

Factors Affecting the Length of Stay of Patients in Emergency Department Observation Units at Teaching and Research Hospitals in Turkey

Türkiye’de Bir Eğitim Araştırma Hastanesi Acil Servisinin Monitörlü Birimindeki Hastaların Kalış Sürelerini Etkileyen Faktörler

Yasin MAHSANLAR,¹ İsmet PARLAK,¹ Sadiye YOLCU,²
Serhat AKAY,¹ Yoldas DEMIRTAS,¹ Veysi ERYIGIT¹

¹Department of Emergency Medicine, Bozyaka Training and Research Hospital, İzmir;

²Department of Emergency Medicine, Bozok University Faculty of Medicine, Yozgat

SUMMARY

Objectives

This study aimed to determine the reasons for long stays in monitoring units and to propose a solution.

Methods

The patients who were followed in monitoring units of emergency service and the factors affecting the length of their hospital stay were analyzed retrospectively. Demographic features, their initial complaint that lead to monitoring, diagnosis, their means of arrival to emergency service, their admittance date and hour, medical history, basic vital signs, length of stay in emergency service, invasive interventions, intubation, mortality rates, consultations, and clinical results were evaluated.

Results

The study included 603 patients. Average emergency service stay in monitoring unit was found to be 6.5 hours. In addition, 15 patients (2.5%) stayed 24 hours or longer, and 78 patients (12.9%) stayed 12 to 24 hours. Of the 15 patients who stayed in emergency service for 24 hours or more, 8 (53.3%) stayed because there wasn't enough space in intensive care units. The most prevalent complaint for admission to the emergency service was chest pain (25.5%), followed by dyspnea (21.9%) and tachycardia (11.6%).

Conclusions

For real emergency conditions, monitoring units are necessary to follow patients closely and to perform immediate interventions. The fullness of the intensive care units primarily affects the emergency service and leads to long stays in emergency service as patients are waiting to be admitted to the intensive care unit. As the number of consultations increases, the monitoring period is prolonged.

Key words: Emergency service; intensive care unit; monitored observation unit.

ÖZET

Amaç

Çalışmamız monitörlü gözlem birimde hastaların uzun kalış nedenlerinin belirlenip bunlara yönelik çözümler üretilmesi gerekliliğini amaçlamıştır.

Gereç ve Yöntem

Acil Tıp Kliniği'ne başvurup monitörlü gözlem biriminde takip edilmiş olan hastalar ve bu hastaların kalış süreleri üzerine etkili faktörler geriye dönük incelendi. Bu hastaların demografik özellikleri, hangi şikayetlerle monitörlü gözleme alındıkları, aldıkları tanımlar, acil servise nasıl getirildikleri, acil servise başvuru tarih ve saatleri, özgeçmişleri, geliş vital bulguları, acil serviste kalış süreleri, uygulanan invaziv girişimler, entübe edilip-edilmedikleri, mortalite durumları, konsültasyonlar ve klinik sonuçları incelendi.

Bulgular

Çalışmaya 603 hasta alındı. Çalışmamızda monitörlü gözlemlenilen hastaların acil serviste ortalama kalış süresi 6.5 saat olarak bulundu. Ayrıca 15 hastanın (%2.5) 24 saat ve üzeri, 78 hastanın (%12.9) 12-24 saat aralığında acil serviste kaldığı görüldü. 24 saat ve üzeri acil serviste kalan 15 hastanın sekizinin (%53.3) kalış sebebi yoğun bakımlarda yer bulunmaması idi. Çalışmamızdaki hastaların acile başvuru şikayetleri incelendiğinde göğüs ağrısı (%25.5) en sık şikayet olurken, bunu nefes darlığı (%21.9) ve çarpıntı (%11.6) şikayetleri izledi.

Sonuç

Acil servislere başvuran hastalar içinde çok acil tanımına uyan hastaların hemen ilk müdahalesinin yapılarak yakından izlenebileceği monitörlü gözlem birimlerinin oluşturulup geliştirilmesi gerekmektedir. Yoğun bakımlarda yer olmaması durumunun acil servisleri primer düzeyde etkilediği ve yatış için yoğun bakımlarda yer bekleyen hastaların acil servislere uzun kalışlarının nedeni olduğu sonucuna ulaşılmıştır. Konsülte edilen birim sayısı arttıkça hastanın monitörlü gözlemlenmesi kalış süresi uzamaktadır.

Anahtar sözcükler: Acil servis; monitörlü gözlem birimi; yoğun bakım.

