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RESEARCH

DEVELOPING A HOME HEALTH CARE NEED SCALE FOR THE ELDERLY

ABSTRACT

Introduction: This study aims to establish a national scale to determine the dependence of elderly individuals and their need for homecare services.

Materials and Method: Initially, we selected 30 questions. Based on feedback from the specialists, three items were excluded from the questionnaire. Logistic regression analyses were used to determine the items that were more effective of the 27 items for home health care needs assessment in the elderly. The resulting scale comprised nine items. Construct validity was assessed using factor analysis, specifically principal component analysis. A Receiver Operating Characteristic was constructed by calculating the specificity and sensitivity of the scale cut-off values.

Results: According to factor analysis, factors were named "activities of daily living (five items)" and "medical conditions (four items)." Cronbach's alpha value was 0.803. Home Health Care Need Scale for the Elderly scores were highly correlated with Katz Activities of Daily Living(r=-0.907) and Barthel Index (r=0.900) by Spearman's rank correlation analysis. An Area Under Curve of 0.860 was found in our study. The analysis indicated that a cut-off score of two had a sensitivity and specificity of 68.2% and 92.9%, respectively.

Conclusion: The Home Health Care Need Scale for the Elderly is a reliable and efficient scale for determining homecare need. The scale must be administered in larger field studies.

Key Words: Elderly; Homecare Need Scale; Activities of Daily Living; Scale Development.

ARAŞTIRMA

YAŞLILARDA EVDE SAĞLIK HİZMETİ İHTİYACI BELİRLEME ÖLÇEĞİ'NİN GELİŞTİRİLMESİ

ÖZ

Giriş: Çalışma, evde sağlık hizmetlerinin sunumunda ulusal standarttın sağlanabilmesi için bağımlılık düzeyini esas alıp evde sağlık hizmeti ihtiyacını belirleyecek bir ölçek geliştirmesi amacıyla yapılmıştır.

Gereç ve Yöntem: Başlangıç anketi 30 sorudan oluşmakta idi. Uzman görüşleri alındıktan sonra 3 soru anketten çıkarıldı. Kalan 27 soru içerisinden yaşlılarda evde sağlık hizmeti ihtiyacını belirlemedeki daha etkin sorular lojistik regresyon analizi sonuçlarına göre belirlendi. Ölçeğin son hali 9 sorudan oluşmakta idi. Yapı geçerliliğini belirlemek amacıyla faktör analizi yapıldı. Ölçeğin güvenilirliğini belirlemek için, Cronbach alfa iç tutarlılık katsayısı ve madde-toplam korelasyonları hesaplandı. Ölçeğin kestirim değerlerinin duyarlılık ve özgüllüğünü belirlemek amacıyla Reciever Operating Characteric analizi yapıldı.

Bulgular: Kaiser-Mayer-Olkin katsayısı 0.847 olarak hesaplandı. Faktör döndürme sonrasında ölçeğin birinci alt boyutunun 5 maddeden (günlük yaşam aktiviteleri), ikinci alt boyutunun 4 maddeden (tıbbi durumlar) oluştuğu belirlendi. Cronbach alfa katsayısı 0.803 olarak hesaplandı. Yaşlılarda Evde Sağlık Hizmeti İhtiyacı Belirleme Ölçeği, Katz Ölçeği (r=-0.907) ve Barthel indeksi ile yüksek korelasyon gösterdi. Reciever Operating Characteric analizi'nde eğri altında kalan alan 0.860'dı. Ölçeğin kesim noktası 2 olarak belirlenmiş olup, duyarlılığı %68.2 ve özgüllüğü %92.9 olarak saptandı.

Sonuç: Yaşlılarda Evde Sağlık Hizmeti İhtiyacı Belirleme Ölçeği evde sağlık ihtiyacını belirlemede kullanılabilecek etkili ve geçerli bir ölçektir. Ölçeğin daha geniş gruplarda uygulanması önerilmektedir.

