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DETERMINING THE FACTORS AFFECTING THE FREQUENCY OF VISITS OF HOME HEALTHCARE PATIENTS

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Abstract

Aim: This study aims to determine the factors affecting the frequency of visits for patients benefiting from home healthcare services.

Methods: The sample of the study consisted of 1,454 patients received home healthcare service uninterruptedly for 12 months in 2019. Linear and log-linear regression methods were used to identify the factors affecting the number of visits in a year, and the statistical significance was evaluated at $p<0.05$ level.

Findings: The majority of the patients were 80 years and older (60.3%), female (68.4%), and fully dependent (55.1%). Cardiovascular and neuropsychiatric diseases were very common among patients

(82.9% and 76.3%, respectively). We identified that the need for INR test, having decubitis ulcer, using urinary catheter, demand for oxygen therapy or enteral nutrition, and having a neuropsychiatric disease significantly increase the number of visits by 62%, 51%, 37%, 25%, 17%, and 17%, respectively.

Conclusion: Several clinical features affect the number of services received during the year. The findings of this study are of great importance in terms of modeling studies aimed at improving home healthcare services and predicting future needs.

Keywords: *Home Healthcare, Home Care, Patient Visits, Care Needs.*

Introduction

Home healthcare is a type of care that is provided at home by healthcare professionals under the direction of a physician (Ellenbecker, et., al 2008). This type of care includes nursing care, home healthcare aides, physical therapy, occupational and speech therapy, and medical social services (Welch, et., al 1996; National Research Council, 2010).

Health care services are being directed toward homes recently. The emergence of various health needs due to old age, the decrease in hospital stay and the continued need for care after discharge, new reimbursement arrangements of insurance companies, and technological developments that allow more complicated home care are the most important reasons for this development (Bruce, et., al 2002; National Research Council, 2011). Besides, the fact that patients and their families are more aware of the advantages and availability of home healthcare services is another factor increasing this demand (Decker and Park-Lee, 2010).

1. Literature

Home healthcare services are getting important day by day not only in Turkey but also throughout the world. Ministry of Health drafted a directive in 2010 to provide effective, efficient, friendly, and human-centered health services by health institutions and organizations to the individuals in need in their homes and family environment (Ministry of Health, 2010). As a result, home healthcare units were established in public hospitals, and a total of 1 million 437 thousand patients benefited from this service until December 2019 (Ministry of Health (a)).

The majority of those patients benefit from home healthcare services are over 65 years of age (Han, et., al 2013; Caffrey, et., al 2011). Most of them have single or multiple chronic diseases including heart and circulatory system diseases, endocrine and metabolic diseases, immune disorders, musculoskeletal and connective tissue diseases, and also diabetes mellitus (NAHC, 2010; Ellenbecker, et., al 2008; Avalere Health, 2019).

It is estimated that the number of people who will need some form of long-term care will nearly be doubled by 2050 (Bercovitz, et., al 2007). According to the estimates developed by the Office of the Assistant Secretary for Planning and Evaluation of U.S. Department of Health & Human Services, the elderly population will increase as the baby boomers generation reaches the age of 85 after 2030. A small increase in the size of 25-54 age group is also expected between 2000 and 2050 (ASPE, 2003). Together with the prolongation of life expectancy, the decreasing birth rates and changing situation in the age structure show that the young population that can provide care to the elderly who need care will not be sufficient in the future (Rest, et., al 2012). Besides, home health care agencies in the USA have difficulty meeting the increasing demand due to nurse shortages (Ellenbecker, 2004). The scarcity of health resources in response to the increasing patient demand necessitates the effective management of this service.

