DETERMINATION OF FACTORS AFFECTING LENGTH OF STAY WITH MULTINOMIAL LOGISTIC REGRESSION IN TURKEY

Rukiye NUMANOGLU TEKİN
Instructor, Department of Health Care Management, Faculty of Health Sciences, Baskent University, Ankara, Turkey.

Fikriye YILMAZ
Assistant Professor, Department of Health Care Management, Faculty of Health Sciences, Baskent University, Ankara, Turkey.

Halil Kemal İLTER
Associate Professor, Department of Management Information Systems, School of Management, Yildirim Beyazit University, Ankara, Turkey

Simten MALHAN
Professor, Department of Health Care Management, Faculty of Health Sciences, Baskent University, Ankara, Turkey.

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ABSTRACT

Length of stay (LOS) has important implications in various aspects of health services, can vary according to a wide range of factors. It is noticed that LOS has been neglected mostly in both theoratical studies and practice of health care management in Turkey. The main purpose of this study is to identify factors related to LOS in Turkey. A retrospective analysis of 2.255.836 patients hospitalized to private, university, foundation university and other (municipality, association and foreigners/minority hospitals) hospitals which have an agreement with Social Security Institution (SSI) in Turkey, from January 1, 2010, until the December 31, 2010, was examined. Patient's data were taken from MEDULA (National Electronic Invoice System) and SPSS 18.0 was used to perform statistical analysis. In this study t-test, one way anova and multinomial logistic regression are used to determine variables that may affect to LOS. The average LOS of patients was 3,93 days (SD = 5,882). LOS showed a statistically significant difference according to all independent variables used in the

study (age, gender, disease class, type of hospitalization, presence of comorbidity, type and number of surgery, season of hospitalization, hospital ownership/bed capacity/ geographical region/residential area/type of service). According to the results of the multinomial lojistic regression analysis, LOS was negatively affected in terms of gender, presence of comorbidity, geographical region of hospital and was positively affected in terms of age, season of hospitalization, hospital bed capacity/ ownership/type of service/residential area.

Key Words: Length of stay, Health services, Hospitalization, Multinomial logistic regression, Turkey

TÜRKİYE'DE HASTA YATIŞ SÜRESİNİ ETKİLEYEN FAKTÖRLERİN MULTİNOMİAL LOJİSTİK REGRESYON İLE BELİRLENMESİ

ÖZ

Birçok faktöre bağlı olarak değişiklik gösteren hasta yatış süresinin sağlık hizmetleri üzerinde önemli etkileri bulunmaktadır. Bu çalışmanın amacı, Türkiye'de hasta yatış süresini etkileyen faktörlerin belirlenmesidir. Bu amaçla 1 Ocak-31 Aralık 2010 dönemi arasında Türkiye genelinde Sosyal Güvenlik Kurumu ile anlaşmalı olan üniversite hastanesi, özel hastane, vakıf üniversitesi hastanesi ve diğer hastanelerde (belediye, dernek ve yabancı/azınlık) yatarak tedavi görmüş 2.255.836 hasta çalışma kapsamına alınmıştır. Hasta verileri MEDULA Sistemi'nden elde edilmiş ve istatistiksel analizler SPSS 18.0 paket programı kullanılarak gerçekleştirilmiştir. Hasta yatış süresini etkileyen faktörlerin belirlenmesinde t-testi, tek yönlü varyans analizi ve multinomial lojistik regresyon yöntemleri kullanılmıştır. Ortalama hasta yatış süresi 3.93 gün (SS = 5.882) olarak belirlenmiştir. Çalışmada kullanılan tüm bağımsız değişkenlere göre (yaş, cinsiyet, hastalık türü, hasta yatış türü, eşlik eden hastalık olup olmama durumu, uygulanan ameliyat türü ve ameliyat sayısı, yatış yapılan mevsim, hastane mülkiyet durumu/yatak kapasitesi/yerleşim yeri/hizmet türü, hastanenin faaliyet gösterdiği coğrafik bölge) ortalama hasta yatış süresinin istatistiksel açıdan anlamlı bir farklılık gösterdiği belirlenmiştir. Çalışmadan elde edilen sonuçlara göre, hasta yatış süresinin cinsiyet, eşlik eden hastalık olup olmama durumu ve hastanenin bulunduğu coğrafik bölge açısından negatif yönde, yaş, hastane yatak kapasitesi, hastane mülkiyet durumu, yatış yapılan mevsim, hastane hizmet türü ve hastane yerleşim yeri açısından pozitif yönde etkilendiği ortaya konulmuştur.