Anahtar Sözcükler: Yaşlı; Evde Bakım Ölçeği; Günlük Yaşam Aktiviteleri; Ölçek Geliştirme

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Introduction

As life expectancy increases, it is obvious that the number of chronically ill and bedridden patients will increase (1). To address this situation, different models of healthcare are being proposed. One model is to provide homecare for elderly patients in their homes (2). The notion of homecare began with changes in social characteristics. Homecare for elderly patients must be coherent with social services, responsive to the needs of the society, consistent with standards, and should be applicable to a large portion of society with the resources at hand (3).

Although Turkey has a fast aging population, it has only recently started to provide this service (4). Homecare was pioneered in the private sector, however, it is provided by local authorities, private healthcare institutes, private homecare establishments, and government-owned hospitals' homecare facilities. However, accessing these facilities is problematic in rural areas and suburbs. This problem can only be solved by integrating homecare into primary care health services (5).

Providing standardized homecare requires determining the population who is in need of this service. As in many other countries, no standard determination method for elderly homecare services exists in Turkey. The reason for this is that there is no objective, scientific determination scale describing homecare services. Some scales are being developed to evaluate systemic diseases in determining the need for homecare. However, no scale exists to determine patient dependence on others to obtain primary care.

The purpose of this study was to establish a national scale to determine the dependence of elderly individuals and their need for homecare services.

Materials and Methods

Study Group

The study was conducted in Eskisehir where the majority of people are engaged in agriculture in rural areas and industry is located in Central Anatolia, Turkey. The total population is 781,247, and the population over 65 years of age is 80,086 (10.0%). Of the residents, 83% live in the city center and 17% live in rural areas.

There are two universities and a medical school in Eskisehir. Health education and research in Eskisehir is conducted at the Public Health Department of Eskisehir Osmangazi University Medical School Education and Research Regions (ESOGU-ERR), which engages in community-based research. ESOGU-ERR includes four semi-rural areas (Sivrihisar, Beylikova, Mahmudiye, Alpu). During the study period, we reached out to all households (n = 7,524) and interviewed 2,915 (38.7%) households in ESOGU-ERR. The demographic characteristics of 9,855 individuals were recorded. The study was performed on 1,018 (10.3%) individuals who were aged 65 years and above.

Procedure

The study was reviewed and approved by the Ethics Committee and the relevant institutions. All participants gave informed consent. Participants completed a questionnaire on socio-demographic characteristics, including age, sex, socioeconomic status, family status, personal care status, smoking status, use of medical consumables (Foley catheter, nasogastric tube, colostomy bag, dialysis catheter, intravenous catheter, cystoscopy catheter, and percutaneous endoscopic gastrostomy), medical equipment (respiratory apparatus, wheelchair, air bed), and status of physician-diagnosed diseases.

The questionnaire also included the Katz index of independence in activities of daily living (Katz ADL) and the Barthel index (BI).

The Katz ADL has been used to quantify independence in ADL across a wide range of patient populations. Functional disability was measured in terms of limitations in daily activities using the Katz ADL; the included items were bathing, transferring, dressing, toileting, continence, and feeding. The response categories provided were "independent" (the person needs no help), "semi-dependent" (the person needs minimal help to perform the activity), or "dependent" (the person needs assistance to perform the activity) (6).

The BI comprises ten items: feeding, moving from wheelchair to bed and vice versa, getting on and off the toilet, bathing, walking on a level surface, ascending and descending stairs, dressing, and controlling bowels and bladder (7). Each item is scored on a three-point scale, where 0=completely dependent, 1=some help needed, and 2=completely independent. Items are weighted and summed to yield a score ranging from 0 to 100, where higher scores indicate total independence. The BI has also been translated into Turkish by Kucukdeveci et al. The Cronbach's α value for the BI was 0.93 (8).

The questionnaire was completed by the researchers using a face-to-face conversation method. Physicians experienced in homecare services examined all participants. Examination findings (state of consciousness, patient's general appearance,

state of being bedridden, and state of oral intake) were noted. Physicians determined the homecare needs of individuals according to the medical examination, values of the ADL indexes, and patient history. Information was obtained during a 25–30 min period.

