



## Demographic and clinical characteristics among Turkish homeless patients presenting to the emergency department



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### ABSTRACT

**Objective:** Since the homeless are at greater risk of encountering health problems than the general population, the reasons for and incidence of their presentations to emergency departments also vary. The purpose of this study was to determine the sociodemographic and clinical characteristics of Turkish homeless patients who brought to the emergency department by ambulance.

**Materials and methods:** The records of homeless adult patients brought to the ED by 112 emergency service ambulance teams over a 1-year period from January to December, 2014, were examined retrospectively.

**Results:** Thirty-six (21.56%) of the homeless patients enrolled in the study presented due to trauma, and 131 (78.44%) due to non-traumatic causes. One hundred thirty-seven (82.04%) of the total patient group were male. The mean age of the non-trauma patients was  $47.3 \pm 15.2$  years (range, 18–81 years), and the mean age of the trauma patients was  $36.9 \pm 14.4$  years (range, 18–63 years). The most common reason for presentation among patients presenting to the emergency department for non-trauma reasons was clouded consciousness ( $n = 39$ , 23.35%), followed by general impaired condition ( $n = 26$ , 15.57%), respiratory difficulty ( $n = 25$ , 14.97%) and abdominal pain ( $n = 21$ , 12.57%). The most common reason for presentation among trauma cases was traffic accidents ( $n = 13$ , 7.78%), followed by sharp implement injury ( $n = 9$ , 5.39%). Four (2.4%) homeless patients died in the emergency department, three (1.8%) homeless patients discharged from the emergency department, and the remaining 160 (95.8%) were admitted to the hospital.

**Conclusion:** Homeless patients may present to the emergency department due to traumatic or non-traumatic causes. Admission levels are high among these patients, who may have many acute and chronic problems, and appropriate precautions must be taken in the management of these subjects in the emergency department.

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### 1. Introduction

The homeless are people with no fixed and regular abodes, who live on the streets, in tunnels or under bridges. The numbers of

homeless in large cities in Turkey have been increasing recently, and the homeless represent a large part of presentations to the emergency department. Homelessness occurs for reasons such as rapid population growth, migration, distorted urbanization, lack of accommodation, unemployment, lack of social security, low incomes, lack of sufficient access to health services, insufficient and imbalanced nutrition and substance dependence. The number of homeless people in Turkey is not known exactly, but there are approximately 760,000 homeless people in America.<sup>1</sup> Since homeless people have a greater risk of suffering health problems compared to the general population, the reasons for and incidences

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of presentations to the emergency department also vary. The homeless experience severe health problems for reasons such as living in unhygienic conditions where protection from weather conditions is difficult, insufficient and incorrect nutrition, lack of sleep, substance use and high-risk sexual behavior. Homeless people, who have to live in unprotected and unsafe environments, are at considerable risk of violence and violence-related disability and death.<sup>2</sup>

The purpose of this study was to determine the sociodemographic and clinical characteristics of the homeless in Istanbul, the city with the largest population in Turkey, by identifying the reasons for their presentations to the emergency department. The medical problems of homeless patients and points deserving of attention in the attitude of emergency physicians to these patients were therefore examined by assessing their demographic and clinical characteristics.

## 2. Materials and Methods

### 2.1. Study design and setting

This study was performed following receipt of ethical committee approval by retrospectively examining the records of homeless adult patients brought to the Haseki Training and Research Hospital by 112 emergency service ambulance teams over a 1-year period from January to December, 2014.

Our hospital is a tertiary health institution based on Turkish national conditions and existing criteria, and our emergency department serves an average of 200,000 patients annually.

### 2.2. Participants

Data concerning the sex and age of patients, reasons for presentation, laboratory and radiological tests at time of presentation, electrocardiography findings, consultations and final medical conditions were obtained from emergency department records. Patients identified as homeless by the social services department, with no fixed abode or staying in cheap hostels or dormitories and aged over 18 were included in the study. Subjects with fixed abodes, homeless patients forced to migrate to Turkey and patients aged under 18 were excluded.

The records of 380 patients were examined, and 167 patients brought to our emergency department during the one-year study period and whose archive records were perfectly maintained were finally enrolled.

### 2.3. Statistical analysis

The study data were analyzed on SPSS 15.0 (Statistical Package for the Social Sciences) software. Data were expressed as mean  $\pm$  standard deviation, median or %. The chi square test was used to compare categoric variables at statistical analysis, and the Mann-Whitney *U* test for constant variables.

