Arrival Date: 13.08.2023 | Published Date: 30.09.2023 | Vol: 8, Issue: Özel Sayı | pp: 833-839 | Doi Number: http://doi.org/10.5281/zenodo.8404311

EVALUATION OF PROGNOSTIC NUTRITIONAL INDEX OF HOME CARE PATIENTS OVER 65 YEARS OF AGE

EVDE SAĞLIK HİZMETİ ALAN 65 YAŞ VE ÜZERİ BİREYLERİN PROGNOSTİK NUTRİSYONEL İNDEKSLERİNİN DEĞERLENDİRİLMESİ

Arzu AYRALER[1], Mert İLK[1], İbrahim Onur KÖSE[1], Kaan SARI[1]

[1] Giresun University, Faculty of Medicine, Giresun, Türkiye

ABSTRACT

Objective: Assessment of nutritional status and Prognostic Nutritional Index (PNI) of frail elderly individuals.

Methods: The retrospective, cross-sectional study was applied to individuals over the age of 65 who were registered with Home Care Services at Giresun University Training and Research Hospital Home Health Services between January and March 2023. Biochemical data and sociodemographic institutional database of registered individuals were created. PNI is classified as high risk with >50%, intermediate risk between 40% and 49%, and low risk below 40%. Medical status, nutritional status and prognostic nutritional index were evaluated.

Results: A statistically weak negative correlation was found between the age of the participants and PNI values (r= -0.228; p=0.012). A statistically positive, moderate correlation was found between the albumin levels of the participants and PNI values (r= 0.558; p=0.003). There was no statistically significant relationship between PNI categories and nutritional status (p=0.459). There was no statistically significant relationship between the PNI values of the participants and other parameters (p>0.050).

Conclusion: In individuals over 65 years of age, we could not determine PNI alone as a suitable tool to assess malnutrition status. Further studies are needed to correlate PNI with nutrition-related parameters such as oral nutrition, nutritional product use, and nutritional adequacy when we evaluate nutritional status.

Keywords: Aging, Home care service, Prognostic nutritional index.

ÖZET

Amaç: Kırılgan yaşlı bireylerin beslenme durumları ile Prognostik Nutrisyonel İndekslerinin(PNI) Değerlendirilmesidir.

Gereç ve Yöntem: Retrospektif, kesitsel çalışma, Giresun Üniversitesi Eğitim ve Araştırma Hastanesi Evde Sağlık Hizmetlerine Ocak-Mart 2023 tarihleri arasında Evde Sağlık Hizmetlerine kayıtlı 65 yaş üstü bireylere uygulandı. Kayıtlı bireylerin biyokimyasal verileri ve sosyodemografik kurumsal veri tabanı oluşturuldu. PNI, >%50 ile yüksek risk, %40 ila %49 arasında orta risk ve %40'ın altında düşük risk olarak sınıflandırılır. Tıbbi durum, beslenme durumu ve prognostik beslenme indeksi değerlendirildi..

Bulgular: Katılımcıların yaşları ile PNI değerleri arasında istatistiksel olarak negatif yönde zayıf bir ilişki bulunmuştur (r= -0,228; p=0,012). Katılımcıların albümin değerleri ile PNI değerleri arasında istatistiksel olarak pozitif yönde orta düzeyde bir ilişki bulunmuştur (r= 0,558; p=0,003). PNI kategorileri ile beslenme durumu arasında istatistiksel olarak anlamlı bir ilişki bulunmamıştır (p=0,459). Katılımcıların PNI değerleri ile diğer parametreler arasında istatistiksel olarak anlamlı bir ilişki bulunmamıştır (p>0,050).

Sonuç: 65 yaş üstünde bireylerde yetersiz beslenme durumlarını değerlendirmek için PNI'yi tek başına uygun bir araç olarak belirleyemedik. Nutrisyon durumlarını değerlendirdiğimizde oral beslenme, beslenme ürünü kullanımı, beslenme yeterlilikleri gibi beslenme ile ilgili parametrelerin PNI ilişkilendirilmesi için daha fazla çalışmaya ihtiyaç vardır.

Anahtar Kelimeler: Yaşlılık, Evde sağlık hizmetleri, Prognostik nutrisyonel indeks.