Anahtar Kelimeler: Hasta yatış süresi, Sağlık hizmetleri, Hastanede yatış, Multinomial lojistik regresyon, Türkiye

INTRODUCTION

The cost of health services increase in many countries together with the increase of life expectancy, changes in the structure of illnesses, technological developments and increase of demand for health services and as a result of this the necessity emerges for more efficient use of available scarce resources. Curative health services require more cost compared to other health services and the important part of this cost results from length of stay.

Length of stay is defined as the duration from admission to hospital to being discharged from hospital. Length of stay which varies according to various factors is an important indicator used in measurement of hospital efficiency, maximizing the number of patients (Kjekshus, 2005: 116) and creates important costs for individuals, institutions and the government. Analysis and modeling of length of stay is very important in the sense of management of hospital and resources in health services management, planning and performance of health services. For many health system applied throughout the world, shortening length of stay is considered as a political aim as most of the authors emphasized (Clarke and Rosen, 2001: 168). In this sense, factors related with patients and hospital should be determined which have effect on length of stay. By making studies on factors affecting length of stay and making appropriate policies, it is possible to improve management of health services and more effective use of resources (Ng, Yau and Lee, 2003: 368).

When length of stay in Turkey is analyzed, it is possible to state that there is a downward trend starting from 1995. While length of stay in Turkey was 5,7 days in 1995, it has decreased to 4,2 days in 2009 (Ministry of Health, 2011: 107-109). With this average, Turkey has shorter length of stay compared to OECD countries. When 2008 data are considered among OECD countries; Japan has the longest length of stay with 18,8 days and Mexico has the shortest duration with 3,9 days (OECD, 2009: 99).

Although length of stay has downwards trend in Turkey, it does not get the attention it deserves with academic studies and institutional practices in the sense of both costs and curative health services. When the literature is analyzed, it is possible to state that there is no adequate number of comprehensive studies about length of stay in Turkey. The aim of this study is to determine factors affecting length of stay and evaluate in the sense of Turkish Health System. During study it was aimed to analyze factors which affect length of stay in details, put forward these factors both in the sense of service providers and patients; according to these factors, it was aimed to develop suggestion for shortening length of stay which has an important cost in the sense of health services management, bring benefit for government, people or

institutions who completely or partly contribute to the financing of health services.

1. Materials and Methods

1.1. Patients Data

2.255.836 patients who were hospitalized in Turkey between January-December 2010 in 491 hospitals apart from hospitals of Ministry of Health which have agreement with SSI were included within the scope of study. Patients data used in the study was obtained from MEDULA System of TR. SSI which was created in order to collect invoice information electronically from health service providers and enable payment of services.

1.2. Variables

In this study which was carried out in order to determine factors which affect length of stay, length of stay was dependent variable and the factors listed under two titles were accepted to be independent variables. Factors about patient are; age, gender, disease class according to ICD-10 Diagnosis Codes, type of hospitalization (Medical Therapy/Surgical Therapy), presence of comorbidity, type and number of operation, the season of hospitalization. Factors about health service providers are ownership, bed capacity, geographic region, residential area (urban-rural area) and type of service (general-specific branch) of hospitals.

1.3. Statistical Analysis

In the first stage, descriptive analyses were made about demographic characteristics of patients, the status of utilization from health services and the characteristics of hospitals. In the further stage, in order to put forward the relation between length of stay and independent variables; Independent Samples T-Test was analyzed for variables composed of two groups, One-Way ANOVA was applied for variables composed of more than two groups.

