malnutrition increases in the presence of dementia and fracture (22). Diseases such as DM, COPD, atherosclerosis, chronic renal failure, fracture and Alzheimer's disease adversely affect the metabolic and nutritional status and increase the risk of malnutrition by triggering inflammation processes in elderly individuals (25).

The study found that the risk of malnutrition was higher in DM, HT and musculoskeletal-joint diseases, while malnutrition was significantly more prevalent in patients with dementia and cancer. Regression analysis revealed that both HT and cancer are risk factors for malnutrition. Malnutrition is a prevalent complication among cancer patients, particularly those with gastrointestinal malignancies. Cancer cachexia can arise as a result of tumor-induced inflammation, reduced food intake, and metabolic abnormalities caused by cancer (26).

Hypertension can cause heart failure and renal failure, impairing appetite and food absorption. DM causes gastroparesis as well as inflammation, delaying gastric emptying and decreasing food intake. Drugs used in connection with these diseases and side effects related to drugs are other factors that increase the risk of malnutrition (23, 27). These findings show the importance of chronic disease follow-up and side effect management of the drugs used to reduce the risk of malnutrition for patients receiving HHC.

It is known that factors such as age, malnutrition, skin condition, perfusion-related diseases (DM, HT, vascular diseases, edema, etc.), hematological measures (low albumin, anemia, etc.) and skin moisture (urinary, fecal incontinence) predispose to pressure ulcer development (7). Although more than one factor plays a role in the development of pressure ulcers, poor perfusion and immobilization are direct risk factors. Prolonged periods of time lying or sitting, wheelchair use and being a sedentary elderly put the individuals at risk (28).

Multivariate logistic regression analysis in the study showed that the presence of CVD and cancer are predictors of pressure ulcer risk. In a systematic review lack of mobility/activity was found as an independent predictors of pressure ulcer development (29). Patients with a history of CVD constitute the group of immobile patients who tend to stay in the same position for a long periods due to neurological deficits, and therefore, pressure ulcers can be expected (30).

More than half of cancer patients develop pressure ulcers. Malnutrition, anorexia, cachexia, anaemia and decreased

mobility, which occur especially in advanced cancers, are common complications in cancer patients and these conditions increase the risk of pressure ulcers by causing skin disorders (31).

In the study, a relationship was found between musculoskeletal diseases and pressure sores. The risk of pressure ulcers may be increased due to the fact that diseases such as rheumatoid arthritis and hip fractures, which are included in this group, both affect mobility and the effects of drugs such as steroids used in the treatment on the skin (32, 33).

In the study, the risk of developing pressure ulcers increased with the level of bedridden status. Pressure ulcers, also referred to as bedsores in the literature, may have a higher risk of developing in bedridden patients due to the reasons listed above (34). Although the rates of pressure ulcers are higher in bedridden patients, it was not found to be a predictor for the risk of developing pressure ulcers in the study. Being semi-bedridden and wheelchair bound were found to be predictors for the risk of developing pressure ulcers according to regression analysis results.

Semi-bedridden patients are more inclined to sit in the same position due to the loss of pain sensation or the ability to feel pressure due to sitting for a long time. They use their support systems less because of their little mobility, or do not use any protective measures to prevent the risk of pressure in assistive devices such as wheelchairs. The risk of developing pressure ulcers may increase due to such reasons (34).

In the study, all air mattress users consisted of bedridden patients, and the rate of air mattress usage was found to be lower (7.8%) compared to the literature (35). Air mattresses are protective methods developed to reduce the risk of compression, and their use rate is much higher in bedridden patients (35). However, it has been shown in the study that semi-bedridden patients, who are less likely to develop pressure ulcers due to their limited mobility, are also at risk. For this reason, to reduce the risk of PU in semi-dependent patients receiving HHC, support systems should be used for pressure redistribution as they tend to sit in prolonged periods, and patients should be provided with a pressure reducing position at certain intervals and times (36). In recent years, pressure sensors have been developed to reduce pressure ulcers in wheelchair users. Thanks to these sensors, the pressure values in the chair are recorded in the application on the phone or computer so that the person can see it and also the sensors can give a warning when sitting in the same position for a long time is detected (34).

Malnutrition has strong effects on pressure ulcer development and delays wound healing (37). In a study conducted with 2,327 patients over 65 years of age, the relationship between the chronic diseases and malnutrition was evaluated and it was found that the frequency of malnutrition was highest in individuals with pressure ulcers (38). In a study, it was observed that malnourished patients who were treated in the hospital had approximately 2.5 times higher risk of developing pressure ulcers than those who did not (39).