Sorumlu Yazar / Corresponding Author: Arzu AYRALER, Asst. Prof., Giresun University, Faculty of Medicine, Giresun, Türkiye. **E-mail:** ayraler7@hotmail.com

Bu makaleye atıf yapmak için / Cite this article: Ayraler, A., İlk, M., Köse, İ. O., & Kaan, S. (2023). Evaluation of Prognostic Nutritional Index of Home Care Patients over 65 years of age. *Gevher Nesibe Journal of Medical & Health Sciences*, 8 (Özel Sayı), XX-XX. http://doi.org/10.5281/zenodo.8404311

INTRODUCTION

Life expectancy is increasing in our world, with estimates predicting that from 2017 to 2050, the number of older people in developing countries will more than double, with particular implications for health (Silva, Carvalho, Figueiredo, Silva-Júnior, & al., 2019). A longer life will bring opportunities for restructuring, not only for older people and their families, but also for societies as a whole (World Health Organization. Ageing and Health, 2022).

With the increase in the number of elderly individuals, the incidence of diseases associated with aging, especially cardiovascular diseases (CVD), will also increase. CVD is one of the main factors of cardiac aging and ranks first among the causes of mortality in the world (Karadüz & Yurdalan, 2021). In order to better understand the factors affecting the health of the elderly population and their adaptation to environmental factors, it is very important to consider the complex environmental context in which the elderly person living at home is living. (Mendieta, Geest, Goderis, & al., 2022)

Home Care Services (HCS) is the provision of health services such as examination, examination, treatment, rehabilitation in the home environment by a professional health team to patients who have inability to reach health institutions due to reasons such as bedridden patients in need of care, chronic diseases, malignant diseases, cerebrovascular events (Çayır & Işık, 2012). (Çayır, 2020)It makes a unique contribution to the care of elderly and disabled adults (Franzosa, Wyte-Lake, Tsui, Reckrey, & Sterling, 2022)

In this study, we aimed to evaluate the relationship between sociodemographic characteristics, nutritional status, clinical characteristics and PNI in individuals over 65 years of age receiving services from HCS.

MATERIALS AND METHODS

Approval was obtained from Giresun University Education and Research Hospital clinical research ethics committee (13.02.2023/10). E-53593568-929-211104921 approval received from Provincial Health Directorate. It was conducted in accordance with the Helsinki principles.

The Prognostic Nutritional Index (PNI) was developed to predict postoperative complications and assess the preoperative nutritional status of malnourished cancer patients (Bullock, Greenley, McKenzie, Paton, & Johnson, 2020). It is a parameter calculated as PNI = 10 x serum albumin (g/dL) + 0.005 x total lymphocyte count (per mm3) (Toya, Endo, Nakamura, & al., 2019). In malnourished patients with Hypertrophic Cardiomyopathy (HCMP), low PNI level has been shown to be an independent prognostic factor in cardiovascular diseases (Tak, Ekizler, Kafes, Cay, & Cetin, 2020). In a study evaluating the relationship between PNI and long-term outcomes in patients with Coronary Artery Disease undergoing Percutaneous Coronary Intervention, it was observed that patients with high PNI values had fewer adverse reactions (Liu, Zheng, Tang, & al, 2022).

In a study that divided PNI into three groups, group 1 (<38.78), group 2 (38.78-47.12) and group 3 (≥47.12), evidence was provided that PNI is a more important indicator than hypoalbuminemia for the progression of diabetic nephropathy, a complication of diabetes mellitus (Zhang, Xiao, Wu, Yang, & al, 2022). Another study showed that PNI was significantly associated with mortality in a population aged 80 years and older with chronic renal failure, a major cause of morbidity and mortality in the geriatric population (Atas, Tugcu, Asicioglu, Velioglu, & al, 2022).