Not only the shortage of service employees is an important problem, but also the services that require an extensive number of home visits increase the financial burden of agencies. For this reason, agencies look for ways to reduce visits while achieving quality results (Terry, et., al 2009). For example, the forward payment system in Medicare-financed home healthcare services in the USA varies according to patient characteristics, including the patient's clinical status, functional status, and need for rehabilitation treatment services. There is a mix of 153 categories of cases to determine payment rates (NAHC, 2010). This lump sum is designed to cover the costs of managing all aspects of patient care, including skilled care visits, support services, and supplies (Schwien, et., al 2005).

Welch et al. (1996) stated that the primary criterion for the use of home healthcare services was the number of visits, as opposed to the number of people receiving care or care episodes. In Turkey, there have been many studies investigating the demographic characteristics of patients benefiting from home healthcare and the reasons for using such services (Catak, 2012; Limnili and Ozcakar, 2013; Cayır, 2013; Karaman, et., al 2015). However, there is a lack of studies investigating the factors affecting the frequency of visits. It is thought that detailed studies regarding the frequency of visits according to patient-specific characteristics will contribute to literature to plan (or manage) the policies of home healthcare. This study aims to determine the factors affecting the frequency of visits for patients benefiting from home healthcare services. The research question

was determined as; "whether the frequency of visits for patients varies according to the service provided to the patients?".

2. Research Methodology

The population of the study consists of patients registered to Uskudar State Hospital Home Healthcare Coordination Center in Istanbul Province to obtain home healthcare services. There are approximately twenty thousand registered patients in the center. The center performs about 3000 visits per month. The registered patients are mostly over 65 years of age and most of them are half or fully dependent individuals with multiple chronic diseases. The patients need various care including urinary catheter, decubitis ulcer, oxygen therapy support or enteral nutrition needs.

This study was performed under the ethics committee approval by Yüksek Ihtisas University Ethics Committee (27/10/2020 Date and 2020/12/02 number). We considered those patients who received home healthcare service uninterruptedly for 12 months in 2019. Patients who received service before 2019 and those received services for less than 12 months were not included in the study. The sample of the study consists of randomly selected 1500 patients among those enrolled in the Center. The patients' data were extracted from the hospital information management system (HBYS) and provided to the researchers in anonymized form. During the pre-analysis of anonymous data, 64 patients were excluded from the study due to insufficient data.

In the analyses, the number of visits in a year and its log-transform were considered as the dependent variables. Age, gender, dependency level, presence of decubitis ulcer, presence of urinary catheter, enteral nutrition status, oxygen therapy status, presence of tracheostomy cannula, INR blood test follow-ups, and presence of systemic chronic diseases were evaluated as potential factors, and included in multivariate regression models as the independent variables (i.e., regressors).

In order to identify the factors affecting the number of visits, multivariate linear and log-linear regression methods were used. Initially, the ordinary least squares estimation was performed. Since the outcome variable (the number of visits) was not normally distributed[1] a logarithmic transformation was applied to normalize the variable of interest (Tobin, 1958). Then, a log-linear

[1] As the outcome variable (number of visits) can not take the values below zero, in other saying it is left censored, Tobit estimations have also been performed. Since the obtained marginal effects from Tobit estimations are not significantly different from OLS coefficients, the results are not presented in the study.

estimation was performed for the log-transformed outcome variable by the authors. The models were illustrated in the formula below:

$$y = \beta_0 + \beta_k X_k + u$$

where y depicts the outcome variable (i.e., the number of visits or its log-transform), X_k refers to kth regressor used in the model, β_k illustrates the impact coefficient for the *kth* regressor on the outcome variable, β_0 demonstrates the regression constant and u bears the effects that cannot be identified by the model.

3. Analysis

A total of 1454 patients were included in the study. The average age of the patients was 78.3 years (SD=15.02). A total of 8058 visits were made to the patients within a year. The average number of visits per patient was 5.54 (SD = 4.79; min = 1, max = 51).