In the study, a strong and positive correlation was found between MNA-SF and MNS scores, indicating that a high risk in one measure tends to coincide with a high risk in the other. However, it is important to emphasize that correlation does not imply causation. Another study found that malnutrition screening can also be used as a predictor for pressure ulcer risk in HHC patients. It was observed that a score below 8 on the MNA test predicted the development of pressure ulcers more strongly than the Braden scale (40). Nevertheless, these findings should be interpreted with caution, and additional studies should explore whether malnutrition directly causes an increased risk of pressure ulcers or if other confounding factors may be at play.

Falls are a significant public health issue because they are common in adults with advanced age, have high death and morbidity rates, impose an economic burden, decrease the older people's quality of life, and generate psychological impacts such as dread of falling in the future (41). Studies have found that factors such as ageing and decreased mobility with age, the presence of chronic diseases such as cancer or hypertension, the number of medications used and their side effects such as dizziness and impaired balance, impaired functionality or the need for home care are significantly associated with the risk of falls (42, 43).

Malnutrition may increase the risk of falls due to its negative effects on muscle strength and balance and through comorbidities such as sarcopenia and frailty (44, 45). Studies have shown that malnutrition increases the likelihood of a future fall (45).

In a study conducted by Adly et al. in hospitalised patients aged 60 years and older, the relationship between MNA-SF scores and various fall scales was evaluated. In the study, malnutrition was shown to be associated with a high risk of falls, but no relationship was found between nutritional status and some fall risk tools such as Schmid-FRAT. This was attributed to the low prevalence of the Schmid-FRAT and that it may not reflect the relationship between nutritional status and fall risk in certain populations (46). Similarly, the lack of a significant relationship between MNA-SF and IFRS may be due to the inadequacy of IFRS in establishing a relationship with nutritional status. This situation is important in terms of showing that different fall risk tools may differ in their relationship with nutritional status and that each tool may not be equally valid in every population.

In a retrospective study in which 1692 patients aged 65 years and older who received HHC were retrospectively analysed, the fall risk was found to be 63.7% and the fall rates were found to be 66.3% between the ages of 65-74 years, 73.6% between the ages of 75-84 years and 75% between the ages of 85-94 years (47). According to the regression analysis performed in the study, being between the ages of 65 and 79 was found to be a predictor of high fall risk. This finding shows the necessity of fall risk assessment and strategies to reduce the risk of falls especially in this age group.

Our study revealed that the risk of falling was found to be higher in bedridden patients than in semi-bedridden and independent patients. According to the regression analysis, both being bedridden and semi-bedridden were found to be predictors of falling and being semi-bedridden has a higher predictive value in determining the risk of falling. In Japan, it has been shown that the dependency status of patients determined by bedridden rank is very useful in predicting in-hospital fall risks. Accordingly, the highest predictive value for falls was found to be in chair-bound patients who were semi-bedridden, followed by housebound and finally bedridden patients who were fully dependent (48).

Another study discovered that older adults with gait problems and concomitant conditions had a higher risk of falling and a better sense and knowledge of the risk of falling than healthy senior patients. Being aware of their conditions and being aware that they are at risk of falling may lead to them adopting fall prevention behaviours and reducing the frequency of their falls (43). However, there are also studies in which a decrease in mobility increases the level of dependency and an increased level of dependency is associated with an increased risk of falling (49).

When the studies studying the factors related with the risk of falling in the literature are analyzed, it is found that, in contrast to our study, the investigations were usually conducted in healthy older persons (10, 11, 21). However our study identified that the age and dependency levels of the patients receiving HHC explained 12% of the falling behaviors of the older people. When the literature was searched, there were no studies examining the relationship between bedridden status and fall risks in home care patients. Comprehensive and predictive studies on this subject are needed because bed dependency and age have a 12% effect on the risk of falling in patients receiving HHC.

5. CONCLUSION

In our study patients receiving HHC were found to be at risk for malnutrition, pressure ulcers and falls. Although it is very difficult to explain the cause of the three complications with a single cause, it was found that the presence of chronic diseases such as HT, dementia and cancer was associated with the development of malnutrition in patients receiving HHC, and the risk of pressure ulcers was high in an individual with nutritional deficiency. The presence of chronic diseases such as CVD, cancer and using a wheelchair were found to be associated with the development of pressure sores.