Statistical Analysis

Data were analyzed with IBM SPSS V23. Compliance with normal distribution was examined by Shapiro-Wilk and Kolmogorov-Smirnov Test. In paired groups, Independent Samples t Test was used to compare the parameters conforming to normal distribution and Mann Whitney U Test was used to compare the parameters not conforming to normal distribution. One-way Analysis of Variance was used for the comparison of parameters conforming to normal distribution in groups of three or more, and multiple comparisons were made with Duncan's Test. Kruskal Wallis Test was used to compare the parameters that did not fit the normal distribution in groups of three or more. Pearson Chi-Square Test was used to compare categorical variables. Spearman's rho Correlation Coefficient was used to examine the relationship between parameters that did not fit the normal distribution. The results of the analysis were presented as frequency (percentage) for categorical variables, mean ± standard deviation and median (minimum - maximum) for quantitative variables. PNI >50% is classified as high nutritional

risk, 40% to 49% as moderate risk, and below 40% as low risk.(14) The significance level was set at p<0.050.

RESULTS

Total of 89 patients enrolled in the home health services unit were included in the study. A statistically weak negative correlation was found between the participants' age and PNI values (r= -0.228; p=0.012). A statistically positive moderate correlation was found between the albumin values of the participants and PNI values (r= 0.558; p=0.003). No statistically significant correlation was found between the PNI values of the participants and other parameters (p>0.050) (Table 1).

Table 1. Examination of the relationship between PNI results and age and blood parameters

	PNI Result	
	r	**p**
Age	-0.228	**0.012**
Glucose	0.164	0.132
Urea	-0.127	0.241
Na	-0.027	0.801
K	0	1,000
Ca	-0.078	0.854
Cholesterol	0.064	0.562
Triglycerides	0.15	0.173
Hdl	-0.045	0.686
Ldl	0.042	0.702
Lower	0.114	0.292
Subordinate	-0.012	0.910
Albumin	0.558	**0.003**
Lymphocyte	0.41	0.273
Hemogram	0.368	0.196
Over Seventy Age Points	-0.127	0.494

r: Spearman's rho Correlation Coefficient

There was no statistically significant relationship between PNI categories and pressure assessment (p=0.182). The rate of pressure sores was 11.1% in those with PNI>50, 7.7% in those with PNI>50, 7.7% in those with PNI>45, 31.3% in those with PNI>45, 31.3% in those with PNI>40 and 14.3% in those with PNI<40.

There was no statistically significant difference between the distribution of home health main disease values according to PNI categories (p=0.772). Here, neurological disease was the most common disease in PNI categories. The rate of those with neurological diseases was 40.7% in those with PNI>50, 48% in those with PNI>50, 48% in those with PNI>45, 31.3% in those with PNI>45, 31.3% in those with PNI>40 and 38.1% in those with PNI<40.

There was no statistically significant relationship between PNI categories and nutritional status (p=0.459). The proportion of those with adequate nutritional status was 100% in those with PNI>50, 96% in those with PNI>50, 96% in those with PNI>45, 100% in those with PNI>45, 100% in those with PNI>40 and 100% in those with PNI<40.

There was no statistically significant relationship between PNI categories and pegged nutritional status (p=0.859). The rate of pegged feeding was 7.4% in PNI>50, 8% in PNI>50, 8% in PNI>45, 12.5% in PNI>45, 12.5% in PNI>40 and 4.8% in PNI<40.

There was no statistically significant relationship between PNI categories and oral nutrition status (p=0.859). The rate of oral feeding was 92.6% in PNI>50, 92% in PNI>50, 92% in PNI>45, 87.5% in PNI>45, 87.5% in PNI>40 and 95.2% in PNI<40.

There was no statistically significant relationship between PNI categories and the presence of nutritional products (p=0.447). The proportion of those with PNI>50 who had a nutritional product was 11.1%, 8% with PNI>50, 8% with PNI>45, 12.5% with PNI>45, 12.5% with PNI>40 and no one with PNI<40 had a nutritional product.

There was no statistically significant relationship between PNI categories and the presence of nasogastric feeding (p=0.609). The rate of nasogastric feeding was 7.4% in those with PNI>50, no one in those with PNI>50>PNI>45, 6.3% in those with PNI>45>PNI>40 and 4.8% in those with PNI<40.

There was no statistically significant relationship between PNI categories and the number of medications used (p=0.784). Here, the highest values were obtained in the use of more than four medications. The proportion of those using more than four medications was 55.6% in those with PNI>50, 70.8% in those with PNI>50, 70.8% in those with PNI>45, 68.8% in those with PNI>45, 68.8% in those with PNI>40 and 78.9% in those with PNI<40.

