

## Research Article

# Evaluation of the Drug Intoxication Cases Admitted to an Emergency Department: Factors Affecting the Outcome and Duration of Stay in the Hospital

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### Abstract

**Objectives:** Intoxications constitute significant public health concerns. In developing countries, the incidence of intentional and unintentional acute intoxications varies from 0.2 to 9.3/1000. This study aimed to investigate the clinical and demographical properties of the cases with drug poisonings admitted to the emergency department (ED) and to determine the factors affecting the final patient outcomes and duration of stay in the ED.

**Methods:** A descriptive, cross-sectional study was conducted. Data for 1243 patients over 18 years of age, who applied during 2008–2012 to the Department of Emergency Medicine, Ege University Faculty of Medicine due to poisoning with medications or chemicals, were analyzed.

**Results:** The overall ED visit rate for drug poisoning was 3.9 per 1000 persons. The mean ( $\pm$ SD) age of the subjects was  $29.4 \pm 10.5$  years. Of the patients, 875 (70.4%) were females with a female to male ratio of 2.4/1; 91.2% (n=1134) were intentional poisoning cases. Factors affecting the duration of stay in the ED were male sex ( $\chi^2=10.7$ ;  $p=0.014$ ), being older than 45 years ( $\chi^2=26.1$ ;  $p<0.001$ ), being married ( $\chi^2=14.6$ ;  $p=0.002$ ), intentionally taking drugs ( $\chi^2=12.0$ ;  $p=0.007$ ), more than 1 hour time lapse reaching the hospital ( $\chi^2=26.1$ ;  $p<0.001$ ), and having a chronic disease ( $\chi^2=37.11$ ;  $p<0.001$ ).

**Conclusion:** There are significant demographic differences among applicants to the emergency department concerning the duration of stay in the ED as well as the outcome. Acute intoxications most commonly affect young women who took easily accessible medications in a suicide attempt with a mostly non-lethal outcome.

**Keywords:** Attempted, emergency service, hospital, intoxication, suicide

Intoxications constitute significant public health concerns.<sup>[1]</sup> In the USA, overdose drug-consumption was the second-most-frequent cause of death, following motor vehicle accidents.<sup>[2]</sup> The incidence of intentional and unintentional acute intoxications in developing countries varies from 0.2 to 9.3/1000.<sup>[3]</sup> In Turkey, 77 988 cases were admitted to the National Poison Center (UZEM) in 2008. According to the data of toxicology agencies, drug intoxications constitute the first rank among all causes of intoxications.

<sup>[4]</sup> On the other hand, medications are the most commonly

preferred routes of suicide attempts.<sup>[5]</sup>

In Turkey, intoxications constitute 0.4–1.7% of all applications to the emergency departments (ED).<sup>[6, 7]</sup> Depending on the medication used and the time elapsed before arriving in the ED, serious, life-threatening outcomes may emerge, and some those patients may require intensive care services.<sup>[8]</sup>

As it is in many countries,<sup>[9]</sup> ED's have a considerably high workload in Turkey.<sup>[10]</sup> Emergency departments are usually the institutions of the first application for all kinds of intoxications, including medication overdose. Evaluation of the

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demographic and clinical features of intoxications admitted to the EDs due to medications and other chemicals are essential for proper planning of diagnostic, therapeutic, as well as follow-up approaches, and to elucidate local geographic differences.<sup>[11]</sup> Besides, interpretation of the factors affecting the outcomes and duration of stay of intoxication cases in the ED may provide valuable information to the healthcare providers and contribute to a more efficient planning of the ED workflow.

This study aimed to investigate the clinical and demographic properties of the cases with drug poisonings admitted to the ED and to determine the factors affecting the final patient outcomes and duration of stay in the ED.

## Methods

### Study Design

The study was conducted in a descriptive, cross-sectional plan at Ege University Faculty of Medicine, Department of Emergency Medicine, between January 2008 and December 2012. Study reporting was done in accordance with the STROBE guidelines.<sup>[12]</sup> The study protocol was approved by the Local Ethics Committee at Ege University Medical Faculty (IRB number: 12-1.1/9; Date: 04/04/2012).

### Setting

Ege University is located in Izmir, a city with the highest third population density at the Aegean border of Turkey. The emergency department where the study was conducted receives around 70.000 patients per year and keeps health records in electronic media.

