

Effect of density in emergency services on waiting time

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ABSTRACT

Aim Nowadays, the application to the emergency services increases and leads to a density. This crowd thus mostly prolongs the waiting time in emergency service. There are also other factors that increase this period. The aim of a retrospective study was to determine the factors that are supposed to affect the waiting time of patients who should be hospitalized.

Methods The clinics have been studied based on the waiting time, service of hospitalization, season, month, the days of the week and time of the day for patients reporting to the Emergency Service of Bolu İzzet Baysal National Hospital between 24. 11. 2009 and 25. 08. 2011.

Results A total of 6683 patients hospitalized in a clinic among the patients reporting to the Emergency Service have been included in this study. The applications were lower during summer ($p<0.05$). The patients report less frequently to the emergency service between noon and 8 AM ($p<0.005$). The patients have been hospitalized mostly in general surgery ($p<0.05$) and then in internal diseases and neurology services.

Conclusion The clinic of hospitalization, season, month, days of the week affect the waiting time in emergency service.

Keywords: adolescent, hospitalization, time.

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INTRODUCTION

The crowd is one of the most important causes of waiting time in the emergency service. In spite of the policies and application developed to decrease the waiting time of patients, there is usually no feedback and analyses (1). The excessive trials to decrease this time are possible only with awareness. The crowd in the emergency service shall attract the attention of hospital managers and politicians in addition to the patients (2).

Emergency services are the application places of the patients for which there is no precise diagnosis. Many national studies were made about the waiting time in emergency services and the hospitalization time (3). As everywhere in the world, presenting to the emergency service can be due to life threatening reasons, but there are also patients who do not require urgent treatment, thus leading to crowding (4).

With an increase in the number of patients presenting to the emergency service in the last years, the mean waiting time and the hospitalization in emergency unit increases (5). So the patients' admission in the emergency service is over the maximum mean waiting time (6). The increased waiting time and the visit time decrease the quality of patients handling and increase the unwanted events for patients with

real diseases. One of the most important factors of the increase of density in the emergency service is the long waiting time for hospitalization (8). Prolonged waiting and hospitalization time also decrease client satisfaction (9).

The aim of this study was to determine if the waiting time in the emergency service according to the hospitalization unit, seasons, months, days of the week and the period in the day.

PATIENTS AND METHODS

The data about the patients presenting to the Emergency Service of Bolu İzzet Baysal National Hospital between 11.24.2009 and 08.25.2011 and hospitalized in a clinic have been recorded on forms. The study was performed upon the authorization of the Head Physician of İzzet Baysal National Hospital.

The following information was collected: service of hospitalization, season, month, day, period (hour interval in a day), hour of application, examination time, time of hospitalization decision, time of hospitalization after the decision.

The time between the application and examination, time between the examination and decision on hospitalization, time between the decision of hospitalization and hospitalization

Table 1. Emergency examination waiting time for each department according to months

	Waiting time for hospitalization according to months												p
	January	February	March	April	May	June	July	August	September	October	November	December	
Cardiovascular and Thoracic Surgery	6±2	27±45	13±15	7±3	9±6	6±2	28±31	54±67	18±20	19±23	6±1	27±34	0.2970
Chest Surgery	14±9	13±11	9±7	9±6	13±21	11±6	6±4	18±21	11±4	6±4	11±11	16±15	0.6740
Genaral Surgery	11±11	13±26	9±15	11±29	11±14	10±9	10±9	9±8	13±18	10±9	12±12	11±9	0.6530
Neurosurgery	12±22	11±10	14±15	17±25	12±10	10±9	12±17	13±14	9±8	11±7	9±6	11±13	0.7330
Ophthalmology	36±33	25±18	70±98	16±10	20±7	50±42	63±72	5±0	15±4	27±29	61±65	40±52	0.7700
Orthopedics and Traumatology	14±12	15±11	18±27	15±17	13±16	11±10	13±11	13±13	24±32	12±9	15±15	25±44	0.0280
Otorhinolaryngology	7±3	15±2	19±22	9±3	5±1	15±9	26±0	29±0	64±2	8±0	27±32	18±18	0.0180
Plastic Reconstructive and Aesthetic Surgery	11±10	13±18	9±4	19±18	13±10	13±13	20±33	13±16	6±3	9±5	19±13	13±10	0.4440
Urology	14±12	6±2	12±11	12±15	9±9	11±14	18±15	13±18	12±1	9±4	6±1	11±6	0.9150
Cardiology	8±6	9±9	9±10	14±15	27±72	11±8	30±56	11±13	10±7	39±63	12±11	17±20	0.4320
Chest Diseases	20±48	14±12	18±24	14±13	15±15	17±19	20±34	12±9	15±12	16±14	18±17	21±37	0.6690
Dermatology	45±0	6±0	4±0	4±0	14±0	22±0	4±0		15±0			4±0	0.0270
Infection Diseases	20±19	13±11	16±13	17±17	26±59	16±13	14±9	18±13	13±10	15±10	25±24	20±13	0.9300
Internal Medicine	22±40	18±13	18±40	18±20	16±17	18±22	20±38	17±19	23±41	27±88	15±14	19±25	0.8460
Neurology	11±9	17±37	15±18	12±15	13±18	13±15	12±16	10±9	15±33	13±11	14±11	11±9	0.4140
Physical Therapy and Rehabilitation	7±2							4±0		51±6			0.0000