There was no statistically significant correlation between PNI categories and pre-assessment of nutrition (p=0.177). The rate of pre-assessment was 44.4% in those with PNI>50, 68% in those with PNI>50, 68% in those with PNI>45, 75% in those with PNI>45, 75% in those with PNI>40 and 61.9% in those with PNI<40.

There was no statistically significant relationship between PNI categories and pain assessment status (p=0.508). The rate of those with moderate pain was 3.7% in those with PNI>50, while no one with pain was found in other categories (Table 2).

Table 2. Examination of the relationship between the PNI categories and the categorical values of the participants

	PNI				Test Request.	p*
	PNI>50	50>PNI>45	45>PNI>40	PNI<40		
Press Evaluation						
There is	3 (11.1)	2 (7.7)	5 (31.3)	3 (14.3)	4,859	0.182
None	24 (88.9)	24 (92.3)	11 (68.8)	18 (85.7)		
Home Health Main Disease						
Respiratory	0 (0)	2 (8)	1 (6.3)	0 (0)		
cardiovascular	5 (18.5)	5 (20)	4 (25)	2 (9.5)		
Digestion	1 (3.7)	0 (0)	0 (0)	0 (0)		
Neurological	11 (40.7)	12 (48)	5 (31.3)	8 (38.1)	13,326	0.772
urogenital	0 (0)	0 (0)	0 (0)	1 (4.8)		
Other	5 (18.5)	3 (12)	3 (18.8)	6 (28.6)		
More than Two	5 (18.5)	3 (12)	3 (18.8)	4 (19)		
Nutritional Status						
Sufficient	27 (100)	24 (96)	16 (100)	21 (100)	2,589	0.459
Insufficient	0 (0)	1 (4)	0 (0)	0 (0)		
Peg Nutrition						
None	25 (92.6)	23 (92)	14 (87.5)	20 (95.2)	0.762	0.859
There is	2 (7.4)	2 (8)	2 (12.5)	1 (4.8)		
Oral Nutrition						
There is	25 (92.6)	23 (92)	14 (87.5)	20 (95.2)	0.762	0.859
None	2 (7.4)	2 (8)	2 (12.5)	1 (4.8)		
Nutrition Product						
There is	3 (11.1)	2 (8)	2 (12.5)	0 (0)	2.66	0.447
None	24 (88.9)	23 (92)	14 (87.5)	21 (100)		
Nasogastric Nutrition						
None	25 (92.6)	25 (100)	15 (93.8)	20 (95.2)	1,829	0.609
There is	2 (7.4)	0 (0)	1 (6.3)	1 (4.8)		
Number of drugs						
one	1 (3.7)	0 (0)	1 (6.3)	1 (5.3)		
2	3 (11.1)	2 (8.3)	2 (12.5)	0 (0)		
3	4 (14.8)	3 (12.5)	0 (0)	1 (5.3)	8,018	0.784
4	4 (14.8)	2 (8.3)	2 (12.5)	2 (10.5)		
More than four	15 (55.6)	17 (70.8)	11 (68.8)	15 (78.9)		
Nutrition Preliminary Evaluation						
Yes	12 (44.4)	17 (68)	12 (75)	13 (61.9)	4,932	0.177
No	15 (55.6)	8 (32)	4 (25)	8 (38.1)		
Nutritional Disruption						
Normal	27 (100)	25 (100)	16 (100)	21 (100)	---	---
Disease Severity						
None	27 (100)	24 (100)	16 (100)	21 (100)	---	---
Nrs Score						
Smaller than 3	27 (100)	23 (100)	16 (100)	21 (100)	---	---
Pain Assessment						

None	26 (96.3)	25 (100)	16 (100)	21 (100)	2,322	0.508
Middle Pain	1 (3.7)	0 (0)	0 (0)	0 (0)		

*Pearson Chi-Square Test; Frequency (Percentage)

The median value of AKSC was 121 in those with PNI>50, 97.5 in those with PNI>50>PNI>45, 123 in those with PNI>45>PNI>40 and 108 in those with PNI<40. A statistically significant difference was found between the median values of the AKŞ parameter of the participants according to PNI categories (p=0.036). No difference was found in multiple comparison results.