Submitted: 05.11.2013 Accepted: 14.01.2014 Published online: 16.01.2014

Correspondence: Dr. Sadiye Yolcu. Bozok Üniversitesi Tıp Fakültesi, Acil Tıp Anabilim Dalı, Yozgat, Turkey.

e-mail: sadiyeyolcu@yahoo.com



Introduction

Emergency departments must provide continuous health-care services for 365 days a year and 24 hours a day for patients requiring urgent treatment. Following life-saving intervention in the emergency department, patients with serious conditions are admitted to the hospital and will continue treatment within a specialist department. Increased workload in the emergency department contributes to delays in treatment and the accumulation of patients, limiting the services that can be provided and the quality of these services; subsequently, declines in overall productivity may be expected.^[1] These challenges may contribute to overall patient safety and satisfaction, as well as workplace psychology among care providers.^[2-4]

Factors contributing to increased patient volume within the emergency department include limited physical space, availability of bed space in the intensive care unit, increasing proportions of geriatric individuals in the general population, personnel shortages, delayed consultation with specialists, and delays in imaging and laboratory services.^[4-6] Critical patients are followed closely within monitored observation units in the emergency department. Accumulation of patients in these specialized units can negatively impact the efficiency of the entire emergency department. In the present study, we investigated the factors that influence the length of stay within these monitored observation units.

Materials and Methods

The study was conducted in the emergency department of the Bozyaka Research And Education Hospital hospital between 16.08.2011 and 16.09.2011. This emergency department uses a five-level triage system, with all patients who are classified in the first four levels treated in the monitored observation unit. The study protocol was reviewed and approved by the local education planning board. The study group included patients treated in the monitored observation unit during the study period. The study data were obtained retrospectively from the hospital's digital information management system (Probel) and from physical records maintained within the emergency department.

Demographic data collected for the study included the means of arrival at the emergency department, times and dates of arrival, medical history, symptoms, vital signs upon arrival, length of stay within the emergency department, diagnoses, applied invasive procedures, use of dialysis, intubation status, mortality, medical consultations, use of imaging modalities such as CT (computed tomography) or MR (magnetic resonance), and clinical outcomes. MINDRAY PM-9000 monitors located in the monitored observation units were used for regular monitoring of clinical parameters. The

Mortara Instrument ELI 250 was used for ECG (electrocardiogram) scans. Computed tomography images were captured using a Toshiba Asteio and Toshiba Aquilion 64 multislice device. A Philips Achieva device was used for magnetic resonance imaging, a Digi Prince DP-9900 was used for ultrasound imaging, and the Dynamic X-ray device was used in chest radiography.

All statistical analyses were performed using SPSS (Statistical Package for Social Sciences) for Windows 15.0 software. The Student's t-test and one-way ANOVA (advanced analysis of binary comparisons, Bonferroni) were used for comparing the parameters between the groups when evaluating the descriptive statistics (mean, standard deviation) and quantitative data. Qualitative, categorical data was evaluated using the Chi-Square test and Fisher's Exact Chi-square test. Results were evaluated at 95% confidence interval and $p < 0.05$ was established as the threshold of statistical significance.

Results

A total of 18,162 patients were admitted to the emergency department during the study period. Out of this population, 603 patients (3.3%) treated in the monitored observation unit. Male patients accounted for 54.7% ($n=330$) of the study group. Patients were subdivided into 8 groups according to their age (<18, 18-24, 25-34, 35-44, 45-54, 55-64, 65-74 and >75 years). The group with patients aged 75 years or greater constituted the largest proportion of the total study population (29.5% $n=178$). In addition, 52.4% ($n=316$) of the monitored patients were at least 65 years old. Chest pain was the most common complaint, reported by 154 patients (25.5%), followed by shortness of breath (21.9%, 132 patients), and heart palpitations (11.6%, 70 patients).

After evaluating the time of admission in the study group, the fewest admissions and discharges occurred between the hours of 05:00 and 06:00, while the largest number of admissions and discharges occurred between hours of 22:00 and 23:00. The highest rate of admission to the monitored observation unit (253 patients, 43.6%) was between the hours of 16:00 and 00:00, which was approximately twice the number of patients admitted between the hours of 00:00 to 08:00 ($n=118$). Furthermore, the number of discharged patients was the greatest (42.1%) between 16:00 and 00:00. Only 15 patients (2.5%) remained in the monitored observation unit for more than 24 hours. There was no statistically significant relationship between the arrival times and the mean length of stay in the emergency department ($p=0.303$) (Table 1).