In determination of factors affecting length of stay, it was decided to use Logistic Regression method in which dependent variable takes double, triple or multiple values; their cause-effect relation with independent variables are analyzed. Due to being suitable with data set, Multinomial Logistic Regression method was used in order to measure effect level of variables influencing length of stay. After arrangement made in the data in order to apply multinomial logistic regression analysis, it was decided to include variables in the model which were significant as a result of Independent Samples T-Test and One-Way ANOVA, yet backwards stepwise elimination method was used in order to determine suitability of all the

independent variables included in the model. All the variables were included in logistic regression model; the variable in the sub-categories which has the highest code value was assigned as the reference category of that group. Length of stay which is the dependent variable was classified considering median value (Median=2) *(2 days or shorter = 1, more than 2 days = 2),* patients who are hospitalized "more than 2 days" were shown reference, values of patients who are hospitalized "2 days or shorter" were determined according to this. All the variables of the study were included in multinomial logistic regression model, according to $p<0,05$ significance level which was determined in the 1. step with backwards stepwise elimination method, it was found that the variable which has the least effect on dependent variable which is "type of hospitalization" was excluded from the model, it was decided to exclude the variable of "number of operation" for being related with the variable of "type of hospitalization". In the 2. Step of backwards stepwise elimination method, variable set to be included in the model was accessed. The variables included in this set are: Age, gender, bed capacity, hospital ownership, type of service, season of hospitalization, geographic region and residential area, presence of comorbidity.

2. RESULTS

2.255.836 patients who were hospitalized in Turkey in all hospitals apart from hospitals of Ministry of Health which have agreement with SSI were included within the scope of study. Average length of stay was determined as 3,93 days (SD= 5,882; Range=1-282). Average length of stay of patients according to age and gender are shown in Table 1. Most of the hospitalized patients are women (58 %). The age of patients vary between 0 and 112 and average of age is 40,58 (SD=23,711) and 19,4 % of patients are 65 years old and above.

Table 1. Patients' demographic characteristics and their association with average length of stay

Age Groups	N	%	Average LOS	Standard Deviation	p-Value
0-4	209.443	9,3	4,41	7,376	p<0,05
5-9	107.373	4,8	2,75	4,418	
10-14	58.186	2,6	3,31	5,212	
15-19	67.735	3,0	3,38	5,672	
20-24	139.078	6,2	2,70	3,990	
25-29	218.478	9,7	2,70	3,862	
30-34	209.881	9,3	2,90	4,242	
35-39	146.137	6,5	3,19	4,895	
40-44	107.589	4,8	3,58	5,550	
45-49	127.350	5,6	3,89	5,988	
50-54	128.091	5,7	4,22	6,088	
55-59	152.255	6,7	4,61	6,554	
60-64	144.325	6,4	4,89	6,567	
65-69	129.259	5,7	5,16	6,760	
70-74	117.398	5,2	5,28	6,709	
75-79	99.524	4,4	5,43	6,838	
80-84	61.416	2,7	5,55	6,878	
>=85	32.318	1,4	5,89	7,216	
Gender					
Female	1.309.340	58,0	3,70	5,478	p<0,05
Male	946.496	42,0	4,25	6,385	

Length of stay of male patients (4,25 ± 6,385) is longer than female patients (3,70 ± 5,478) (p<0,05). It was determined that length of stay of patients who are in 0-4 age group and 45 years and above age group are higher, the longest length of stay belongs to 85 years old and above age group with 5,89 days (p<0,05).

As it is seen in Table 2, 12,2 % of patients were hospitalized due to Diseases of the Circulatory System, another 12,2 % are hospitalized due to Diseases of Respiratory System and 11,6 % are hospitalized with Pregnancy, Childbirth and the Puerperium diagnosis. The highest average length of stay belongs to patients who are diagnosed with Mental and Behavioural Disorders is 8,62 days which is followed by patients diagnosed with Neoplasms with 6,5 days and Certain Conditions Originating in the Perinatal Period with 6,40 days.