### Participants

The population of the study consisted of all patients over 18 years of age, who applied during 2008-2012 to the ER due to poisoning with medications or chemicals.

### Variables

The study variables were age (years), gender (male/female), marital status (single/married), the month of the year on the admission, year, time lapse from the poisoning to the admission (<1 hour/1-6 hour/>6 hours), and the cause of the poisoning. The toxicants were grouped as analgesics, antidepressants, antipsychotics, antihistaminic medications, cardiovascular drugs, cleaning agents, insecticides/pesticides, and others.

The dependent variables of the study were the duration of stay in the ED (<8 hour/8-15:59 hour/16-24 hour/>24 hours) and the discharge status on leaving the ER (cure/hospitalization/intensive care/death/referral).

### Bias

To prevent bias, error checking and debugging were done after the data was entered into the computer.

### Study Size

Medical records of 1332 patients over 18 years of age, designated as 'forensic' for the study duration were reviewed retrospectively for intoxication. Patients with missing data, ineligible records, and those who spent less than 30 minutes in the ER were excluded from the study (n=89). Data for a total of 1243 patients were analyzed (Fig. 1).

### Quantitative Variables

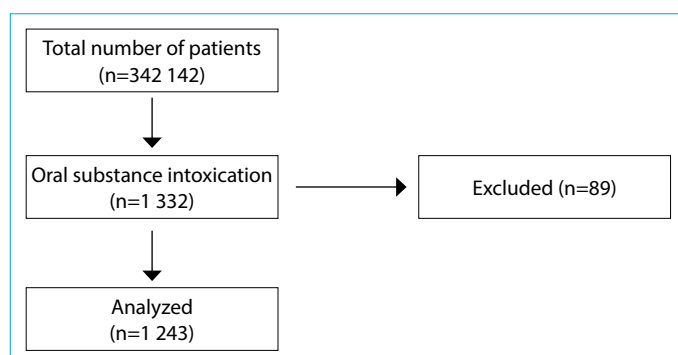
### Statistical Methods

Data were entered into the computer and analyzed using the SPSS 20.0 software. The results were presented as frequencies, percentages, means, and standard deviations (SD). The Chi-Square test was used to analyze the effects of gender, age, marital status, the type of poisoning, number of agents, time lapse before the admission to the hospital, psychiatric comorbidity, and the presence of chronic disease on the duration of stay in the ED and discharge status from the ER. A p value of <0.05 was considered statistically significant.

## Results

### Participants

The study comprised 1243 subjects. The overall ED visit rate for drug poisoning was 3.9 per 1000 persons. The study flow diagram is given in Figure 1. The mean ( $\pm$ SD) age of the subjects was  $29.4 \pm 10.5$  years. Of the patients, 875 (70.4%) were females with a female to male ratio of 2.4/1; 63.5% (n=789) were 18-30 years old, 68.3% (n=848) were single, 91.2% (n=1134) were intentional poisoning cases, 47.7% (n=593) reached to the hospital in 1 to 6 hours, 23.1% (n=286) had a psychiatric diagnosis, and 16.5% (n=205) had a chronic disease. Basic characteristics of the patients are given in Table 1.



**Figure 1.** Patient flow diagram showing the total number of patients applied to the emergency department and the number of patients included in the analysis.

**Table 1.** Patients characteristics (n=1243)

	n	%
Gender		
Male	368	29.6
Female	875	70.4
Patient age (years)		
18-30	789	63.5
31-45	337	27.1
>45	116	9.3
Marital status		
Married	394	31.7
Single	848	68.3
Drug and alcohol		
Yes	146	11.7
No	1097	88.3
Type of poisoning		
Intentional	1134	91.2
Accidental	109	8.8
Number of drugs		
Single	578	46.5
Multiple	665	53.5
Time-lapse (poisoning-ED admission)		
<1 hour	550	44.2
1-6 hour	593	47.7
>6 hours	100	8.0
Psychiatric diagnosis		
Yes	286	23.0
No	957	77.0
Chronic disease		
Yes	205	16.5
No	1038	83.5

## Descriptive Data

There was an increasing trend in the proportion of drug intoxication per year; 15% (n=187) of the cases were seen in 2008 while the proportion increased to 26.2% (n=326) in 2012. Most of the cases (28.0%; n=348) were observed during spring and evening hours (18:00 to 23:59) (40.3%, n=501, Fig. 2).