Among the 15 patients remaining in the monitored observation unit for more than 24 hours, lack of space in the intensive care unit ($n=8$, 53.3%), lack of space in the emergency department ($n=1$, 6.7%), absence of a consulting physician

Table 1. Length of stay in the monitored observation unit according to emergency department arrival time

	n	%	Length of stay (hour: min)	p
			Mean±SD	
08:00-16:00	222	36.8	07:06±08:10	0.303
16:00-00:00	263	43.6	07:16±07:04	
00:00-08:00	118	19.6	08:22±07:09	
Total	603	100	07:25±07:31	

SD: Standard deviation.

Table 2. The diagnostic distribution of patients who stayed in the monitored observation unit for more than 24 hours

Diagnosis	n	%
Acute coronary syndromes (ACS)	1	6.7
Supraventricular tachycardia (SVT)/atrial fibrillation with rapid ventricular response (AFRVR)	3	20.0
Acute renal failure (ARF)	1	6.7
Chronic renal failure (CRF)	1	6.7
Cerebrovascular event (CVE)	1	6.7
Cardiac failure	1	6.7
Pneumonia	3	20.0
Hypoglycemia	1	6.7
Suicide	1	6.7
Non-specific chest pain	1	6.7
Epileptic attack	1	6.7
Cardio-pulmonary arrest	4	26.7
Electrolyte imbalance	4	26.7
Other	1	6.7

(n=4, 26.7%), failure to complete the diagnosis (n=2, 13.3%) and the conflict between the consultant and emergency physicians regarding the department to which the patient would be transferred (n=6, 40.0%) contributed to increased length of stay in the monitored observation unit.

The diagnostic distribution of patients who stayed in the monitored observation unit for more than 24 hours is given in Table 2.

Clinical outcomes of patients treated in the monitored observation unit for more than 24 hours were as follows: 10 patients (66.7%) were hospitalized, 2 patients (13.3%) were transferred to another hospital, 1 patient (6.7%) was discharged, and 2 patients (13.3%) refused treatment and voluntarily left the emergency department. Among the 603 monitored patients, 221 patients (36.7%) were hospitalized, 82 patients

(13.5%) were transferred, 250 (41.5%) were discharged, 41 patients (6.8%) refused treatment and voluntarily left the emergency department, and 8 patients (1.3%) passed away.

No medical consultation was required for 232 patients (38.5%). The mean length of stay in the emergency department among patients requiring consulting physicians was 397 min among the 262 patients (43.4%) seen by one consultant physician, 614 min among 73 patients (12.1%) that were seen by two consultant physicians, 515 min among the 24 patients (4.0%) seen by three consultant physicians, 510 min among the 11 patients (1.8%) seen by four consultant physicians. The most commonly requested consultations were internal medicine (n=219, 36.3%), neurology (n=78, 12.9%) and cardiology (n=49, 8.1%), respectively.

A total of 221 patients (36.7%) were hospitalized. The rate

Table 3. The rate of hospitalization is according to length of stay in the emergency department

Hosp.	Length of stay										Total	
	More than 24 hours		12 - 24 hours		6 - 12 hours		3 - 6 hours		Less than 3 hours		n	%
	n	%	n	%	n	%	n	%	n	%		
Yes	10	66.7	43	55.1	66	33.3	56	25.2	46	30.3	221	36.7
No	5	33.3	35	44.9	132	66.7	104	46.8	106	69.7	382	63.3
Total	15	2.5	78	12.9	198	32.8	160	26.5	152	25.2	603	100.0

Hosp.: Hospitalization

of hospitalization is given according to length of stay in the emergency department in Table 3. A total of 43 hospitalized patients (19.5%) stayed in the monitored observation unit for 12-24 hours, while 10 patients (4.5%) stayed in the monitored observation for more than 24 hours. In total, 8 patients died in the emergency department. All of the deceased patients were intubated. Only 3 of the deceased patients (37.5%) were seen by a consulting physician.

When examining patient vital signs, we observed a statistically significant difference in length of stay among patients classified as having high, low, and normal systolic blood pressure ($p=0.016$). Mean length of stay in the emergency department according to vital statistics is given in Table 4.

Discussion

In the present study, we evaluated patients presenting to the emergency department and admitted to the monitored observation unit between 16.08.2011 and 16.09.2011. This is the first study of its kind to be conducted in this country.

A total of 18,162 patients were admitted to the emergency department during the one-month study period, and 603 of these patients (3.3%) were treated in the monitored observation unit. According to the 2005 data from the Center for Disease Control and Prevention, 5.5% of patients should be evaluated in the emergency department immediately.^[5] A similar proportion of the present study population was treated without delay.