Table 2. Patients' Diseases and their association with average length of stay

Disease Class According to ICD-10 Diagnosis Codes	N	%	Average LOS	SD	p-Value
A00-B99- Certain Infectious and Parasitic Diseases	133.404	5,9	3,85	7,205	
C00-D48- Neoplasms	185.966	8,2	6,50	8,634	
D50-D89- Diseases of the Blood and Bloodforming Organs and Certain Disorders Involving the Immune Mechanism	41.196	1,8	5,18	7,546	
E00-E90- Endocrine, Nutritional and Metabolic Diseases	123.501	5,5	5,59	6,990	
F00-F99- Mental and Behavioural Disorders	26.286	1,2	8,62	12,492	
G00-G99- Diseases of the Nervous System	65.346	2,9	6,10	9,093	
H00-H59- Diseases of the Eye and Adnexa	73.312	3,2	2,46	4,036	
H60-H95- Diseases of the Ear and Mastoid Process	27.582	1,2	2,91	3,465	
I00-I99- Diseases of the Circulatory System	275.010	12,2	4,31	5,481	
J00-J99- Diseases of the Respiratory System	274.286	12,2	2,57	3,716	
K00-K93- Diseases of the Digestive System	171.128	7,6	3,08	4,088	
L00-L99- Diseases of the Skin and Subcutaneous Tissue	39.947	1,8	3,23	5,679	p<0,05
M00-M99- Diseases of the Musculoskeletal System and Connective Tissue	109.898	4,9	4,94	6,076	
N00-N99- Diseases of the Genitourinary System	169.801	7,5	3,05	4,029	
O00-O99- Pregnancy, Childbirth and the Puerperium	261.031	11,6	2,59	2,674	
P00-P96- Certain Conditions Originating in the Perinatal Period	53.930	2,4	6,40	8,306	
Q00-Q99- Congenital Malformations, Deformations and Chromosomal Abnormalities	20.178	0,9	4,99	6,112	
R00-R99- Symptoms, Signs and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified	78.602	3,5	3,12	4,429	
S00-T98- Injury, Poisoning and Certain other Consequences of External Causes	69.507	3,1	3,51	4,890	
VOO-Y99- External Causes of Morbidity and Mortality	7.570	0,3	2,93	3,993	
Z00-Z99- Factors Influencing Health Status and Contact With Health Services	48.355	2,1	2,49	3,357	

52,3% of patients have no comorbid disease and 52,6% are surgical patients. Average length of stay of medical therapy patients (4,20±6,20) was longer than surgical patients (3,69±5,56); average length of stay of patients who have comorbid disease (4,61 ± 6,824) was longer than those who do not have comorbid disease (3,19 ± 4,521) ($p<0,05$). Average length of stay according to type of operation was analyzed both in the sense of operation classification made by Turkish Medical Association (TMA) and open-laparoscopic surgery types. 80,7% of patients had only one operation and 1.473.667 operations were carried out in total and 34,6% of these operation are C group (Big Operations and Attempts), 23,6% are E Group (Small Operations and Attempts), 19,5% are B Group (Special Operations and Attempts), the rest of 22,3% are A Group (Specific Operations and Attempts), D Group (Mediocre Operations and Attempts) and Other operations. It was determined according to operation classification made by TMA that the highest average of length of stay belongs to patients who are applied with Specific Operations and Attempts which is A Group with 8,06 days ($p<0,05$). For the patients who underwent Appendectomy, Inguinal Hernia Repair, Cholecystectomy and Nephrectomy operations; average length of stay of patients who underwent open surgery (3,05± 2,452) is longer than those who underwent laparoscopic surgery (2,79 ± 1,821) ($p<0,05$). The highest rate of hospitalization took place in spring period with 31,1% and the lowest rate took place in fall period with 14,1%. The longest length of stay according to season took place in winter with 4,30 days and in spring with 4,14 days ($p<0,05$) (Table 3).