Although a significant difference was observed between dependency level and the risk of pressure ulcers and falls, one of the most important results of our study was that being semi-bedridden was also shown to be a risk factor for developing pressure ulcers and falling. Necessary warnings should be given at every visit, so that semi-bedridden patients receiving HHC should not be neglected in terms of risks and preventive measures should be taken for this patient group.

The limitations of the study are that it was carried out retrospectively and included patients in a specific region. At the same time, no scale was used while evaluating the dependency levels of the patients and it was determined by the clinician's decision during the patient examination. In future studies, the use of scoring systems evaluating the addiction levels of patients may minimise the potential for clinician bias. In addition, conducting prospective studies with a larger patient population may facilitate the establishment of a causal relationship.

Funding: The author(s) received no financial support for the research.

Conflicts of interest: The authors declare that they have no conflict of interest.

Ethics Committee Approval: This study was approved by Ethics Committee of Hatay Mustafa Kemal University, Noninvasive Clinic Ethics Committee (Approval date ; 24/09/2020 Number: 15)

Peer-review: Externally peer-reviewed.

Author Contributions:

Research idea: YGA

Design of the study: YGA, GZÖ

Acquisition of data for the study: YGA

Analysis of data for the study: GZÖ, SBA

Interpretation of data for the study: SBA

Drafting the manuscript: YGA, GZÖ, SBA

Revising it critically for important intellectual content: YGA, GZÖ, SBA

Final approval of the version to be published: YGA, GZÖ, SBA

REFERENCES

- [1] World Health Organization. Home health care and community-based services: A handbook for professionals. World Health Organization, 2015 Available from: <https://iris.who.int/bitstream/handle/10665/204893/B0021.pdf;jsessionid=654E85DA272768D88E211E81B908FB62?sequence=1> Accessed on: 23.08.2024
- [2] Vandiver T, Anderson T, Boston B, Bowers C, Hall N. Community-based home health programs and chronic disease: Synthesis of the literature. *Prof Case Manag.* 2018;23(1):25-31. DOI:10.1097/NCM.000.000.0000000242.
- [3] Türkiye İstatistik Kurumu. İstatistiklerle yaşlılar, 2019. <https://data.tuik.gov.tr/Bulten/Index?p=İstatistiklerle-Yaslılar-2019-33712#:~:text=T%C3%9C%C4%B0K%20Kurumsal&text=Ya%C5%9F%C4%B1%20n%C3%BCfus%20olarak%20kabul%20edilen,9%2C1'e%20y%C3%BCKseldi.> Accessed: 11.07.2024 (Turkish)
- [4] Arsava EM, Aydoğdu İ, Güngör L, Togay Işııkay C, Yaka E. Nutritional approach and treatment in patients with stroke, an expert opinion for Turkey. *Turkish Journal Of Neurology.* 2018;24(3):226-242. DOI:10.4274/tnd.92603
- [5] Guyonnet S, Rolland Y. Screening for malnutrition in older people. *Clin Geriatr Med.* 2015;31(3):429-437. DOI:10.1016/j.cger.2015.04.009
- [6] Nazemi L, Skoog I, Karlsson I, Hosseini S, Mohammadi MR, Hosseini M, Hosseinzade MJ, Mesbah-Namin SA, Baikpour M. Malnutrition, prevalence and relation to some risk factors among elderly residents of nursing homes in Tehran, Iran. *J Public Health.* 2015;44(2):218-227.
- [7] Coleman S, Gorecki C, Nelson EA, Closs SJ, Defloor T, Halfens R, Farrin A, Brown J, Schoonhoven L, Nixon J. Patient risk