The mean ( $\pm$ SD) number of tablets taken was 26.34 $\pm$ 25.59. The most frequently used agents were analgesics (54.4%, n=676), antidepressants (33.5%, n=416), and antibiotics (16.3%, n=203) (Table 2).

## Outcome Data

Factors affecting the duration of stay in the ED were male sex ( $\chi^2=10.7$ ; p=0.014), being older than 45 years ( $\chi^2=26.1$ ; p<0.001), being married ( $\chi^2=14.6$ ; p=0.002), intentionally taking drugs ( $\chi^2=12.0$ ; p=0.007), more than 1 hour time lapse reaching the hospital ( $\chi^2=26.1$ ; p<0.001), and having chronic disease ( $\chi^2=37.11$ ; p<0.001) (Table 3).

**Table 2.** Distribution of the agents responsible from intoxication

Drug type	n	%*
<b>Analgesics</b>	<b>676</b>	<b>54.4</b>
Paracetamol	342	27.5
NSAIDs	255	20.5
Other	79	6.4
<b>Antidepressants</b>	<b>416</b>	<b>33.5</b>
SSRI	205	16.5
Tricyclic	164	13.2
Atypical	47	3.8
<b>Antibiotics</b>	<b>203</b>	<b>16.3</b>
<b>Different (PPI, Vitamin)</b>	<b>196</b>	<b>15.8</b>
<b>Antihistamines</b>	<b>130</b>	<b>10.5</b>
<b>Antipsychotics</b>	<b>75</b>	<b>6.0</b>
<b>Anxiolytics</b>	<b>89</b>	<b>7.2</b>
<b>Antiepileptics</b>	<b>50</b>	<b>4.0</b>
<b>Cleaning agents</b>	<b>15</b>	<b>1.2</b>
<b>Cardiovascular Drugs</b>	<b>106</b>	<b>8.6</b>
Antihypertensives	30	2.4
Beta-blockers	30	2.4
Antiaggregants	21	1.7
Other	25	2.1
<b>Sympathomimetics</b>	<b>19</b>	<b>1.6</b>
<b>Insecticide/pesticides</b>	<b>19</b>	<b>1.5</b>
<b>Oral Antidiabetics</b>	<b>17</b>	<b>1.4</b>
<b>Rat poison (Warfarin)</b>	<b>14</b>	<b>1.1</b>
<b>Other**</b>	<b>23</b>	<b>1.8</b>

\* Totals do not sum up to 100% due to multiple agents in 665 (53.5 %) cases;