Evaluation of the Home Health Care Need Scale for the Elderly (HHCNSE)

The HHCNSE comprises two parts: activities of daily living and medical conditions. The HHCNSE items related activities of daily living were prepared based on the Katz ADL and BI, the most commonly used and accepted indexes. We selected 30 questions from the Home-Based Long-Term Care report by the WHO (2000) for home health care needs and criteria from the Public Health Institution of Turkey to determine the item-related medical conditions (9,10).

Ten specialists' (four epidemiologists, five physicians in homecare services, and one language specialist) opinions on the questionnaire were obtained. According to the specialists, three items were unnecessary and were excluded from the questionnaire. Logistic regression analyses were used to determine the items that were more effective of the 27 items for home health care needs assessment in the elderly. Home health care need status was the dependent variable in the model. The scale was developed by combining the items with test values of $p<0.01$. The resulting scale comprised of nine items. Specialists assessed the content validity of the scale. According to this assessment, the specialists reported that the scale had suitable content, expression, and scope.

Factor Analysis

To determine the qualities measured by the scale and examine the meaning of the total scores, construct validity was assessed using factor analysis, specifically principal component analysis. To assess the adequacy of sample size Kaiser-Meyer-Olkin (KMO) test was applied. The KMO result was >0.50, and factor analysis was performed.

Because all the items exhibited factor loadings of >0.40 in the analysis(11), there was no need to remove items. Of the available factor rotation methods, the equamax rotation method was selected. According to factor loadings obtained from the factor analysis, items pertained to a sub-dimension according to their maximum factor weight. Two sub-dimensions were identified by the factor analysis.

Internal Consistency

Cronbach's alpha coefficient and item-total correlations were calculated to analyze the reliability of each subscale. Items greater than 0.20 of total item correlation were considered reliable. Correlation analysis was used to assess internal consistency reliability. The correlation coefficient must not be negative or below 0.20. Items were divided into two groups according to if items were single or double, and consistency between the two groups was tested using Spearman's correlation analyses.

Discriminative Validity

The BI and Katz ADL serve as indicators of functional limitation. The scores of these indexes were compared to the HHCNSE to assess the validity of the HHCNSE by Spearman's correlation. The discriminative validity of the scale compares the group scores.

In testing the construct validity of the scale, the following hypothesis was established: median HHCNSE scores will be higher for individuals for whom physicians recommend home health care need(s) than for people who have not received such a recommendation. Therefore, the total scores of the study group were compared using a Mann-Whitney U test.

Scoring

The final scale comprised nine items with two sub-dimensions. Each item was worth 1 point. The maximum score was 9 for the entire scale, 5 for the activities of daily living sub-dimension, and 4 for medical conditions. The minimum score was zero for the entire scale and sub-dimensions.

In the first sub-dimension of the scale (activities of daily living), each item was scored on a two-point scale, where 0=completely independent and 1=completely dependent. In the second sub-dimension of the scale (medical conditions), each item was also scored on a two-point scale, where 0=no use of medical consumables and 1=use of medical consumables; 0=clear consciousness and 1=closed consciousness; 0=not bedridden and 1=bedridden; 0=no use diaper and 1=use diaper. The reference standard was the present home health care need(s) decision of the physician. A receiver operating characteristic (ROC) curve was constructed by calculating the specificity and sensitivity of the scale cut-off values, and the area under the curve (AUC) was computed. The optimal cut-off point was defined as the point at which the sum of sensitivity and specificity was maximal.

Statistical Analysis

IBM SPSS Statistics for Windows, Version 20.0. (IBM Corp. Armonk, NY) was used for the data analysis. The demographic characteristics of the study group were reported using descriptive statistics (frequencies, proportions, means, medians) and dispersion measures (standard deviation, min-max). Initially, the normality of the total scores was tested using the Kolmogorov-Smirnov normality test and graphs. Therefore, the median scores were compared using Kruskal Wallis (and Bonferroni's ad hoc test) and Mann-Whitney U tests.