The distributions of the patients according to their demographic characteristics and care needs are demonstrated in Table 1. The majority of the patients (60.3%) were at 80 years of age or above. Besides, most of them were female (68.4%) and fully dependent (55.1%). As for their health status indicators, 13.1% of the patients had decubitis ulcer, 19.7% were using urinary catheter and 6.6% had tracheostomy cannula. Additionally, 3% of the patients received home healthcare services need oxygen therapy, 9.4% of them need blood tests for INR monitoring regularly, and 16.6% were fed enter ally.

Table 1: Distribution of Demographic and Care Needs of Patients

Variable		**n**	**%**
Age	0-64 age	183	12.6
	65-79 age	394	27.1
	80+ age	877	60.3
Gender	Female	995	68.4
	Male	459	31.6
Dependency	Independent	17	1.2
	Half Dependent	636	43.7
	Fully Dependent	801	55.1

Decubitus Ulcer	Yes	191	13.1
	No	1263	86.9
Urinary Catheter	Yes	287	19.7
	No	1167	80.3
Enteral Nutrition	Yes	242	16.6
	No	1212	83.4
Tracheostomy Cannula	Yes	96	6.6
	No	1358	93.4
Oxygen Therapy	Yes	44	3.0
	No	1410	97.0
INR Blood Test	Yes	136	9.4
	No	1318	90.6

When the patients were categorized according to the diagnosis of any systemic diseases, we observed that cardiovascular diseases and neuropsychiatric diseases were very common among patients with %82.9 and %76.3, respectively (Table 2).

Table 2: Distribution of Patients by Disease Diagnosis

Variable		**n**	**%**
Cardiovascular system	Yes	1206	82.9
	No	248	17.1
Metabolic system	Yes	541	37.2
	No	913	62.8
Urinary system	Yes	96	6.6
	No	1358	93.4
Respiratory system	Yes	246	16.9
	No	1208	83.1
Oncological system	Yes	88	6.1
	No	1366	93.9
Neuropsychiatric system	Yes	1109	76.3
	No	345	23.7
Cerebrovascular system	Yes	54	3.7
	No	1400	96.3

According to the results of the multivariate linear regression analysis, the average number of visits for patients who do not need any care and who have not been diagnosed with any systemic disease examined within the scope of the study, was found to be 3.24 visits per year The linear regression analysis indicated statistically significant associations between the frequency of visits and having decubitis ulcer ($p<0.001$), using urinary catheter ($p<0.001$), presence of INR test ($p<0.001$), and need for oxygen therapy ($p=0.036$). Having decubitis ulcer or using urinary catheter increased the number of patient visits by a factor of 5.1, and 2.6, respectively. Moreover, the number of visits was increased 3.3-fold with the presence of INR test tracking, 2.4-fold with the need for oxygen therapy, and 0.6-fold under diagnosis with a neuropsychiatric disease. On the other hand, there was no significant relationship between the frequency of visits and other clinical features of the patients, such as age, gender, patient dependency level, and having a tracheostomy cannula ($p>0.05$). In terms of systemic diseases; there is no statistically significant relationship between the frequency of visits and six chronic diseases, namely cardiovascular system, metabolic system, urinary system, respiratory system, oncological system, cerebrovascular system diseases ($p>0.05$) (Table 3, First Column).

Table 3: Explained regression coefficients for patients who received home healthcare service uninterruptedly for 12 months in 2019.

	Number of Visits	***log* (Number of Visits)**
Age (65-79)	-0.263	0.035
	(0.532)	(0.064)
Age (80+)	-0.586	-0.011
	(0.525)	(0.063)
Female	0.511	-0.037
	(0.247)	(0.035)
Half Dependent	0.037	-0.018
	(0.674)	(0.141)
Fully Dependent	0.419	0.167
	(0.684)	(0.141)
Decubitis Ulser	**5.074*** **	**0.513*** **
	(0.638)	(0.059)
Urinary Catheter	**2.590*** **	**0.373*** **