The mean value of albumin was 39.5 in PNI>50, 37.79 in 50>PNI>45, 37 in 45>PNI>40 and 30.75 in PNI<40. A statistically significant difference was found between the mean values of the albumin parameter of the participants according to PNI categories (p=0.021). Here, the albumin value of those in the PNI<40 category differs from the other categories.

While the mean value of lymphocyte was 2.38 in those with PNI>50, it was 1.76 in those with PNI>50>PNI>45. A statistically significant difference was found between the mean values of the lymphocyte parameter of the participants according to PNI categories (p=0.045) (Table.3).

Table 3. Comparison of the quantitative values of the participants according to the PNI categories

	PNI				Test Request	p
	PNI>50	50>PNI>45	45>PNI>40	PNI<40		
Age	74.56 ± 20.2 78 (4 - 96)	81.64 ± 10.05 85 (58 - 95)	81.27 ± 8.98 81.5 (60 - 97)	85.24 ± 8.98 87 (55 - 95)	χ^2= 7,651	0.054
Glucose	165.37 ± 107.64 121 (86 - 523)	129.17 ± 70 97.5 (75 - 382)	142.75 ± 52.84 123 (92 - 282)	102.79 ± 26.39 108 (47 - 149)	χ^2= 8,535	**0.036**
Urea	44.78 ± 29.07 37 (15 - 134)	47.8 ± 19.95 45 (22 - 104)	50.81 ± 17.44 50.5 (19 - 81)	47.11 ± 24.88 40 (22 - 101)	χ^2= 3,858	0.277
Na	138.07 ± 4.67 137 (125 - 148)	136.6 ± 4.75 138 (125 - 143)	137.31 ± 4.44 137 (131 - 147)	138.11 ± 3.74 139 (127 - 143)	χ^2= 1,740	0.628
K	4.33 ± 0.58 4 (4 - 5)	4.2 ± 0.45 4 (4 - 5)			L= 6,500	0.693
Ca	9.33 ± 0.58 9 (9 - 10)	9.4 ± 0.85 9.4 (9 - 10)	9.5 ± 0.71 9.5 (9 - 10)		χ^2= 0.542	0.910
Cholesterol	203.85 ± 46.17 199 (108 - 316)	173.87 ± 43.61 165.5 (103 - 251)	185.56 ± 61.97 194.5 (72 - 297)	187.29 ± 46.65 197 (101 - 286)	F = 1.623	0.191
Triglycerides	176.81 ± 127.62 134 (74 - 724)	156.5 ± 62.63 151.5 (43 - 269)	158.44 ± 85.36 150 (47 - 409)	129.53 ± 87.08 106 (54 - 421)	χ^2= 5,189	0.158
Hdl	44.81 ± 15.31 44 (23 - 100)	46 ± 11.87 45 (26 - 83)	43.13 ± 11.24 38.5 (28 - 66)	50.76 ± 27.95 46 (24 - 135)	χ^2= 0.863	0.834
Ldl	122.89 ± 40.91 124 (47 - 215)	99.83 ± 35.59 94 (40 - 168)	119.19 ± 50.8 114 (26 - 225)	111.12 ± 38.78 108 (45 - 184)	F = 1.471	0.229
Lower	15.37 ± 8.03 15 (5 - 33)	10.72 ± 5.12 9 (5 - 23)	16.88 ± 18.5 10.5 (3 - 70)	15.11 ± 17.75 10 (4 - 82)	χ^2= 4,812	0.186
Subordinate	19.48 ± 7.98 19 (7 - 38)	20.88 ± 14.27 15 (10 - 66)	20.75 ± 10.74 17 (8 - 44)	20.79 ± 10.82 18 (12 - 50)	χ^2= 0.748	0.862
Albumin	39.5 ± 6.54b 41 (27 - 45)	37.79 ± 3.38b 38.1 (30 - 41)	37 ± 2.83b 37 (34 - 42)	30.75 ± 2.22a 31 (28 - 33)	F = 3,968	**0.021**
Lymphocyte	2.38 ± 1.08 2.88 (1 - 3)	1.76 ± 0.27 1.72 (2 - 2)			t = 2,331	**0.045**
Hemogram	14.23 ± 2.28 14 (11 - 18)	11.2 ± 1.97 11.7 (9 - 14)		13.4 ± 0.57 13.4 (13 - 14)	χ^2= 4,714	0.194
Over Seventy Age Points	0.77 ± 0.44 1 (0 - 1)	0.86 ± 0.38 1 (0 - 1)	0.75 ± 0.5 1 (0 - 1)	1 ± 0 1 (1 - 1)	χ^2= 1,994	0.574