The study group included 330 (54.7%) males and 273 (45.3%) females. Furthermore, individuals age 75 or greater, a total of 178 patients (29.5%), constituted the largest proportion of patients followed in the monitored observation unit. In addition, 316 (52.4%) of patients followed in the monitored observation unit were at least 65 years old. Of these patients, 49.7% were male and 50.3% were female. A study conducted by Taymaz et al. included patients age 65 and older, of which 46% were male and 54% were female.^[6] Kılıçaslan et al. re-

ported that among their triage 1-grouped patients 37.1% were at least 65 years old.^[7] In all of these studies it is apparent that geriatric patients constitute a major proportion of patients followed using monitored observation.

Upon evaluation of the time of admission to the emergency department, we observed that the number of applicants dropped significantly between the hours 00:00 to 08:00. Kılıçaslan et al. have reported similar observations.^[7] Efficient and effective emergency room services will need to account for day-night variations in the number of admissions.

In the present study, 15 patients (2.5%) were treated in the monitored observation unit for more than 24 hours, while 78 patients (12.9%) stayed between 12-24 hours. The mean length of stay among all 603 patients followed in the monitored observation unit was 393 minutes.

Out of 15 patients who remained under monitored observation more than 24 hours, 8 patients could not be transferred due to a lack of available space in the intensive care unit. A previous study also reported prolonged waiting times due to an absence of intensive care resources.^[8] In the present study, the mean length of stay among 221 patients who were hospitalized after release from the monitored observation unit was 537 minutes. Aydin et al. have reported mean length of stay of 585.14 minutes in a similar patient group.^[9] Meanwhile, according to the 2005 report of Center for Disease Control and Prevention, the mean length of stay is 210 minutes for emergency room patients in need of hospitalization.

We evaluated patient medical history in individuals monitored in the emergency department. The most common diseases were hypertension, coronary artery disease, diabetes, respiratory diseases, neurological diseases, and psychiatric disorders, respectively. Taymaz et al. reported the most commonly observed diseases as hypertension, ischemic heart disease, diabetes, respiratory disease, neurological disease, psychiatric disorders, respectively, in a similar study.^[6] Improved patient education may result in better treatment

Table 4. Mean length of stay in the emergency department according to vital statistics

	n	%	Mean±SD (hour: min)	p
Systolic pressure				
Cardiopulmonary arrest	5	0.8	03:51±04:16	0.016
>140	163	27.0	08:38±08:39	
90 - 140	393	65.2	06:47±06:25	
<90	42	6.7	09:06±11:10	
Diastolic pressure				
Cardiopulmonary arrest	5	0.8	03:51±04:16	0.121
>90	112	18.6	08:18±09:01	
60 - 90	422	69.9	07:02±06:44	
<60	64	10.6	08:45±09:18	
Breathing rate				
Cardiopulmonary arrest	5	0.8	03:51±04:16	0.011
>25	38	6.3	10:58±12:06	
12 - 25	543	90.1	07:09±06:40	
<12	17	2.8	09:10±15:29	
Pulse				
Cardiopulmonary arrest	5	0.8	03:51±04:16	0.010
>100	196	32.5	08:51±09:10	
60 - 100	376	62.4	06:45±06:31	
<60	26	4.3	06:56±06:24	
Blood glucose				
60 and above	597	99.0	07:26±07:33	0.598
<60	6	1.0	05:48±01:52	
Oxygen saturation				
95 and above	424	70.3	06:32±05:32	0.001
90 - 94	98	16.3	09:44±10:50	
80 - 89	51	8.5	09:45±08:11	
<80	30	4.9	08:31±13:18	
Temperature				
>37.2	55	9.1	08:24±05:26	0.314
36 - 37.2	548	90.9	07:19±07:41	
State of consciousness				
Open	477	79.1	06:38±05:13	0.001
Confused	91	15.0	09:48±09:05	
Closed	35	5.9	12:01±18:51	

SD: Standard deviation.

compliance among patients with common diseases such as hypertension, coronary artery disease, and diabetes mellitus.

The most common symptom at the time of presentation to the emergency department was chest pain, followed by shortness of breath and palpitations. Kekeç et al. reported that the most common symptoms at the time of presentation at the emergency department were various cardiac symptoms, fatigue and general poor health, pain and im-

paired consciousness.^[10]

The most frequently consulted specialties are cardiology, neurology and internal medicine, respectively, according to Taymaz et al.^[6] In our study, internal medicine consultations occurred most frequently, while cardiology consultations were less frequent. During non-working hours internal medicine physicians perform the cardiology consultations at the hospital where the study was conducted.