	(0.392)	(0.042)
Enteral Nutrition	0.720	**0.171*** **
	(0.391)	(0.044)
Tracheotomy Cannula	0.695	0.084
	(0.728)	(0.068)
INR Test	**3.331*** **	**0.616*** **
	(0.365)	(0.047)
Oxygen Treatment	**2.354** **	**0.246** **
	(1.121)	(0.106)
Cardiovascular System	0.171	0.071
	(0.403)	(0.048)
Metabolic System	0.169	0.039
	(0.215)	(0.033)
Urinary System	0.434	0.104
	(0.410)	(0.062)
Respiratory System	-0.208	-0.007
	(0.274)	(0.042)
Oncological System	0.016	-0.001
	(0.390)	(0.063)
Neuropsychiatric System	**0.644** **	**0.174*** **
	(0.258)	(0.041)
Cerebrovascular System	0.829	-0.047
	(1.12)	(0.104)
Constant	**3.236*** **	**0.949*** **
	(0.942)	(0.161)
Number of Observations	1454	1454
F-value	14.32	29.64
R-squared	0.3	0.29

*** p<0.001, **p<0.01, *p<0.05.

According to the results of the log-linear regression analysis with log-transformation of the outcome variable (the number of visits), enteral nutrition was also found to be statistically significant with the number of patients visits ($p<0.001$) in addition to the resultant factors of the previous analysis (i.e., linear regression) The analysis results showed that the number of annual visits increased by 62% with INR test, 51% with decubitis ulcer, 37% with urinary catheter, 25%

with oxygen therapy, 17% with enteral nutrition and 17% with the presence of neuropsychiatric disease (Table 3, Second column).

4. Conclusion/Discussion and Recommendations

Home healthcare services consists of different activities. Jones et al. (2012) found that services commonly used by home health care patients aged 65 and over were skilled nursing services (84%), physical therapy (40%), assistance with daily living activities (ADLs) (37%), at home care services (17%), occupational therapy (14%), wound care (14%) and dietary counseling (14%).

Detailed characterization of the factors (i.e, demographic and clinical features of patients) and evaluation of their impact on the number of visits, i.e. the primary criterion for the use of home healthcare services (Welch, et., al 1996), are critical in policy development, planning, and management of home healthcare services. On the other hand, these factors are population-dependent. Despite studies investigating the demographic characteristics of patients benefiting from home healthcare in Turkey (Catak, 2012; Limnili and Ozcakar, 2013; Cayır, 2013; Karaman, et., al 2015), the potential impacts of demographic and clinical features of patients on the frequency of visits were not investigated comprehensively under a large sampling. Therefore, in the present study, we aimed to determine the factors affecting the visit frequency of patients benefiting from home healthcare services via employing a comprehensive dataset including the demographic characteristics, care needs, and diagnostic features of 1454 patients who received home healthcare service for at least 12 months in 2019.

In the study, most of the participants (60.3%) were 80 years old or older, and mean value of age was (78.04 years±15.2) in accordance with the age distribution of the previous samplings, in which the mean value of age was observed as 78.3 ± 15.02 (Han, et., al 2013), 85.5 ± 6.3 (Gjevjon, et., al 2013), 74.80 ± 18.60 (Cubuklu and Yazicioglu, 2016), 68.7 ± 19.2 (Cayır, 2013), 69.2 ± 17.8 (Korkmaz, et., al 2016), 67.9 (Akdemir, et., al 2011), 77.1 ± 15.6 (Uzan, et., al 2017), and 74.9 ± 15.4 (Hisar and Erdogdu, 2014) years old. Furthermore, the majority of the patients (68.4%) were female. Similar to our study, the rate of female patients was higher than that of male patients in previous samplings (Gjevjon, et., al 2013; Chang, et., al 2010; Çayır, 2013; Gumus and Sarıbas, 2017; Korkmaz, et., al 2016; Akdemir, et., al 2011; Uzan, et., al 2017; Karaman, et., al 2015; Hisar and Erdoğdu, 2014; Artantas and Koroglu, 2019). Based on these observations, we concluded that the female patients over 65 years old benefited most from the home healthcare services (Han, et.,

al 2013; Gumus and Sarıbas, 2017; Akdemir, et., al 2011; Karaman, et., al 2015; Artantas and Koroglu, 2019).