RESULTS

The study group comprised 1,018 (10.3%) participants aged over 65 years old. Of these, 443 (43.5%) were male and 575 (56.5%) were female. The mean age of the participants was 73.8± 6.62 (range 65–98 years). Of the participants, 764 (75.0%) lived alone or with their partner, and 254 (25%) lived with their extended family. Physicians in the study team determined that 267 (26.3%) of the participants needed homecare.

The logistic regression model determining the HHCNSE items for home health care need assessment is presented in Table 1.

The construct validity of the HHCNSE was assessed using factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.847. Bartlett's test of sphericity was significant (x^2=2876.1, df=36, p<0.001). According to the results, HHCNSE extracted two factors whose eigenvalues were greater than 1.0, which accounted for 54.1% of the variance in scores. There was no need to remove any items. It was determined that the first sub-dimension comprised five items (one–five items) and the second sub-dimension comprised four items (six–nine items). The first sub-dimension factor loadings varied between 0.408 and 0.857, and the second sub-dimension factor loadings varied between 0.544 and 0.763. The factors were named "activities of daily living" and "medical conditions." The items included in the final scale, along with their factor loadings, variance, and Cronbach's

Table 1— Logistic Regression Model Determining the HHCNSE Items for Home Health Care Need Assessment.

HHCNSE items	p	OR	95%CI
Feeding	<0.001	12.425	8.44-18.28
Self-Care	<0.001	19.358	13.24-28.30
Bathing	<0.001	3.557	2.42-5.24
Toileting	<0.001	33.260	21.45-51.58
Transferring	<0.001	19.956	14.07-28.30
Consciousness	<0.001	17.709	6.76-46.38
Being bedridden	<0.001	37.855	13.47-106.41
Using diaper	<0.001	37.860	13.46-106.41
Using medical equipment	<0.001	9.474	3.74-23.99

Table 2— Items Included in the Final Scale and Factor Loadings, Variance and Cronbach's Alpha Scores for Each Item.

Sub-dimensions	Items	Factor Loading	
		1	2
Activities of Daily Living	Feeding	0.709	
Explained Variance:%33.059	Self-Care	0.830	
Cronbach's alpha: 0.818	Bathing	0.408	
	Toileting	0.857	
	Transferring	0.851	
Medical Condition	Consciousness		0.656
Explained Variance:%21.014	Being bedridden		0.763
Cronbach's alpha: 0.763	Using diaper		0.544
	Using medical equipment		0.648
Total Variance: %54.073	**Total Cronbach's alpha:** 0.803		