t: Independent Samples t-Test; U: Mann Whitney U Test; F: One-Way Analysis of Variance; χ^2: Kruskal Wallis Test; ab: There is no difference between groups with the same letter

Other parameters did not differ statistically according to PNI values (p>0.050).

DISCUSSION

Malnutrition is an important problem that negatively affects the quality of life ,early diagnosis is essential to prevent malnutrition and to provide nutritional support. (Serón-Arbeloa, Labarta-Monzón, Puzo-Foncillas, & al, 2022) The European Society for Clinical Nutrition and Metabolism (ESPEN) evaluates psychological, social and biochemical data according to nutritional history in addition to BMI < 18.5 kg/m 2 , BMI < 18.5 kg/m 2 , BMI > 10% or > 5% involuntary weight loss in the last 3 months as the first option to evaluate the clinical status of nutrition. (Rondel, Langius, Schueren, & Kruizenga, 2018)

The Prognostic Nutritional Index was first developed by Mullen et al. to assess nutritional status and postoperative disease status in surgical patients. (Mullen, Buzby, Waldman, Gertner, & al., 1979)

Nutrition plays an important role in chronic wound healing. (García, Chacón, Mora, & Anta, 2021) When we examined PNI values with pressure sores, which we frequently encounter in patients aged 65 years and older, no significance was found between PNI values and pressure sores, unlike the literature. This may be due to different basic clinical characteristics of the patients.

In a review on the effect of nutrition in chronic pain conditions, it was shown that nutrition may be effective on pain due to obesity, increased inflammatory response, disruption of homeostatic balance and affecting pain sensitivity, and the need for new studies in this field was emphasized. (16) In thıs study, only 1 patient reported moderate pain and the PNI value of our patient was found to be above 50. A statistically significant result could not be demonstrated.

It has been shown in various studies that there may be a relationship between nutritional status and polypharmacy and new studies are needed in this field. (García, Chacón, Mora, & Anta, 2021) In our study, no relationship was found between PNI values and polypharmacy.

In thıs study, no significant correlation was found with PNI in any of our nutrition-related parameters such as oral nutrition, NG feeding, nutritional product use, and nutritional adequacy in our patients whose nutritional adequacy status was evaluated with MNA. In a meta-analysis published in 2019 examining the effect of malnutrition markers on clinical status in geriatric patients diagnosed with cancer, it was concluded that PNI alone is insufficient to evaluate cachexia and malnutrition. (Bullock, Greenley, McKenzie, Paton, & Johnson, 2020)

CONCLUSION

In individuals over 65 years of age, we could not determine PNI alone as a suitable tool to assess malnutrition status. Further studies are needed to correlate PNI with nutrition-related parameters such as oral nutrition, nutritional product use, and nutritional adequacy when we evaluate nutritional status.

Acknowledgement
None.

Author Contributions
Plan, design: AA, Mİ, İOK**; Materials, methods, and data collection:** AA, İOK, Mİ, KS**; Analysis and interpretation:** AA**; Writing and critical assessment:** AA, İOK, Mİ, KS.

Conflict of interest
There is no conflict of interest to declare in this study.

Funding
This study was not financially supported.

REFERENCES

Atas, D. B., Tugcu, M., Asicioglu, E., Velioglu, A., & al, e. (2022). Prognostic nutritional index is a predictor of mortality in elderly patients with chronic kidney disease. Int Urol Nephrol., 54(5), 1155-1162. doi:10.1007/s11255-021-03002-6

Bullock, A., Greenley, S., McKenzie, G., Paton, L., & Johnson, M. (2020). Relationship between markers of malnutrition and clinical outcomes in older adults with cancer: systematic review, narrative synthesis and meta-analysis. Eur J Clin Nutr., 74(11), 1519-1535. doi:10.1038/s41430-020-0629-0

Çayır, Y. (2020). Evde Sağlık Hizmetleri. Türkiye Aile Hekimliği ve Birinci Basamak Dergisi, 147-152.