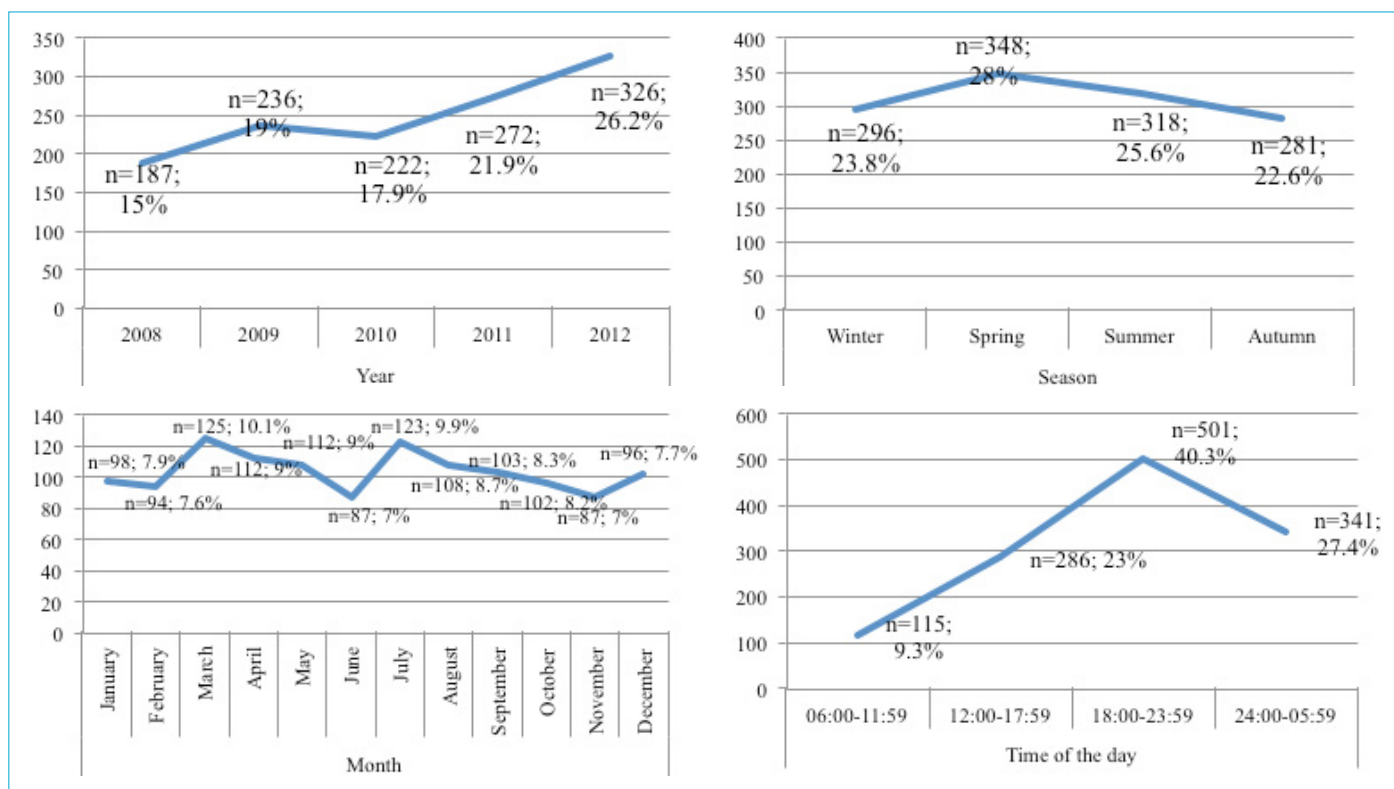
\*\* Lithium (n=8), Antiparkinsonian drugs (n=5), Bronchodilator drugs (n=2), Methanol (n=3), Synthetic thinner (n=3), Mercury (n=1), Cosmetics (n=1).

Factors affecting the outcome after the emergency service are given in Table 4. While intensive care was required in 4.1% (n=15) of the men, it was needed in 2.1% (n=18) of the women ( $\chi^2=10.7$ , p=0.014). Patients aged over 45 years had lower cure rates and higher intensive care and referral needs compared to other age groups ( $\chi^2=31.42$ , p<0.001). Hospitalization and referral rates of singles were higher than that of the married persons ( $\chi^2=10.76$ , p=0.013). Referral rates of intentionally intoxicated persons were higher than the accidentally intoxicated ( $\chi^2=8.89$ , p=0.026). Patients with psychiatric diagnoses and chronic diseases had significantly higher referral rates (p<0.001).

## Discussion

### Key Results

The overall ED visit rate for drug poisoning was 3.9 per 1000 persons with a female to male ratio of 2.4/1. Of the intoxications, 91.2% were intentional (suicidal). The most frequently used agents for intoxication were analgesics (54.4%), antidepressants (33.5%), and antibiotics (16.3%).



**Figure 2.** Time distributions of patient admissions.

Factors affecting the duration of stay in the ED were male sex, being older than 45 years, being married, suicide intention, more than 1-hour time lapse before reaching the hospital, and having a chronic disease.

Men required significantly more intensive care service than women. Factors affecting referral were being single, intentional intoxication, having a psychiatric diagnosis, and having a chronic disease. Factors affecting hospitalization were being single and intentional intoxication.

### Limitations

This study had some limitations. The sample is hospital-based, not community-based. For this reason, there is no external validity of the results. The residential origin of the patients and their admission intervals were not perfectly determined in the whole patient population due to insufficient patient files and lack of recording of patients who were transferred from external centers. The few numbers of analyzed patients and low mortality rates also hindered fine determinations of the risks regarding the consumed agents and patient groups.