Table 3. Patients' hospitalization characteristics and their association with average length of stay

Presence of comorbity	N	%	Average LOS	SD	p-Value
Yes	1.179.320	52,3	4,61	6,824	p<0,05
No	1.076.516	47,7	3,19	4,521	
Type of hospitalization					
Medical Therapy	1.070.207	47,4	4,20	6,200	p<0,05
Surgical Therapy	1.185.629	52,6	3,69	5,569	
Number of operation					
1 operation	957.007	80,7	3,22	4,526	p<0,05
2 operation	180.786	15,2	4,86	6,660	
3 operation	36.257	3,1	7,42	10,166	
4 operation	11.579	1,0	12,88	17,300	
Type of operation					
A Group Operations *Specific Operations and Attempts*	98.395	6,7	8,06	7,319	p<0,05
B Group Operations *Special Operations and Attempts*	287.265	19,5	4,11	5,333	
C Group Operations *Big Operations and Attempts*	510.778	34,6	3,01	3,889	
D Group Operations *Mediocre Operations and Attempts*	226.488	15,4	3,84	7,081	
E Group Operations *Small Operations and Attempts*	347.726	23,6	4,39	7,838	
Other Operations	3.015	0,2	6,46	10,252	
Type of surgery					
Open Surgery	18.835	44,9	3,05	2,452	p<0,05
Laparoscopic Surgery	23.157	55,1	2,79	1,821	
Season of hospitalization					
Spring	702.673	31,1	4,14	6,302	p<0,05
Summer	638.778	28,3	3,75	5,437	
Autumn	318.660	14,1	3,16	3,840	
Winter	595.725	26,4	4,30	6,638	

Distribution of patients according to health institution and length of stay are shown in Table 4. Patients who are analyzed within the scope of study were hospitalized in 491 hospitals. 66,5% of the patients are hospitalized in private hospitals, 28,2% are hospitalized at university hospitals, 4,8% are hospitalized at foundation university hospitals. Bed capacities of 430 hospitals out of 491 were accessed from data of Ministry of Health. 38,6% of patients were hospitalized at hospitals with 50 and below bed capacity, 21,6% at hospitals with 60 and above bed capacity, 15,5% at hospitals with 51-100 bed capacity, 12,6% at hospitals with 101-200 bed capacity, 6,9% at hospitals with 201-400 bed capacity. 28,7% of patients are in Marmara Region, 15,6% are in Central Anatolia Region, 15,6% are in Mediterranean Region, 11,8% are in Southeastern Region, 10,1% are in Aegean Region, 9,4% are in Black Sea Region and 8,9% are in Eastern Anatolia. 89,7% of patients are hospitalized in urban hospitals and 97,3% are hospitalized in general hospitals.

Table 4. Distribution of patients according to health institutions' characteristics and their associations with with average length of stay

	N	%	Average LOS	SD	p-Value
Hospital Ownership					
University Hospital	636.671	28,2	6,98	8,554	P< 0,05
Private Hospital	1.500.614	66,5	2,60	3,512	
Foundation University Hospital	107.488	4,76	4,27	5,717	
District General Hospital	996	0,04	5,00	3,580	
Voluntary Hospital	2.627	0,12	2,38	1,547	
Foreigners/Minority Hospitals	7.440	0,33	7,55	9,693	
Bed capacity					
<=50	787.477	38,6	2,34	2,986	P< 0,05
51-100	316.519	15,5	2,99	4,093	
101-200	257.095	12,6	3,33	4,411	
201-400	140.932	6,9	5,43	7,260	
401-600	95.295	4,7	6,99	7,716	
>=601	440.351	21,6	7,34	9,049	
Geographic Region					
Central Anatolia Region	352.011	15,6	4,11	5,425	P< 0,05
Marmara Region	647.496	28,7	3,94	6,482	
Aegean Region	227.162	10,1	5,04	7,280	
Mediterranean Region	352.314	15,6	4,04	5,656	
Black Sea Region	211.152	9,4	4,54	5,859	
Eastern Anatolia	199.911	8,9	3,24	4,805	
Southeastern Region	265.790	11,8	2,61	4,062	
Residential Area					
Urban	2.024.243	89,7	4,03	6,068	P< 0,05
Rural	231.593	10,3	3,11	3,800	
Type of service					
General Hospital	2.195.422	97,3	3,94	5,904	P< 0,05
Specific	60.414	2,7	3,60	5,014	