- factors for pressure ulcer development: Systematic review. *Int J Nurs Stud.* 2013;50(7):974-1003. DOI:10.1016/j.ijnurstu.2012.11.019.
- [8] Phelan EA, Ritchey K. Fall prevention in community-dwelling older adults. *Ann Intern Med.* 2018;169(11):ITC81. DOI:10.7326/AITC201812040
- [9] Hnizdo S, Archuleta RA, Taylor B, Kim SC. Validity and reliability of the modified John Hopkins Fall Risk Assessment Tool for elderly patients in home health care. *Geriatr Nurs (Minneap).* 2013;34(5):423-427. DOI:10.1016/j.gerinurse.2013.05.011
- [10] Cattelani L, Palumbo P, Palmerini L, Bandinelli S, Becker C, Chesani F, Chiari L. FRAT-up, a web-based fall-risk assessment tool for elderly people living in the community. *J Med Internet Res.* 2015;17(2):e41. DOI: 10.2196/jmir.4064.
- [11] [11] Bayrak F, Ersoy S, Pala E. Ümraniye Durmuş Tanış aile sağlığı merkezine başvuran 65 yaş üzeri hastalarda malnütrisyon sıklığı ve ilişkili durumlar. *Abant Med J.* 2021;10(1):93-103. DOI:10.47493/abantmedj.2021.38. (Turkish)
- [12] [12] Guigoz G, Vellas B, Garry P. Assessing the nutritional status of the elderly: The mini nutritional assessment as part of the geriatric evaluation. *Nutr Rev.* 1994;51(1):59-65. DOI: 10.1111/j.1753-4887.1996.tb03793.x.
- [13] [13] Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for undernutrition in geriatric practice: Developing the short-form mini-nutritional assessment (MNA-SF). *J Gerontol A Biol Sci Med Sci.* 2001;56(6):M366-M372. DOI:10.1093/gerona/56.6.M366
- [14] [14] Sarıkaya D, Halil M, Kuyumcu ME, Kilic MK, Yesil Y, Kara O, Ozturk S, Gungor E, Karabulut E, Balam Yavuz B, Cankurtaran M, Ariogul S. Mini nutritional assessment test long and short form are valid screening tools in Turkish older adults. *Arch Gerontol Geriatr.* 2015;61(1):56-60. DOI: 10.1016/j.archger.2015.04.006.
- [15] [15] Ek A, Unosson M, Bjurulf P. The modified norton scale and the nutritional state. *Scand J Caring Sci.* 1989;3(4):183-187. DOI:10.1111/j.1471-6712.1989.tb00290.x
- [16] [16] Sağlık Bakanlığı, Sağlıkta Kalite Standartları, Sağlık Hizmetleri Genel Müdürlüğü Sağlıkta Kalite ve Akreditasyon Daire Başkanlığı. İtaki düşme riski ölçeği. <https://dosyaism.saglik.gov.tr/Eklenti/60196/0/itaki-23012019pdf.pdf> Accessed on: 10.07.2024 (Turkish)
- [17] [17] Sauvage P, Toufflet M, Pradere C, Portalier F, Michel JM, Charru P, Passadori Y, Fevrier R, Hallet-Lezy AM, Beauchêne F, Scherrer B. Pressure ulcers prevention efficacy of an alternating pressure air mattress in elderly patients: E²MAO a randomised study. *J Wound Care* 2017;26(6):304-312. DOI:10.12968/jowc.2017.26.6.304.
- [18] [18] Sinyukov DA, Troy KL, Bowers MP, Padir T. Wheelchairs and other mobility assistance. *Biomechatronics* 2019;373-417. DOI: 10.1016/B978-0-12-812939-5.00013-6
- [19] [19] Menard S. Applied logistic regression analysis. in: Applied logistic regression analysis. Second Edition. SAGE University Paper; 2002:67-90.
- [20] [20] Mastronuzzi T, Paci C, Portincasa P, Montanaro N, Grattagliano I. Assessing the nutritional status of older individuals in family practice: Evaluation and implications for management. *Clinical Nutrition* 2015;34(6):1184-1188. DOI:10.1016/j.clnu.2014.12.005
- [21] [21] Tüzün S, Hacıgaoğlu N, Dabak MR. Malnutrition in home care patients. *TJFMP.* 2019:159-166. DOI:10.21763/tjfm.569695 .