In our study, about half of the patients (55.1%) were fully dependent, whereas 43.7% were half dependent and only 1.2% were independent, consistent with the samplings by Cubuklu and Yazicioglu (2016) and Korkmaz et al. (2016), which reported similar percentages for fully dependent patients, i.e., 61.2% and 42.4%, respectively.

We determined the average number of visits per person per year as 5.54 (SD=4.79; min=1, max=51). This finding obtained in our study shows a little higher results to previous studies conducted in Turkey. Isik et al. (2016) found that the frequency of receiving care of 40.4% of the patients was 4 or more times. Cubuklu and Yazicioglu (2016) stated that patients used home healthcare services an average of 2.51 times annually, another study reported that services were provided 2.06 times for each patient (Artantas and Koroglu, 2019). On the other hand, it was observed that the average number of visits was higher in studies conducted abroad. For instance, in a study conducted in Taiwan in 2004, it was observed that 19,483 (0.9%) patients received home healthcare services with an average of 6.0±4.8 visits per person (Chang, et., al 2010). Gjevjon et al. (2013) stated that, the number of care visits varied between 11 and 190, with an average of 51 visits (median 50) during the 4-week data collection in their study in Norway.

In this study, we also observed that cardiovascular diseases and neuropsychiatric diseases are very common among patients (%82.9 and %76.3, respectively), who need home healthcare services. However, this should be population-dependent since previous investigations presented diverse findings. For instance, Karaman et al. (2015) reported that 51.6% of patients had neurological, 12.8% respiratory system, 7.3% endocrine system, 7.2% cardio-vascular system, 6.4% has oncological, 6.3% orthopedic and traumatological, 2.8% muscle, 3.3% psychiatric, 0.9% gastrointestinal system, 0.6% hematological, 0.5% urinary system and 0.2% had other diseases groups. Several studies showed that the incidence of cerebrovascular disease was higher among patients (Chang, et., al 2010; Hisar and Erdogdu, 2014; Korkmaz, et., al 2016). In the report by the National Association for Home Care & Hospice (2010), it was indicated that the first 5 highest ICD diagnoses among home healthcare patients in 2000 were diabetes, decubitis ulcers, essential hypertension, heart disease, and osteoarthritis.

It has been observed that the health problems and care needs of patients who benefit from home healthcare services are very similar even in different populations (Korkmaz, et., al 2016; Akdemir, et., al 2011; Westra, et., al 2013). In this study, 13.1% of the patients had decubitis ulcer, 19.7% had urinary catheter, and 6.6% had tracheostomy cannula. In addition, 3% of the patients received oxygen therapy, 9.4% of them regularly had blood tests for INR monitoring, and 16.6% of them were fed enterally. In addition to these, it has been reported that some patient groups used nasogastric catheter (3.6%) and jejunal tube (2.8%) (Korkmaz, et., al 2016), and had urinary incontinence (52.6%) and serious nutritional problem (3%), indicated by the need for parenteral or enteral therapy (Westra, et., al 2013).

Many studies indicated that decubitis ulcer is a common health problem in home healthcare. Decubitus ulcers constitute a major burden of care, since chronic wound care in homecare is costly, i.e., the inconsistency in wound evaluation and documentation and the use of inappropriate wound care products prolongs the healing time, as a result of this, the number of patient visits increases and recovery rates decreases (Schwien, et., al 2005). Moreover, decubitus ulcers require long-term treatment. The reported duration for average wound healing differs between 51 days to 27 months (Terry, et., al 2009; Teot, et., al 2020; Ellenbecker, 2008).