Average length of stay differs according to ownership, bed capacity, geographic region, residential area and type of service of hospitals. When the average length of stay is analyzed according to type of ownership, it was determined that the longest average length of stay belongs to Foreigners/Minority Hospitals with 7,55 days and University Hospitals with 6,98 days ($p<0,05$). It was determined that the longest average length of stay according to bed capacity of hospitals belongs to hospitals with 601 and above bed capacity with 7,34 days and 401-600 bed capacity with 6,99 days ($p<0,05$). The longest average length of stay according to hospital geographic regions belongs to hospitals in Aegean Region with 5,04 days ($p<0,05$). Average length of stay in urban hospitals (4,03 ± 6,068) are higher than patients hospitalized in rural hospitals (3,11 ± 3,800) ($p<0,05$). It was determined that average length of stay in general hospitals (3,94 ± 5,904) are higher than patients hospitalized in specific branch hospitals (3,60 ± 5,014) ($p<0,05$).

Multinomimal Logistic Regression technique was used in order to model length of stay and demographic features of patients, utilization from health services and characteristics of hospitals being hospitalized. Compatibility test with Chi-square and pseudo R^2 model were used in order to test compatibility of the model and explain changes in data. According to Nagelkerke test results, independent variables included in the model explains around 26% of the change in length of stay which is dependent variable. As a result of stepwise classification, correct classification probability (overall percentage) of variables was determined to be 71,1%.

It was observed that all co-efficient and OR values were significant except for one category (Ownership: University Hospital) obtained as a result of multinomial logistic regression method (Table 5). Compared to patients who are hospitalized more than 2 days; patients who are hospitalized for 2 days and below are affected negatively in the sense of gender, presence of comorbidity and geographic region of hospital; affected positively in the sense of age, hospital bed capacity, hospital ownership status, season of hospitalization, type of hospital service and hospital residential area.

Table 5. 2. Step of backwards stepwise elimination method in Logistic Regression Model

	B	S.E.	Wald statistic	df	P-value	OR
Constant	-1,047	,025	1698,634	1	,000	
Gender (Female)	-,080	,003	592,389	1	,000	,923
Age (0-14)	,469	,005	7791,513	1	,000	1,598
Age (15-64)	,679	,004	27352,751	1	,000	1,972
Bed Capacity (<=100)	,876	,008	12062,211	1	,000	2,401
Bed Capacity (101-300)	,471	,007	3969,878	1	,000	1,601
Ownership (University)	,000	,021	,001	1	,982	1,000
Ownership (Private)	1,002	,020	2464,859	1	,000	2,725
Ownership (Foundation)	,340	,021	254,254	1	,000	1,406
Season (Spring)	,061	,004	217,124	1	,000	1,063
Season (Summer)	,128	,004	885,237	1	,000	1,136
Season (Autumn)	,160	,005	901,277	1	,000	1,173
Type of service (General)	,330	,010	1135,015	1	,000	1,391
Comorbidity (Yes)	-,617	,003	36436,684	1	,000	,540
Region (Central Anatolia)	-,613	,006	8908,302	1	,000	,542
Region (Marmara)	-,532	,006	8136,003	1	,000	,587
Region (Aegean)	-,525	,007	5402,774	1	,000	,591
Region (Mediterranean)	-,640	,006	9838,920	1	,000	,527
Region (Karadeniz)	-,996	,007	17700,849	1	,000	,369
Region (Black Sea)	-,213	,007	808,988	1	,000	,808
Residential area (Urban)	,137	,005	632,726	1	,000	1,147

General characteristics of patients hospitalized for more than 2 days in all diagnosis groups:

- Females
- In 65 years and above age group
- Having comorbid disease
- Hospitalized in hospitals which are located in Central Anatolia, Marmara, Aegean, Black Sea and Eastern Anatolia Regions
- Hospitalized at hospitals with more than 300 bed capacity

- Hospitalized at hospitals whose ownership status is in others category (municipality, association, foreigners and minority)
- Hospitalized in winter
- Hospitalized at specific branch hospitals
- Hospitalized in rural hospitals