## 3. Results

Thirty-six (21.56%) of the homeless patients enrolled in the study presented due to trauma, and 131 (78.44%) due to non-traumatic causes. One hundred thirty-seven (82.04%) of the total patient group were male and 30 (17.96%) female. One hundred six of the non-trauma patients were male and 25 female, while 31 of the trauma cases were male and five were female. No significant differences were observed between homeless patients with trauma and the non-trauma group in terms of gender ( $P = 0.472$ ).

The mean  $\pm$  standard deviation (SD) age of the non-trauma

patients was  $47.3 \pm 15.2$  years (range, 18–81 years), and the mean SD age of the trauma patients was  $36.9 \pm 14.4$  years (range, 18–63 years). A significant difference was observed between homeless patients with trauma and the non-trauma groups in terms of age ( $P = 0.001$ ). Age and gender distributions of homeless patients with trauma or non-trauma presenting to the emergency department are summarized in Table 1.

The most common hour of presentation to our emergency department was 23:00–23:59 ( $n = 17$ , 10.18%). No patients presented at 07:00–07:59 (Fig. 1). The most common times of presentation of patients with traumatic causes were 23:00–23:59 ( $n = 5$ , 13.89%). No homeless patients presented due to trauma during the 4-h period between 05:00 and 09:00. There was no statistically significant difference between times of presentation to the emergency department of patients with traumatic and non-traumatic causes.

The most common month for presentations in homeless patients with no trauma was May ( $n = 17$ , 10.18%), followed by March ( $n = 14$ , 8.38%) and January, April and November ( $n = 13$ , 7.78%, each). The lowest number of presentations was observed in September. The most common month for presentations among homeless patients with trauma was July ( $n = 9$ , 25%), followed by August ( $n = 7$ , 19.4%) and June ( $n = 6$ , 16.7%). There were no presentations in March or October. The lowest number of presentations was in September. Distribution of homeless patients with trauma by months is given in Fig. 2.

The most common reason for presentation among patients presenting to the emergency department for non-trauma reasons was clouded consciousness ( $n = 39$ , 23.35%), followed by general impaired condition ( $n = 26$ , 15.57%), respiratory difficulty ( $n = 25$ , 14.97%) and abdominal pain ( $n = 21$ , 12.57%). The least common reason for presentation was headache. The most common reason for presentation among trauma cases was traffic accidents ( $n = 13$ , 7.78%), followed by sharp implement injury ( $n = 9$ , 5.39%) (Table 2).

A normal sinus rhythm was the most common finding at electrocardiogram among patients presenting for non-traumatic reasons ( $n = 63$ , 37.72%), while the least common findings were bifascicular block and ventricular tachycardia ( $n = 2$ , 1.2%) (Table 3).

Anemia was determined in 36 (21.6%) of all patients, in 28 (21.4%) homeless patients presenting due to non-traumatic causes and in eight (22.2%) of those presenting due to trauma. Of the patients in whom anemia was determined, four (2.44%) had gastrointestinal (GI) hemorrhage and two (1.2%) were trauma patients in hypovolemic shock. Leukocyte values were above normal ranges in 76 (45.5%) patients. Fifteen (8.98%) of these 76 patients were trauma cases. A low platelet value accompanied by bicytopenia was present in five (2.99%) non-trauma patients. Platelet elevation was present in 36 (26.83%) patients, seven (4.88%) of whom were trauma cases. Low platelet values were determined in 13 patients, including two (1.2%) trauma patients. Of these cases, low Hb was determined in three patients and low leukocyte values with

**Table 1**

Age and gender distribution of homeless patients presenting to the emergency department.

	Homeless Patients Presenting to the Emergency Department			
	Non-Trauma Patients		Trauma Patients	
	n (%)	age	n	age
Male	106 (80.9)	$48.3 \pm 15.3$	31 (86.1)	$37.3 \pm 15.0$
Female	25 (19.1)	$43.2 \pm 14.3$	5 (13.9)	$34.4 \pm 10.7$
Total	167 (100)	$47.3 \pm 15.2$	36 (100)	$36.9 \pm 14.4$

Data are presented as means  $\pm$  standard deviation or n = numbers of patients (percentages in parentheses).

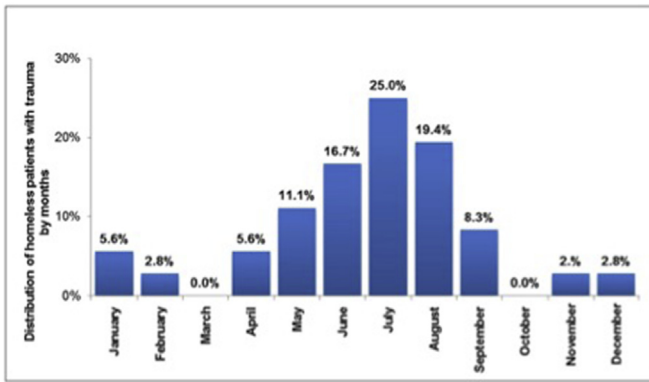


Fig. 1. Distribution of homeless patients by times of presentation.