### Interpretation

In Turkey, different studies reported intoxication-related emergency admission rates as 0.8% to 5.0% percent of all admissions<sup>[13,14]</sup> or between 0.46% to 1.7%.<sup>[15]</sup> Globally, these

rates were found to range between 0.2% to 0.9% percent of all emergency admissions.<sup>[16,17]</sup> In this study, the rate of intoxications among all emergency admissions was parallel to the literature. In the study of Ozkose et al.,<sup>[14]</sup> acute intoxications admitted to the emergency in a one-year period, the female/male ratio was 3:1, the percentage of patients below 25 years of age was 63.6%, and the major cause of acute intoxication was medications with a rate of 75.9%. In the study conducted by Serinken et al.,<sup>[18]</sup> females constituted 71% percent of the 257 acute intoxications, 88.7% of the intoxications were in the age group of 17 to 40, which exerted a high suicide rate committed with medicines.

As to the study of Tountas et al.<sup>[19]</sup> in 2001, the women to men ratio of acute intoxications was found as 1.92:1. In similar studies conducted in the same center previously in 1977 and 1987, these ratios were reported as 3.68:1 and 7.7:1, respectively. The recent reduction in women to men ratio was attributed to the increase of women in business life, which may have helped to their capability in coping with stress. In our study, the women to men ratio were 2.4:1 and the most frequent intoxications occurred in the age group of 18 to 30. The high women to men ratio and the accumulation of cases in the young age groups are also compatible with the general literature.

Other studies from Turkey, reported 82-92% of attempted suicide as the reasons for intoxication.<sup>[20,21]</sup> Similarly, the

**Table 3.** Factors affecting the duration of stay in the emergency department

Factors	Duration of stay in the ED (hours)								$\chi^2$	p
	<8		8-15		16-24		>24			
	n	%	n	%	n	%	n	%		
Gender										
Male	210	57.1	115	31.2	33	9.0	10	2.7	10.69	0.014
Female	549	62.7	270	30.9	45	5.1	11	1.3		
Age (years)										
18-30	497	63	246	31.2	35	4.4	11	1.4	28.56	0.000
31-45	211	62.6	93	27.6	27	8.0	6	1.8		
>45	51	44	45	38.8	16	13.8	4	3.4		
Marital status										
Married	217	55.1	131	33.2	37	9.4	9	2.3	14.55	0.002
Single	542	63.9	253	29.9	41	4.8	12	1.4		
Type of poisoning										
Intentionally	677	59.6	367	32.4	71	6.3	19	1.7	12.01	0.007
Accidentally	82	75.3	18	16.5	7	6.4	2	1.8		
Number of agents										
Singles	369	63.9	170	29.4	29	5.0	10	1.7	4.95	0.175
Multiple	390	58.6	215	32.3	49	7.4	11	1.7		
Time-lapse (poisoning-ED admission)										
<1 hour	370	67.3	150	27.3	23	4.2	7	1.4	26.07	0.000
1-6 hour	330	55.6	205	34.6	49	8.3	9	1.5		
>6 hours	59	59.0	30	30.0	6	6.0	5	5.0		
Psychiatric diagnosis										
Yes	161	56.3	95	33.3	25	8.7	5	1.7	5.6	0.133
No	598	62.5	290	30.3	53	5.5	16	1.7		
Chronic disease										
Yes	90	43.9	83	40.5	25	12.2	7	3.4	37.05	0.000
No	669	64.5	302	29.1	53	5.1	14	1.3		

\*Fisher's Exact Test; ED: Emergency department.

vast majority of cases in our research were intentional. In the study conducted by Hovda et al.<sup>[23]</sup> in 2007, multiple agent intoxications constituted 62.5% percent of cases. It was revealed that analgesics comprised the majority of intoxication causes followed by antidepressants and antipsychotic drugs, which is similar to findings obtained in various countries.<sup>[24]</sup> While consumption rates of single and multiple drugs were similar, ingestion of multiple drugs was found to be slightly higher, which may relate to situations where patients had consumed various medicines in their homes or were capable of obtaining various drugs from pharmacies.

In the study conducted by Kavalcı et al.,<sup>[25]</sup> it was determined that the majority of intoxicated patients were admitted to the hospital within the first two hours after ingestion an agent. According to a study conducted in Izmir, the emergency admission interval is mostly within the first two hours after ingestion with a rate of 45.2%.<sup>[26]</sup> In our study,

the majority of cases were admitted in the interval of 1 to 6 hours after intoxication, followed by admissions in the first hour. This time gap may be due to the admission of cases only after repent of their acts or the urge of their relatives to vomit, leading to delays in emergency admissions. Additionally, since our hospital is a tertiary care center, forwarding ambulances from the surrounding districts may also explain admissions after 1 hour of taking intoxicants.