Length of stay was modeled as such with Multinomial Logistic Regression analysis:

$$\mathbf{LOS} = -1{,}047 - 0{,}80\ G_1 + 0{,}469\ A_1 + 0{,}679\ A_2 + 0{,}876\ BC_1 + 0{,}471\ BC_2 + 1{,}002\ O_2 + 0{,}340\ O_3 + 0{,}061\ S_1 + 0{,}128\ S_2 + 0{,}160\ S_3 + 0{,}330\ ST_1 - 0{,}617\ PC_1 - 0{,}613\ GR_1 - 0{,}532\ GR_2 - 0{,}525\ GR_3 - 0{,}640\ GR_4 - 0{,}996\ GR_5 - 0{,}213\ GR_6 + 0{,}137\ SP_1$$

- Gender (**G_1** = Female)
- Age (**A_1** = 0-14 age, **A_2** = 15-64 age)
- Bed Capacity (**BC_1** = 100 and below, **BC_2** = between 101 – 300)
- Hospital Ownership (**O_2** = Private Hospital, **O_3** = Foundation University Hospital)
- Season of Hospitalization (**S_1** = Spring, **S_2** = Summer, **S_3** =Fall)
- Service Type (**ST_1** = General Hospital)
- Presence of Comorbidity (**PC_1** = Yes)
- Geographical Region of the Hospital (**GR_1** = Central Anatolia, **GR_2** = Marmara, **GR_3** = Aegean, **GR_4** = Mediterranean, **GR_5** = Black Sea, **GR_6** = Eastern Anatolia)
- Residental Area of Hospital (**SP_1** = Urban)

3. DISCUSSION

In the study, length of stay were determined from data of 2.255.836 patients who were hospitalized in all hospitals apart from those of Ministry of Health which have agreement with SSI, data was obtained from MEDULA System of TR. SSI between January-December 2010 and the factors affecting length of stay were explained.

It was determined that average length of stay has statistically significant difference according to all independent variables used in the study (age, gender, type of disease, type of hospitalization, presence of comorbidity, type and number of surgery, season of hospitalization, ownership/bed capacity/residential area, geographic region of the hospital).

According to the results of multinomial logistic regression analysis, length of stay is affected negatively in the sense of gender, presence of comorbidity and geographic region of hospital; affected positively in the sense of age, season of hospitalization, bed capacity/ownership status/service type/ residential area of hospitals.

When literature studies are analyzed, it was determined that there are studies which have similar results with this study.

In the study it was determined that age variable has an effect which increases length of stay. When the literature is considered, it is seen that the age of patient has significant effect on length of stay (McAleese ve Odling-Smee, 1994: 743; Munin et al, 1995: 299; Schoetz et al, 1997: 808; Forrest et al, 1998: 187-188; Kurki et al, 2001: 1185; Krantz et al, 2008: 1696; San Roman et al, 2009: 213-214; Downing et al, 2009: 206-208; Crawford et al, 2011: 306; Hacker, Schultz and Helling, 1990: 611-612). It was determined that especially patients who are 65 years old and above have longer length of stay.

Within the scope of study it was determined that there is a significant difference between gender and length of stay throughout Turkey; length of stay of males is longer than females. When the literature is analyzed, while there are significant differences between length of stay and gender in many studies (Clarke, 1996: 174-177; Foster, 2000: 63; Somova et al, 2000: 103; Chiu et al, 2003: 230; Sepehri, Simpson and Sarma, 2006: 1767; Husted, Holm and Jacobsen, 2008: 170-172), there are also studies stating that gender has no effect on length of stay (Forrest et al, 1998: 187-188; San Roman et al, 2009: 213-214; Peterson et al, 2008: 72; Frantz et al, 1999: 452; Kenar, 2007: 32).

It was determined that there is a difference in average length of stay according to diagnosis class, the longest average length of stay belongs to patients in Mental and Behavioral Disorder diagnosis class with 8,62 days and this difference is statistically significant. When the literature is analyzed, it is seen that there are various studies which put forward that there are statistically significant differences between disease types and length of stay (Somova et al, 2000: 103; Chiu et al, 2003: 230; Frantz et al, 1999: 452-453).