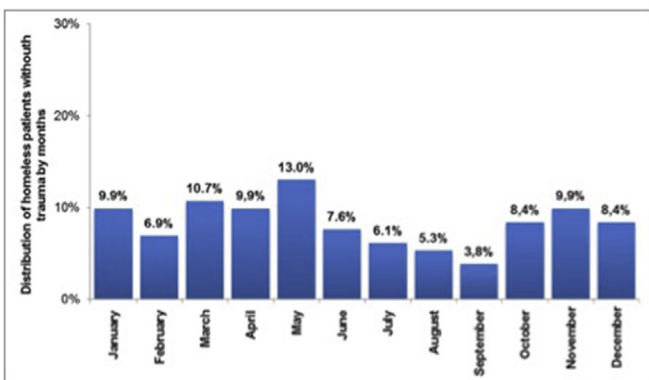


Fig. 2. Distribution of homeless patients with trauma by months.

**Table 2**  
Reasons for presentations to the emergency department by homeless patients.

Homeless Patients Presenting to the Emergency Department					
Non-Trauma Patients (n, %)			Trauma Patients (n, %)		
Clouded consciousness	39	29,8	Traffic accident	13	36,1
Poor general condition	26	19,8	Knife wound	9	25,0
Respiratory difficulty	25	19,1	Fall	7	19,4
Abdominal pain	21	16,0	Blow	4	11,1
Speech difficulty	9	6,9	Burn	3	8,3
Black stool	5	3,8			
Vomiting-nausea	4	3,1			
Headache	2	1,5			
	131			36	

**Table 3**  
Homeless patients' ECG findings.

ECG Finding	Non-Trauma Patients		Trauma Patients		Total	
	n	%	n	%	n	%
Normal Sinus Rhythm	63	48,1	21	58,3	84	50,3
Sinus Tachycardia	23	17,6	12	33,3	35	21,0
ST Alteration	16	12,2	2	5,6	18	10,8
Atrial Fibrillation	9	6,9	1	2,8	10	6,0
Sinus Bradycardia	5	3,8			5	3,0
Branch Block	4	3,1			4	2,4
Other	7	5,3			7	4,2
Supraventricular tachycardia	3	2,3			3	1,8
Bifascicular block	2	1,5			2	1,2
Ventricular Tachycardia	2	1,5			2	1,2

accompanying bicytopenia in two.

C-reactive protein (CRP) tests were performed on 131 non-trauma patients (CRP), and the results were high in 101 (79.69%). Impairment was determined in 41 (31.3%) of the 131 non-trauma patients, impairment in kidney function tests in 36 (27.48%), hyperglycemia in 19 (14.5%), hypoglycemia in five (3.82%), hypopotassemia in eight (6.11%), hyperpotassemia in six (4.58%), hypocalcemia in eight (6.11%), hyponatremia in 11 (8.4%) and hypernatremia in six (4.58%) (Table 4). Laboratory tests for all our patients were performed during presentation, and these could not be compared with previous data since the medical records were unavailable.

X-ray + CT was performed on patients presenting for non-traumatic reasons (n = 50 38.2%), followed by X-ray alone (n = 17, 13%). USG alone was performed on seven patients (4.2%), while 19 (14.5%) underwent USG + X-ray and five (3.8%) underwent USG + CT. X-ray alone was most commonly applied in the case of patients presenting due to traumatic causes (n = 20, 55.6%), followed by combined X-ray + CT (n = 7, 19.4%). No imaging techniques were requested for six patients.

The most common forms of consultation requested for all patients were psychiatric (n = 39, 23.35%) and internal diseases (n = 38, 22.75%) consultations. These were followed by anesthesia (n = 35, 20.96%), chest diseases (n = 30, 17.96%), neurology (n = 27, 16.17%), general surgery (n = 25, 14.97%) and orthopedic (n = 21, 12.57%) consultations. Psychiatric consultations were most commonly requested, since many patients appeared anxious and we expected that psychiatric problems would be present in many subjects.