The intoxications happened highest from 18:01 to 23:59 and 24:00 to 05:59. These differences may be the results of acute stress in daily life and the wish of suicidal cases to draw the attention of their relatives and friends when they are at home. Also, evening and night hours constitute times when people take time for them and stay alone. It may be deduced that people having endogenous psychological vulnerabilities settle up with themselves and become more pessimist, which could subsequently induce suicide attempts.

**Table 4.** Factors affecting the outcome after emergency service

Factors	Outcome after emergency service								$\chi^2$	p
	Cure		Hospitalization		Intensive care		Referral			
	n	%	n	%	n	%	n	%		
Gender										
Male	265	72.2	17	4.6	15	4.1	70	19.1	14.76	0.002*
Female	709	81.1	39	4.5	18	2.1	108	12.3		
Age (years)										
18-30	646	82.0	38	4.8	14	1.8	90	11.4	31.42	0.000*
31-45	253	75.1	13	3.9	11	3.3	60	17.7		
>45	74	64.3	5	4.3	8	7.1	28	24.3		
Marital status										
Married	309	78.4	8	2.0	10	2.5	67	17.1	10.76	0.013
Single	664	78.5	48	5.7	23	2.7	111	13.1		
Drug and alcohol										
Yes	119	82.1	7	4.8	4	2.8	15	10.3	2.14	0.544
No	855	78.0	49	4.5	29	2.6	163	14.9		
Type of poisoning										
Intentional	889	78.5	48	4.2	27	2.4	169	14.9	8.89	0.026*
Accidental	85	78.7	8	7.4	6	5.6	9	8.3		
Number of drugs										
Single	456	79.2	29	5.0	17	3.0	74	12.8	2.74	0.434
Multiple	518	77.9	27	4.1	16	2.4	104	15.6		
Time-lapse (poisoning-ED admission)										
<1 hour	451	82.1	20	3.7	9	1.6	69	12.6	12.77	0.047
1-6 hour	450	76.0	32	5.5	18	3.0	92	15.5		
>6 hours	73	73.0	4	4.0	6	6.0	17	17.0		
Psychiatric diagnosis										
Yes	182	63.9	16	5.6	7	2.5	80	28.2	59.74	0.000
No	792	82.8	40	4.2	26	2.7	98	10.3		
Chronic disease										
Yes	133	64.9	11	5.5	8	3.9	53	25.9	30.3	0.000
No	841	81.2	45	4.3	25	2.4	125	12.1		

The number of deaths was zero; \*Fisher's Exact Test.

In the study of Yilmaz et al.,<sup>[27]</sup> it was determined that the intoxications were most frequently caused by TCAs, other medications (including vitamins and antihistamines) and analgesics with rates of 34%, 31%, and 21%, respectively. In the study conducted by Ozhasenekler et al.,<sup>[28]</sup> suicidal drug ingestions included TCAs, organophosphates and non-tricyclic antidepressants with rates of 53.3%, 18.3%, and 16.6%, respectively. In the study conducted by Kavalci et al.,<sup>[25]</sup> the most frequently ingested drugs were analgesics, which followed antidepressants (of all types). In the study conducted by Gunduz et al.,<sup>[21]</sup> the most frequently intentionally-consumed drugs were analgesics (20.9%), followed by antidepressants and antipsychotics. In our study, the most frequently consumed drug groups were analgesics and psychotropic drugs. Paracetamol intoxications constituted the first rank among drug intoxications. This

may be explained by the fact that paracetamol is cheap, sold as an over-the-counter medicine in many stores and thus, easily accessible.

## Conclusion

There are significant demographic differences among applicants to the emergency department concerning the duration of stay in the ED as well as the outcome. Acute poisoning most commonly affects young women who take easily accessible medications in a suicide attempt with a mostly non-lethal outcome. National healthcare policies and guides should be developed to combat this health burden. Future studies should concentrate on possible interventions aimed to reduce the time spent in the emergency department.

## Disclosures

**Ethics Committee Approval:** The study protocol was approved by the Local Ethics Committee at Ege University Medical Faculty (IRB number: 12-1.1/9; Date: 04/04/2012).

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**Conflict of Interest:** None declared.

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