In our study, patients who were admitted to intensive care had longer mean waiting times compared to patients who were admitted to another department. High occupancy rates in the intensive care unit are likely to contribute to this observation.^[8] Increasing the capacity of the intensive care unit may be a highly effective means of decreasing delays for patients under observation in the emergency department.

In our study, a lack of bed space in the intensive care unit was the most frequent cause of emergency room stays longer than 24 hours.^[8]

Patients with acute coronary syndrome accounted for the largest proportion of patients transferred to another facility. We are unable to perform PTCA (Percutaneous Coronary Transluminal angioplasty) in our hospital. The absence of angiography resources is a significant limitation to patient care.

The age distribution of 103 patients admitted to the intensive care unit is as follows: 29 patients (28.2%) age 55-64, 20 patients (19.4%) age 65-74, and 42 patients (40.8%) age 75 and older. The mean age of patients admitted to the intensive care unit in a report by Ceylan et al. was 63.7.^[11] These findings are comparable with our study data and it is notable that older patients are the most frequently admitted in both studies.

Conclusion

The presence and continuous improvement of monitored observation units is required for close follow-up and emergency interventions in critical patients admitted to the emergency department. In the present study we identified the time of day at which emergency room admission are the most frequent, and suggest that staffing and organization should be conducted in a manner that enables optimal response to anticipated patient volumes. In addition, space limitations are a fundamental challenge to emergency department care, and limitations in intensive care frequently exacerbate this problem by necessitating longer emergency department delays. Therefore, increased intensive care unit capacity is essential. Concomitant diseases are frequently observed among patients qualifying for monitored observation in the emergency department, and the medical history of each patient should be taken into consideration to avoid further complications. In addition, the establishment of angiography units in all level 3 health care centers, enabling the performance of PTCA procedures, may significantly decrease the rate of patient transfers from the emergency department.

Limitations

The limited time period of data collection in this one-month cross-sectional study may limit the ability to apply the study conclusions to other populations; in addition, the study design cannot account for possible seasonal variations in disease incidence and, hence, emergency department patient populations.

Conflict of Interest

The authors declare that there is no potential conflicts of interest.

References

1. Weiss SJ, Derlet R, Arndahl J, Ernst AA, Richards J, Fernández-Frackelton M, et al. Estimating the degree of emergency department overcrowding in academic medical centers: results of the National ED Overcrowding Study (NEDOCS). *Acad Emerg Med* 2004;11:38-50.
2. Dickinson G. Emergency department overcrowding. *CMAJ* 1989;140:270-1.
3. Feferman I, Cornell C. How we solved the overcrowding problem in our emergency department. *CMAJ* 1989;140:273-6.
4. Derlet RW, Richards JR. Emergency department overcrowding in Florida, New York, and Texas. *South Med J* 2002;95:846-9.
5. Nawar EW, Niska RW, Xu J. National Hospital Ambulatory Medical Care Survey: 2005 emergency department summary. *Adv Data* 2007;386:1-32.
6. Taymaz T. Acil polikliniğinden yatırılan geriatric hastaların ayrıntılı irdelenmesi. *Akad Geriatri* 2010;2:167-75.
7. Kılıçaslan İ, Bozan H, Oktay C, Göksu E. Demographic properties of patients presenting to the emergency department in Turkey. [Article in Turkish] *Turk J Emerg Med* 2005;5:5-13.
8. Chalfin DB, Trzeciak S, Likourezos A, Baumann BM, Dellinger RP; DELAY-ED study group. Impact of delayed transfer of critically ill patients from the emergency department to the intensive care unit. *Crit Care Med* 2007;35:1477-83.
9. Aydın T, Aydın ŞA, Köksal Ö, Özdemir F, Kulaç S, Bulut M. Uludağ Üniversitesi Tıp Fakültesi hastanesi acil servisine başvuran hastaların özelliklerinin ve acil servis çalışmalarının değerlendirilmesi. *JAEM* 2010;9:163-8.
10. Kekeç Z, Koç F, Büyük S. Acil serviste yaşlı hasta yatışlarının gözden geçirilmesi. *JAEM* 2009;8:21-4.
11. Ceylan E, İtil O, Arı G, Ellidokuz H, Uçan ES, Akkoçlu A. İç hastalıkları yoğun bakım ünitesinde izlenmiş hastalarda mortalite ve morbiditeyi etkileyen faktörler. *Toraks Dergisi* 2001;2:6-12.