Table 2. Emergency examination waiting time for each department according to weekdays

Emergency examination waiting time (minutes)	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	p	Weekdays	Weekend	p
Cardiovascular and Thoracic Surgery	245±477	253±357	282±424	27±38	32±45	96±125	79±122	0.3120	198±364	84±120	0.5610
Chest Surgery	368±431	350±440	147±146	180±289	141±121	95±65	165±145	0.0070	249±343	129±115	0.3840
General Surgery	176±255	182±258	199±285	174±222	194±242	191±221	106±203	0.0000	185±253	139±214	0.1100
Neurosurgery	311±399	288±362	242±355	231±283	192±276	306±394	181±280	0.1840	258±345	237±341	0.2730
Ophthalmology	0±0	142±376	221±389	28±32	37±44	41±53	80±113	0.6480	89±242	47±61	0.6280
Orthopedics and Traumatology	169±303	133±245	153±257	150±269	156±270	112±150	81±83	0.3080	152±267	99±127	0.2470
Otorhinolaryngology	50±70	41±59	308±303	37±53	0±0	30±19	27±0	0.0220	87±152	27±0	0.4420
Plastic Reconstructive and Aesthetic Surgery	155±266	99±229	105±261	175±343	147±305	97±129	42±37	0.6050	134±277	72±101	0.9740
Urology	251±442	249±403	307±407	214±399	55±42	57±93	25±58	0.0360	224±379	40±78	0.3350
Cardiology	637±439	622±499	503±426	584±472	597±496	474±489	400±399	0.5820	592±461	447±455	0.0600
Chest Diseases	384±432	301±442	306±397	311±389	288±352	195±296	186±211	0.0030	322±406	191±257	0.0040
Dermatology	89±0	45±0	204±0		4±0	241±0		0.6370		96±0	0.7820
Infection Diseases	240±305	214±260	131±104	182±135	231±348	172±173	146±140	0.3430	196±244	160±158	0.8900
Internal Medicine	306±361	291±347	251±304	236±297	273±358	194±246	220±273	0.0110	274±338	206±259	0.9740
Neurology	220±295	195±251	229±303	214±277	204±287	146±187	128±137	0.0010	212±283	136±162	0.4730
Physical Therapy and Rehabilitation		0±0	1416±0		1±1		0±0	0.0000	236±577	0±0	0.0001

on were calculated respectively as acceptance time, emergency examination time and hospitalization waiting time.

The calculation of numeric values was made using Oneway ANOVA test and Post Hoc Tukey test and was considered significant when $p < 0.05$. The chi-square χ^2 test was used for non-parametrical values and these values were considered significant when $p < 0.05$.

RESULTS

The total number of 6683 patients hospitalized upon the presentation to the Emergency Service of Bolu İzzet Baysal National Hospital between 11.24.2009 and 08.25.2011 were included in the study.

Most of the patients were admitted to the General Surgery ($n=1524$) while the Otorhinolaryngology Clinic received less patients ($n=21$) ($p < 0.05$). The service that received the highest number of patients was the Department for Internal Diseases ($n=1209$), while the lowest number was at the Physical Therapy and Rehabilitation (PTR) Clinic ($n=10$)

($p < 0.05$).