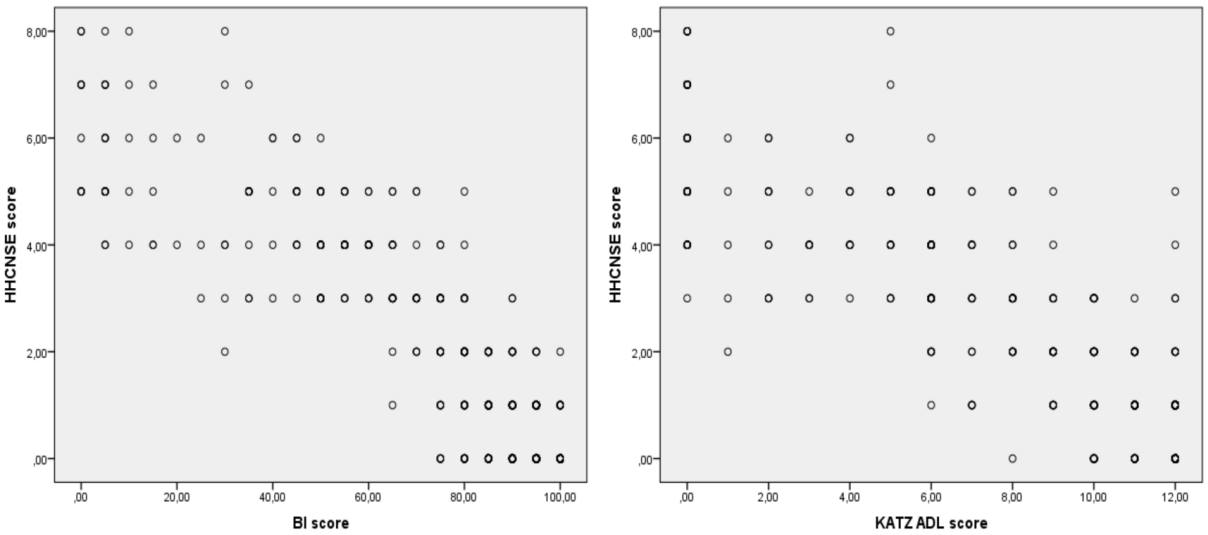

Figure 1a and 1b— A scatter plot of the HHCNSE with BI and Katz ADL scores.

alpha scores, are presented in Table 2.

Internal consistency was assessed by calculating Cronbach's alpha, and the value was 0.803 for HHCNSE. The deletion of any item from the questionnaire produced Cronbach's alpha values that ranged between 0.747 and 0.811. The Cronbach's alpha values for the activities of daily living and medical conditions subscales were 0.823 and 0.611, respectively. The corrected item-total score correlation coefficient was a minimum of 0.267 and a maximum of 0.776, which was significant. The results of the split half reliability between the even -and odd- numbered items yielded a Spearman's correlation coefficient of 0785; p <0.001.

In terms of discriminative validity, HHCNSE scores were highly correlated with Katz ADL (r=-0.907; p<0.001) and BI (r=-0.900; p<0.001) by Spearman's rank correlation analysis. Scatter plots of the HHCNSE with Katz ADL and BI scores are shown in Figures 1A and 1B.

The mean, standard deviation, median, and min-max of total scores taken from the scale were 1.03±1.72 and (0–8). We used a ROC curve to determine the cut-off point for HHCNSE. HHCNSE score of two generates the best cut-off point at which the sum of sensitivity and specificity was maximum (Table 3). An AUC of 0.860 (95%CI=0.827–0.881) was found in our study. The analysis showed that a cut-off score of two had a sensitivity and specificity of 69.1% (95% CI=63.1–74.6) and 93.0% (95% CI=90.9–94.7), respectively. Finally, according to the results, home health care should be considered for individuals with HHCNSE scores of two or higher. The ROC curve for HHCNSE and physician-recommended home health care is shown in Figure 2.

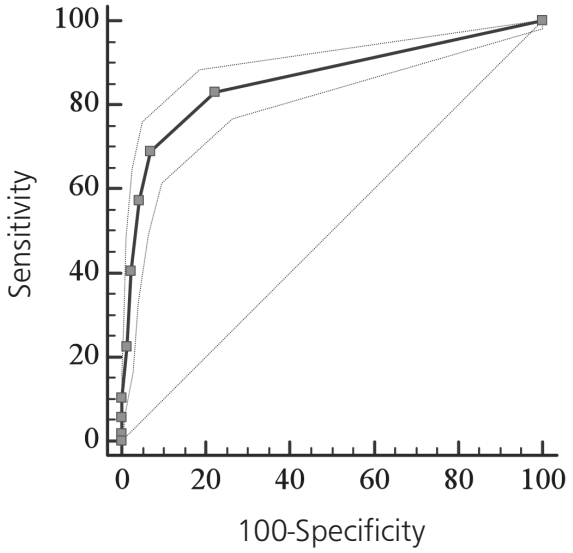

Figure 2— ROC curve for HHCNSE and physician-recommended home health care.

As a last fact, the distributions of physician-recommended home health care with HHCNSE, Katz ADL, and BI are presented in Table 3.

Table 2— The Distribution of Physician-recommended Home Health Care With HHCNSE, Katz ADL and BI.