Çayır, Y., & Işık, M. (2012). Terminal dönem kanser hastalarında evde sağlık hizmetleri. Smyrna Tıp Dergisi(2), 87-9.

Franzosa, E., Wyte-Lake, T., Tsui, E., Reckrey, J., & Sterling, M. (2022). Essential but Excluded: Building Disaster Preparedness Capacity for Home Health Care Workers and Home Care Agencies. J Am Med Dir Assoc., 23(12), 1990-1996. doi:doi:10.1016/j.jamda.2022.09.012

García, R. M., Chacón, R. F., Mora, A. L., & Anta, R. O. (2021). La nutrición en la prevención y curación de heridas crónicas. Importancia en la mejora del pie diabético [Nutrition in the prevention and healing of chronic wounds. Importance in improving the diabetic foot]. Nutr Hosp., 38(2), 60-63. doi:10.20960/nh.03800

Karadüz, E. G., & Yurdalan, U. (2021). Does Cardiac Physiology also Take Age in Geriatric Population? Journal of Geriatric Science, 4(3), 93-102. doi:Doi:10.47141/geriatrik.1022619

Liu, T., Zheng, Y., Tang, J., & al, e. (2022, Jan-Dec.). Prognostic Nutritional Index as a Novel Predictor of Long-Term Prognosis in Patients with Coronary Artery Disease After Percutaneous Coronary Intervention. Clin Appl Thromb Hemost. Clin Appl Thromb Hemost.(28), 10760296221103271. doi:10.1177/10760296221103271

Mendieta, M., Geest, S. D., Goderis, G., & al., e. (2022, November 3). . A multi-level perspective on perceived unmet needs for home support in home-dwelling older adults in the Swiss context: a secondary data analysis of a population study. BMC Geriatr., 22(1), 833. doi:doi:10.1186/s12877-022-03479-5

Mullen, J., Buzby, G., Waldman, M., Gertner, M., & al., e. (1979). Prediction of operative morbidity and mortality by preoperative nutritional assessment. Surg Forum(30), 80-82.

Rondel, A., Langius, J., Schueren, M. d., & Kruizenga, H. (2018). The new ESPEN diagnostic criteria for malnutrition predict overall survival in hospitalised patients. Clin Nutr., 37(1), 163-168. doi:10.1016/j.clnu.2016.11.018

Serón-Arbeloa, C., Labarta-Monzón, L., Puzo-Foncillas, L., & al, e. (2022, June 9). Malnutrition Screening and Assessment. Nutrients, 14(12), 2392. doi:10.3390/nu14122392

Silva, C., Carvalho, Figueiredo, M., Silva-Júnior, & al., e. (2019). Health promotion of frail elderly individuals and at risk of frailty. Rev Bras Enferm. Rev Bras Enferm., 72(2), 319-27. doi:http://dx.doi.org/10.1590/0034-7167-2018-0575

Tak, B., Ekizler, F., Kafes, H., Cay, S., & Cetin, E. e. (2020). Low prognostic nutritional index is associated with adverse outcomes in patients with hypertrophic cardiomyopathy. Turk J Clin Lab(11), 136-145. doi:10.18663/tjcl.731609

Toya, Y., Endo, M., Nakamura, S., & al., e. (2019). Long-term outcomes and prognostic factors with non-curative endoscopic submucosal dissection for gastric cancer in elderly patients aged ≥ 75 years. Gastric Cancer(22), 838-844. doi:https://doi.org/10.1007/s10120-018-00913-9

World Health Organization. Ageing and Health. (2022, 04 23). Available from 03 24, 2023 https://www.who.int/news-room/factsheets/detail/ageing-and-health.

Zhang, J., Xiao, X., Wu, Y., Yang, J., & al, e. (2022). Prognostic Nutritional Index as a Predictor of Diabetic Nephropathy Progression. Nutrients., 14(17), 3634. doi:10.3390/nu14173634.