The acceptance time for emergency examination was 8 ± 13 (median 4, min.0, max. 170), minutes.

The emergency examination time was 70 ± 103 (median 35, min., max. 597) minutes.

The hospitalization waiting period was 18 ± 18 (median 10, min.10, max. 177) minutes.

The patients for whom hospitalization was decided mostly reported to the Emergency Service in summer, 1560 (30%), while there was minimal presentation during November, 241 (4.8%) ($p < 0.05$). When the patients are considered according to the month of the presentation, July was the most preferred and November less preferred month of application, in 591 (11.5%) and 241 (4.8%) cases ($p < 0.05$). (Table 1)

Most applications occurred on Mondays, 802 (16.1%), while minimum on Fridays, 696 (13.9%). Moreover, the patients presenting during the week were hospitalized more than those presenting during the weekends (Table 2) While the patients applying to the emergency service during the day were more numerous

Table 3. Emergency examination waiting time for each department during a day period

Emergency examination waiting time (minutes)	Day period						P
	0-3 AM	4-7 AM	8-11 AM	12-15 PM	16-19 PM	20-23 PM	
Cardiovascular and Thoracic Surgery	50±22	52±19	248±426	249±425	151±248	55±52	0.432
Chest Surgery	98±114	68±41	517±443	293±392	128±156	122±56	0.0001
General Surgery	140±154	135±245	251±322	191±265	142±215	125±159	0.0001
Neurosurgery	159±170	92±50	580±488	360±433	156±222	143±157	0.0001
Ophthalmology	53±38	0±0	0±1	198±356	29±53	30±48	0.319
Orthopedics and Traumatology	82±78	112±65	370±475	139±249	92±118	94±83	0.0001
Otorhinolaryngology	14±3	154±249	38±53	31±41	43±51	54±106	0.378
Plastic Reconstructive and Aesthetic Surgery	76±42	146±0	371±487	105±249	87±179	70±78	0.0001
Urology	61±76	1±0	392±464	161±337	31±52	130±279	0.005
Cardiology	289±343	133±108	780±446	637±459	275±336	226±220	0.0001
Chest Diseases	127±93	136±186	551±489	387±444	199±277	134±159	0.0001
Dermatology	548±0	52±66	2±2	263±0	115±82	136±164	0.006
Infection Diseases	115±83	150±44	327±356	260±316	162±184	151±142	0.003
Internal Medicine	158±211	169±212	534±415	336±375	170±238	136±121	0.0001
Neurology	133±165	95±131	302±354	220±305	181±237	134±132	0.0001
Physical Therapy and Rehabilitation	0±0			708±1001		0±0	0.128

between 4 and 8 PM, they were at the lowest level between 4 and 8 AM ($p<0.005$) (Table 3). The waiting time in emergency examination changed according to the unit of hospitalization ($p<0.005$). The patients who had been waiting longer were cardiology patients, while plastic surgery patients had waited less (Table 4). The waiting time in emergency service following the decision on hospitalization varied depending on the department ($p<0.005$). Cardiology patients had been waiting longer than General Surgery patients ($p>0.005$) (Table 4).

There were statistically significant differences between the period of the day and the waiting time following the decision of hospitalization ($p<0.005$). The patients presenting between 12 AM and 3 PM had been waiting longer than the patients applying between 8 and 11 PM and noon and 3 AM had waited less ($p<0.005$). The longest waiting time following the decision of hospitalization occurred between 4 and 8 AM ($p<0.005$) (Table 3).

A significant statistical difference was observed in the waiting time in emergency service according to the week ($p<0.005$). While patients applying on Sundays had been waiting for a shorter period of time, patients applying on Mondays had been waiting longer (Table 2). Usually, the patients wait less during the week than during weekends ($p<0.005$). No significant statistical difference has been observed for

hospitalization waiting time between weeks and weekends.

DISCUSSION

The patients taken to the emergency service shall be hospitalized in the concerned clinic following the first aid. However, in the past years, the long waiting time of the patients in emergency unit and the delay of treatment have been considered as an important issue in most countries (10). The waiting time and the admission in emergency service increase in relation with the properties of the hospital and the severity of patients' situation. The utilization of the emergency service as the first application place, number of staff, physical situation of the emergency and laboratory analyses can increase this time (11).