	Home Healthcare Need				
	Yes		No		
	Median	Min-Max	Median	Min-Max	Test Value (Z, p)
BI	100	5-100	65	0-100	Z=8.76; p <0.001
Katz ADL	18	6-18	13	6-18	Z=20.60; p <0.001
HHCNSE					
Activities Of Daily Living	0	0-5	3	0-5	Z=20.05; p <0.001
Medical Condition	0	0-2	0	0-3	Z=11.24; p <0.001
Total	0	0-6	3	0-8	Z=20.01; p <0.001

Discussion

Turkey is a country that is initiating homecare services. The planning must start by identifying those in need of these services. In this study, we aimed to develop a scale to determine the need for home health care in semi-rural areas among the elderly.

Globally, 23% of morbidity and mortality occurs among individuals who are 60 years of age or older. A large proportion of this burden is due to chronic illnesses (12). As life expectancy increases, temporary and permanent disabilities arising from these chronic illnesses also increase. The initiation of homecare has led elderly patients to prefer accessing healthcare through homecare rather than hospitals.

The results of The National Home and Hospice Care Survey, a social survey, state that 70% of homecare is given to individuals over 65 years of age (13). Therefore, the study focuses on the need for homecare in the elderly population.

Turkish traditions promote the care of the elderly be undertaken by their children. However, migration to urban areas and increasing female employment has led to a period of elderly people living on their own, and this is considered a major problem for the elderly. Informal care provided to these elderly people must be transformed to formal care in a standardized way by first determining those who are in need of this service. According to previous studies, individuals living in rural areas are in lower socioeconomic brackets, are older and have a higher incidence of hypertension, arthritis, diabetes, and heart-related illnesses. Additionally, it is reported that these individuals usually access healthcare via emergency services. Rural areas have access only to governmental primary care health services, whereas urban areas have other facilities and institutions that provide health care services. Therefore, the provision of homecare services must start in rural areas (14). According to a study conducted by McAuley et al, it is significantly easier to access homecare in urban areas compared to rural areas (15). Another issue is increasing the quality of informal care through integration with formal institutions. To produce standardized, healthy, and functioning homecare, individuals in need of this service must be identified in an efficient manner.

The lack of a scientific and objective evaluation procedure for determining the recipients of homecare services is the main reason for unequal and unjust homecare. Japan is the most important country that has implemented an objective evaluation procedure. In Japan, forms completed by applicants divide patients into six different homecare groups (16). In Europe, the ASIM system evaluates patients' dementia status, personal safety perceptions, urinary incontinence, movement ability, social care status, residence quality, residence usability, and functional capacity (17). In Turkey, bedridden status, consciousness state, usage of medicinal equipment, medical state, nutrition, self-care, movement, washing, and dressing are considered regardless of social care status. In this study, standard criteria in the HHCNSE have been developed for planning the homecare system and effective usage of health labor.

For internal consistency, Cronbach's alpha should be higher than 0.70. Dividing the test questions into two groups by even and odd question numbers resulted in acceptable correlation levels. The correlation between items and the whole test was evaluated. The acceptable correlation value was 0.20 (18); in our study, the total correlations were between 0.26 and 0.78.

The Katz ADL and BI were used to compare the developed scale and test results. The Katz ADL and BI are the most

frequently used scales for the evaluation of dependence. In this study, the Pearson product moment correlation coefficients between scale total score and Katz ADL and BI scores were sufficient (-0.907 and -0.900, respectively). Medical homecare must be provided to everyone in need of it, regardless of family care at home. Evaluations of patients' independence and medical situation are important in determining their need for homecare. The inclusion of these factors in population screening will result in the just allocation of homecare. As stated by Anderson and Newman, medical state and handicap status are the most important factors in providing homecare. In many studies, patients not receiving homecare indicated that they felt more functional and healthy compared to homecare patients(19).

When observing HHCNSE's constructional validity, the varimax axle rotation technique was used in factor analysis. Two factors stood out in the result of the analysis. The ROC analysis for approximation value showed that the area under the curve was 86%. The HHCNSE successfully evaluated 86% of the population's need for homecare, and the scale is an efficient tool for this purpose (20).

As a conclusion, the HHCNSE is a reliable and efficient scale for determining homecare need. The scale must be administered in larger field studies.

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