The frequency of decubitus ulcers among patients was also varying. The incidences of decubitis ulcers at the beginning of care among patients in 2003 and 2004 were 6.9% and 7%, respectively (Schwien, et., al 2005). However, it has been observed that the frequency of decubitus ulcers among patients has also increased over the years. Ellenbecker (2008) reported that more than a third of patients needed treatment for wounds, and 37% of those wounds were decubitis ulcers, and approximately 42% of patients had more than one wound. Approximately 10% of applicants treated by a large nonprofit homecare agency had wounds requiring nursing intervention (Terry, et., al 2009). According to Dale and Wright (2011), 9.3% of the patients had a diagnosis of skin and subcutaneous tissue disease including decubitis ulcers. Similarly, 42% of the patients evaluated within the scope of the study by Cayir et al. (2013) had decubitis ulcers.

The average number of visits for patients who do not need any care and who have not been diagnosed with any systemic disease examined within the scope of the study, was found to be 3.2 visits per year. However we found that several factors were effective in determination of the frequency of visit. A statistically significant relationship was found between the frequency of visits

and decubitis ulcer (p=0.000), urinary catheter (p=0.000), INR test (p=0.000), and oxygen therapy (p=0.036). Having decubitis ulcer increased the number of patient visits by 5.1 (51%). And visit number will increase by 2.6 (37%) if patient has a urinary catheter, by 3.3 (62%) presence of INR test tracking, by 2.4 (25%) oxygen therapy and by 0.6 (17%) visits neuropsychiatric disease. Additionally in the normalized results, enteral nutrition was found to be statistically significant with the number of patient visits (17%).

On the other hand, we found that there was no significant relationship between age, gender, patient dependency level, having a tracheostomy cannula and frequency of visits (p>0.05). Six of the chronic diseases studied in the analysis had not a significantly important relationship (cardiovascular system, metabolic system, urinary system, respiratory system, oncological system, cerebrovascular system diseases) with the frequency of visits (p>0.05).

It has been observed that the health problems and care needs of patients who benefit from home healthcare services are very similar even in different populations. According to Karaman et al, (2015) 78.7% of the patients were given only physical examination services, 9.5% were given decubitis care, 7.3% were given urinary catheterization care, and 0.2% were given care practices such as tracheostomy care. Artantas and Koroglu (2019) found that wound dressing was 16.0% and urinary catheter application was 6.6%. In another study, when the distribution between visits was examined, wound dressing was 11.1%, urinary catheter application was 3.3% (Gumus and Saribas, 2017). Injection, catheter and wound care services were provided to the most of the patients (67.7%) (Isik, et., al 2016).

Westra et al. found that the highest prevalence of clinical condition of patients was urinary incontinence, which accounts for almost half (43.6%) of all maintenance episodes (2013). On the other hand, according to Cubuklu and Yazicioglu (2016) decubitis dressing had the highest number of visits and foley catheter was the most used invasive intervention. In a study qualified nursing services at home were ranked as exchanging tubes (95%), wound care (4.6%), ostomy care (0.2%), IV fluid injection (0.2%) (Chang, et., al 2010). Also in another study, as a treatment service, wound care, dressing and urinary catheter were installed in 56.5% of the patients (Hisar and Erdogdu, 2014).

Patients who benefit from home healthcare have different chronic diseases and their care needs also vary. Different clinical conditions and care needs specific to each patient affect the number of

services that patients receive from home healthcare providers throughout the year. There is a need for studies to determine the frequency of visits appropriate to the patient profile in order to make an efficient application in the management of home health services in our country. The limitation of this study is that the patients were selected among people who received service from only one home health care center in Istanbul. In addition, only the provided services were evaluated. Their service requirements in cases of not getting or not requesting were unknown. Nevertheless, the findings of this study are of great importance in terms of modeling studies aimed at improving home healthcare services and predicting future needs.

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