In the USA, the mean waiting time in 1997 was 38 minutes while this increased up to 47.4 minutes in 2004 (12). In 2006, the patient admission time was calculated as 37 minutes instead of the recommended 15 minutes (13). In different studies, the observed waiting time in emergency unit was determined as 92.5 minutes (7). The waiting time determined in our study is compatible with the literature.

In literature, there are many studies showing that the number of patients presenting during weekends increased (14) as well as studies showing no significant difference between

Table 4. Emergency examination and hospitalization waiting time for each department

Hospitalization waiting time (minutes)	The emergency examination time				Hospitalization waiting time			
	Mean \pm standard deviation	Min.	Max.	Median	Mean \pm standard deviation	Min.	Max.	Median
Cardiovascular and Thoracic Surgery	177 \pm 224	33	884	69	32 \pm 49	7	318	14
Chest Surgery	161 \pm 175	33	954	106	18 \pm 19	7	153	12
General Surgery	205 \pm 185	31	959	195	16 \pm 24	7	513	9
Neurosurgery	180 \pm 169	31	941	131	18 \pm 21	7	191	10
Ophthalmology	141 \pm 216	31	911	135	59 \pm 76	7	353	30
Orthopedics and Traumatology	120 \pm 136	31	958	83	23 \pm 30	7	406	14
Otorhinolaryngology	127 \pm 142	41	523	96	26 \pm 27	7	97	14
Plastic Reconstructive and Aesthetic Surgery	103 \pm 108	31	933	68	21 \pm 27	7	252	13
Urology	210 \pm 214	38	913	124	17 \pm 17	7	85	11
Cardiology	362 \pm 269	33	946	272	24 \pm 50	7	539	9
Chest Diseases	190 \pm 189	31	946	119	25 \pm 36	7	526	15
Dermatology	186 \pm 167	35	548	149	18 \pm 18	7	66	8
Infection Diseases	192 \pm 146	36	841	20	27 \pm 38	7	497	20
Internal Medicine	223 \pm 203	31	948	150	28 \pm 51	7	1042	17
Neurology	156 \pm 150	31	958	113	19 \pm 28	7	511	12
Physical Therapy and Rehabilitation	-	-	-	-	35 \pm 33	7	88	14

weeks and weekends (15). In our study, the density of application occurs due to the increase of the polyclinic accumulation and thus the orientation of the patients towards the emergency service; we also determined that the number of real patients during the weekend was higher than during the week.

Booth et al. (16) described that the patients apply to the emergency service between 5 and 9 PM and 9 AM and 1 PM at a rate of 28.6% and 27.7% respectively. In our study, most of the applications occur between 4 and 8 PM and the lowest application time is between 4 and 8 AM, which corresponds to the literature; these patients increase the work density, accentuate the disease and thus lead them to apply to the emergency service towards the end of the working time.

In our country, the lowest application rate was observed during spring, while the highest application number is in summer, and the number of patients varies according to the seasons (17). In the same manner, Atherton et al. (18) showed in their study that the number of patients in emergency service increased especially during summer. On the other hand, Holleman et al. (19) declared that the patient application is the highest during winter. In our study, we assumed that the increase of density during

summer is related to the general work density. Diehl et al. (20) observed that patient applications increased from May to August. Batal et al. (21) stated that the busiest period is from November to February. Emet et al. (15) declared that July is the busiest and March is a less busy month. But there are also studies showing that the highest density of applications to the emergency service is between August and January (22).

The application rate to our emergency service was high. The patients were victims of trauma for 17%, while 17.5% of them do not have social insurance. The highest application number occurred in July while the lowest was in March; the lowest mean patient number was in spring while the highest was in summer. The ratio of trauma patients to the total patients was highest in March. In our study, the increase of applications in July was associated with the work density during summer, while the hospitalization decisions mostly occurred in November in relation to the increase of severe diseases in autumn.

The arrival time of the consulting physicians, the analysis time and the discharge operations can be effective to decrease the hospitalization time (5).

As a result, the hospitalization of patients in

a surgery clinic, presentation to the clinic during summer or in July, during the week and around the end of the working time affect the waiting time in emergency service. The consideration of factors such as the diagnosis of hospitalization of the patient, triage color code and distance to the emergency service will be

useful to diminish the waiting time.

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