- [22] [22] Adigüzel E, Acar Tek N. Effect of some characteristics of nutritional status on quality of life in elderly individuals receiving home care service. *Elderly Issues Research Journal* 2018;11(1):19-25.
- [23] [23] Kiesswetter E, Colombo MG, Meisinger C, Peters A, Thorand B, Holle R, Ladwig KH, Schulz H, Grill E, Diekmann R, Schrader E, Stehle P, Sieber CC, Volkert D. Malnutrition and related risk factors in older adults from different health-care settings: An enable study. *Public Health Nutr.* 2020;23(3):446-456. DOI:10.1017/S136.898.0019002271.
- [24] Öztürk GZ, Egici MT, Bukhari MH, Toprak D. Association between body mass index and activities of daily living in homecare patients. *Pak J Med Sci.* 2017;33(6). DOI:10.12669/pjms.336.13748
- [25] Norman K, Haß U, Pirlich M. Malnutrition in older adults—recent advances and remaining challenges. *Nutrients* 2021; 13(8):2764. DOI:10.3390/nu13082764.F
- [26] Fearon K, Strasser F, Anker SD, Bosaeus I, Bruera E, Fainsinger RL, Jatoi A, Loprinzi C, MacDonald N, Mantovani G, Davis M, Muscaritoli M, Ottery F, Radbruch L, Ravasco P, Walsh D, Wilcock A, Kaasa S, Baracos VE. Definition and classification of cancer cachexia: An international consensus. *Lancet Oncol.* 2011;12(5):489-495. DOI:10.1016/S1470-2045(10)70218-7.
- [27] Alencherry B, Laffin LJ. treatment of hypertension in patients with diabetes mellitus: A contemporary approach. *Curr Cardiol Rep.* 2021;23(3):14. DOI: 10.1007/s11886.021.01443-0.
- [28] Porter-Armstrong AP, Moore ZE, Bradbury I, McDonough S. Education of healthcare professionals for preventing pressure ulcers. *Cochrane Database of Systematic Reviews* 2018; 25;5(5):CD011620. DOI:10.1002/14651858.CD011620.pub2
- [29] Coleman S, Gorecki C, Nelson EA, Closs SJ, Defloor T, Halfens R, Farrin A, Brown J, Schoonhoven L, Nixon J. Patient risk factors for pressure ulcer development: Systematic review. *Int J Nurs Stud.* 2013;50(7):974-1003. DOI:10.1016/j.ijnurstu.2012.11.019.
- [30] Çetiner M, Akkaya Arı S, Eşkut N, Ocak Ö, Canbaz Kabay S, Özışık Karaman HI. Evaluation of clinical features and the factors related to nutrition in home care patients with pressure ulcer. *Fam Pract Palliat Care* 2021;6(1):7-12. DOI:10.22391/fppc.776139.
- [31] Biçer EK, Güçlüel Y, Türker M, Kepiçoğlu NA, Sekerci YG, Say A. Pressure ulcer prevalence, incidence, risk, clinical features, and outcomes among patients in a Turkish hospital: A cross-sectional, retrospective study. *Wound Manag Prev.* 2019;65(2):20-28.
- [32] Firth J, Waxman R, Law G, Nelson EA, Helliwell P, Siddle H, Otter S, Butters V, Baker L, Hryniw R, Bradley S, Loughrey L, Alcaccer-Pitarch B, Davies S, Tranter J. The predictors of foot ulceration in patients with rheumatoid arthritis. *Clin Rheumatol.* 2014;33(5):615-621. DOI: 10.1007/s10067.013.2428-7.
- [33] Chiari P, Forni C, Guberti M, Gazineo D, Ronzoni S, D'Alessandro F. Predictive factors for pressure ulcers in an older adult population hospitalized for hip fractures: A prognostic cohort study. *PLoS One* 2017;12(1):e0169909. DOI:10.1371/journal.pone.0169909.
- [34] Nadzri N, Hamzaid NA, Chung TY. Design and development of a wheelchair seating pressure relief reminder system for pressure ulcer prevention among paraplegics. *J Med Eng Technol.* 2021;45(7):574-581. DOI:10.1080/03091.902.2021.1936238