In the study it was determined that average length of stay of patients who have comorbid disease was longer than those who have not. When the literature is analyzed it was determined that there are various studies supporting this result (Forrest et al, 1998: 187-188; Krantz et al, 2008: 1696; Downing et al, 2009: 206-208; Cots et al, 2004: 162-164; Cohen et al, 1999: 1034; Furlanetto, Silva and Bueno, 2003: 15-18; Ghali et al, 1999: 252).

When average length of stay according to season is analyzed within the scope of study, it was determined that the longest length of stay belongs to winter season. It was put forward through studies in literature that seasonal period of being hospitalized is effective in length of stay (Ghali et al, 1999: 252; Rodriguez et al, 2007: 442).

When average length of stay according to ownership of hospitals is analyzed, it was determined that the longest length of stay belongs to Foreign/Minority Hospitals and University Hospitals. When the literature is analyzed, in the studies carried out by Hornbrook and Goldfarb (1981: 65-66); Chiu, Lee et al. (2003: 228-231); Cots, Mercade et al. (2004: 166) and Mawajdeh, Hayajneh et al. (1997: 170), there was statistically significant relation between ownership of hospital and length of stay.

There are various studies putting forward that there is statistically significant relation between bed capacity and length of stay in the literature (Krantz et al, 2008: 1696; Cots et al, 2004: 165-166; Nawata et al, 2009: 2894; Hedges, Osterud ve Mullins, 1992: 404; Kroneman and Nagy, 2001: 33). In a study carried out by Kroneman and Nagy (2001: 32-34), it was stated that as the bed capacity of hospital increases so does the length of stay. Similarly in this study it was determined that the longest average length of stay takes place at hospitals with more than 401 bed capacity (Kroneman and Nagy, 2001: 33).

In the study it was determined that there is statistically significant relation between geographical region of health service providers in Turkey and length of stay and the longest average length of stay was in Aegean Region. When the literature is analyzed, in a study carried out by Nawata et al. (2009: 2894) on patients who underwent cataract operation in Japan, it was stated that length of stay varied according to city/town.

When average length of stay is analyzed according to hospital residential area, average length of stay in urban hospitals are higher than patients hospitalized in rural hospitals. When the literature is analyzed, similar to the results of this study it was stated in the study of Kjekshus (2005: 120); Collopy et al. (1991:277) and

Xiao et al. (1999: 52) that length of stay differs according to hospital residential area; average duration in urban hospitals is longer than the length of stay at rural hospitals.

As a result of literature review, it was also determined that various factors about patient and health service providers which are different from those used in this study have significant effect on length of stay; however it was not possible to achieve data about these factors. In order to carry out more comprehensive studies that would enable efficiency in health services management, patient files in the hospital should be conveyed to electronic format and this information should be accessible by Social Security Institution.

In order to enable efficient use of resources and decrease costs in the sense of hospital management, standards of hospitalization can be improved through clinic protocols for each disease and according to these standards it can be enabled to shorten length of stay and increase quality and efficiency of health services without posing negative effect of their health.

In a study carried out by Baker et al. (2004: 542), it was determined whether there is any relation between length of stay of patients and postdischarge mortality or readmission and it was stated that it is possible to shorten length of stay of patients without causing any negative effect in their health. Moreover supporting laparoscopy surgery instead of open surgery would shorten length of stay as well.

Average length of stay is significantly longer among patients who are 65 years old and above compared to other groups. Studies can be carried out in order to put forward reasons of this in details and home care services which are especially provided limited for elder patients can be popularized and length of stay can be shortened this way.

Within the scope of study it was determined that having comorbid disease increases average length of stay. Studies about comorbid disease of patients can be carried out in details, comorbid chronic disease can be followed regularly and length of stay can be shortened in this way.

In the study, the longest length of stay was determined among patients hospitalized with diagnosis of Mental and Behavioral disorder. First of all, long length of stay which would harden reintegration of patients with Mental and Behavioral Disorders should be avoided and detailed studies should be carried out about these diseases and their direct and indirect cost should be determined. With these studies mental health services can be improved and popularized in Turkey.

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