- [35] Demirci Şahin A, Seyrek S, Ertürk A, Artantaş Baydar A. Evde bakım hastalarında bası yaralarına yaklaşım: En uygun yaklaşım koruyucu hekimlik. *Konuralp Tıp Dergisi* 2017;9(1):14-18. DOI:10.18521/ktd.286610 (Turkish)
- [36] The National Pressure Injury Advisory Panel. Wheelchair seating pocket guide. https://cdn.ymaws.com/npiap.com/resource/resmgr/events/NPIAP_Per mobil_WC_Seating_Po.pdf. Accessed: 10.07.2024
- [37] Field LB, Hand RK. Differentiating malnutrition screening and assessment: A nutrition care process perspective. *J Acad Nutr Diet*. 2015;115(5):824-828. DOI:10.1016/j.jand.2014.11.010
- [38] Ülger Z, Halil M, Kalan I, Yavuz BB, Cankurtaran M, Güngör E, Arioğul S. Comprehensive assessment of malnutrition risk and related factors in a large group of community-dwelling older adults. *Clin Nutr*. 2010;29(4):507-511. DOI:10.1016/j.clnu.2010.01.006.
- [39] Alhaug J, Gay CL, Henriksen C, Lerdal A. Pressure ulcer is associated with malnutrition as assessed by Nutritional Risk Screening (NRS 2002) in a mixed hospital population. *Food Nutr Res*. 2017;61(1):1324230. DOI:10.1080/16546.628.2017.1324230
- [40] Yatabe MS, Taguchi F, Ishida I, Sato A, Kameda T, Ueno S, Takano K, Watanabe T, Sanada H, Yatabe J. Mini nutritional assessment as a useful method of predicting the development of pressure ulcers in elderly inpatients. *J Am Geriatr Soc*. 2013;61(10):1698-1704. DOI:10.1111/jgs.12455.
- [41] World Health Organisation. WHO global report on falls prevention in older age. Published online 2007. https://iris.who.int/bitstream/handle/10665/43811/978.924.1563536_eng.pdf?sequence=1 Accessed 10.07.2024.
- [42] Kenis C, Decoster L, Flamaing J, Debruyne PR, De Groof I, Focan C, Cornélis F, Verschaeve V, Bachmann C, Bron D, Van den Bulck H, Schrijvers D, Langenaeken C, Specenier P, Jerusalem G, Praet JP, De Cock J, Lobelle JP, Wildiers H, Milisen K. Incidence of falls and fall-related injuries and their predictive factors in frail older persons with cancer: A multicenter study. *BMC Geriatr*. 2022;22(1):877. DOI:10.1186/s12877.022.03574-7.
- [43] Souza LF de, Batista REA, Camapanharo CRV, Costa PCP da, Lopes MCBT, Okuno MFP. Factors associated with risk, perception and knowledge of falls in elderly people. *Rev Gaucha Enferm*. 2022;43:e20200335. DOI:10.1590/1983-1447.2022.202.00335
- [44] Volkert D, Beck AM, Cederholm T, Cruz-Jentoft A, Goisser S, Hooper L, Kiesswetter E, Maggio M, Raynaud-Simon A, Sieber CC, Sobotka L, van Asselt D, Wirth R, Bischoff SC. ESPEN guideline on clinical nutrition and hydration in geriatrics. *Clin Nutr*. 2019;38:10-47.
- [45] Eckert C, Gell NM, Wingood M, Schollmeyer J, Tarleton EK. Malnutrition risk, rurality, and falls among community-dwelling older adults. *J Nutr Health Aging* 2021;25(5):624-627. DOI:10.1007/s12603.021.1592-8.
- [46] Adly NN, Abd-El-Gawad WM, Abou-Hashem RM. Relationship between malnutrition and different fall risk assessment tools in a geriatric in-patient unit. *Aging Clin Exp Res*. 2020;32(7):1279-1287. DOI:10.1007/s40520.019.01309-0.
- [47] Neziraj M, Hellman P, Kumlien C, Andersson M, Axelsson M. Prevalence of risk for pressure ulcers, malnutrition, poor oral health and falls – a register study among older persons receiving municipal health care in southern Sweden. *BMC Geriatr*. 2021;21(1):265. DOI:10.1186/s12877.021.02205-x.
- [48] Hirata R, Tago M, Katsuki NE, Oda Y, Tokushima M, Tokushima Y, Hirakawa Y, Yamashita S, Aihara H, Fujiwara M, Yamashita SI. History of falls and bedriddenness ranks are useful predictive factors for in-hospital falls: A single-center retrospective observational study using the saga fall risk model. *Int J Gen Med*. 2022;15:8121-8131. DOI:10.2147/IJGM.S385168.
- [49] Pitchai P, Dedhia H, Bhandari N, Krishnan D, D'Souza NJ, Bellara J. Prevalence, risk factors, circumstances for falls and level of functional independence among geriatric population – A descriptive study. *Indian J Public Health* 2019;63(1):21-26. DOI:10.4103/ijph.IJPH_332_17.

How to cite this article: Gökseven Arda Y, Zeren Öztürk G, Aksu SB. Evaluation of Nutrition, Pressure Ulcer and Fall Risk Status and Related Factors in Individuals Receiving Home Health Care Services. *Clin Exp Health Sci* 2024; 14: 843-852. DOI: 10.33808/clinexphealthsci.1456039