Four (2.4%) of the 167 presenting patients died during emergency intervention, and only three (1.8%) were discharged in a healthy condition after treatment in the emergency department. All these four non-surviving patients had presented due to non-traumatic causes. The remaining 160 (95.8%) patients were admitted to hospital for treatment. Thirty-eight (22.8%) patients died while treatment was continuing (traumatic:non-traumatic, n = 10:28), and 91 (54.5%) were subsequently discharged in a healthy condition (traumatic:non-traumatic, n = 25:66). Fifteen of the homeless patients admitted to hospital were admitted to intensive care (8.98%), four due to traumatic causes and 11 for non-traumatic causes. The remaining 31 (18.6%) absconded before the end of treatment.

#### 4. Discussion

Although previous studies have investigated chronic diseases and causes of death among the homeless by looking at autopsies, our study is the first to examine demographic data for homeless people in Istanbul, Turkey's largest metropolitan city.<sup>3,4</sup> It is compatible with the results of Kılıç et al.'s study from İzmir. However, our study also examined patients exposed to trauma in detail.<sup>5</sup> We determined that 21.56% of our patients were exposed to and brought to hospital due to trauma, the most common cause being traffic accidents. It is not surprising that patients with advanced age or impaired mental state were more exposed to trauma. It has been stated that people who are homeless tend to use the emergency department more often than people who are not homeless.<sup>6</sup> However, appropriate or inappropriate ER use among homeless patients is controversial.<sup>6–8</sup> In our study, of the 167 homeless patients, 160 (95.8%) were admitted to hospital for treatment. Due to high hospitalization rate among homeless patients, we can assume that their emergency department use is more often appropriate.

Infection parameters such as CRP and leukocyte counts were

**Table 4**

Laboratory tests of non-trauma and trauma homeless patients (in orders of number and levels).

Laboratory test	Laboratory Data	Total patients		Non-trauma patients		Trauma patients		p
		n	%	n	%	n	%	
C-reactive protein	<1.0 mg/L	113	67.7	101	77.1	12	33.3	<0.001
Leukocytosis	>10.0 K/ $\mu$ L	76	45.5	61	46.6	15	41.7	0.601
Thrombocytosis	>300 K/ $\mu$ L	44	26.3	38	29.0	6	16.7	0.137
Thrombocytopenia	<100 K/ $\mu$ L	5	3.0	1	0.8	4	11.1	0.008
Bicytopenia	Plt-Leukopenia:2	5	3.0	5	3.8	0	0.0	0.586
	Plt-Anemia:3	0	0.0	0	0.0	0	0.0	–
AST and/or ALT (U/L)	>24/>22 U/L	49	29.3	41	31.3	8	22.2	0.290
Urea and/or Cre elevation	>43 or >0.95 mg/dL	39	23.4	36	27.5	3	8.3	0.016
Anemia	<11.0 g/dL	28	16.8	21	16.0	7	19.4	0.627
Polycythemia	>16.0 g/dL	8	4.8	7	5.3	1	2.8	1.000
Hyperglycemia	>106 mg/dL	23	13.8	20	15.3	3	8.3	0.414
Hypoglycemia	<74 mg/dL	4	2.4	4	3.1	0	0.0	0.578
Hypernatremia	>145 mmol/L	3	1.8	3	2.3	0	0.0	1.000
Hyponatremia	<136 mmol/L	16	9.6	14	10.7	2	5.6	0.527
Hyperpotassemia	>5.1 mmol/L	4	2.4	4	3.1	0	0.0	0.578
Hypopotassemia	<3.3 mmol/L	12	7.2	10	7.6	2	5.6	1.000
Hypercalcemia	>10.5 mg/dL	1	0.6	1	0.8	0	0.0	1.000
Hypocalcemia	<8.4 mg/dL	7	4.2	7	5.3	0	0.0	0.348

high in our study. This may be attributed to patients living in the open and to inadequate nutrition. According to Laporte's SAMENTA study, the homeless are heavy consumers of alcohol, and alcohol-related death rates are higher than in the normal population.<sup>9</sup> Liver and kidney function tests were also high in our study. Impairment of kidney and liver tests may be expected due to drug abuse and alcohol use among the homeless.

Various imaging techniques were employed for the homeless patients presenting to our hospital. X-ray imaging was most commonly performed on patients presenting due to both traumatic and non-traumatic causes. Routine X-ray was particularly performed in trauma cases, and more detailed screening with CT and USG was required in subjects in whom pathology was identified. Routine X-ray was also performed on patients presenting due to non-traumatic causes, and CT, USG and/or MRI were performed depending on patients' characteristics. The main reason for performing CT together with X-ray was to exclude cerebral pathologies in patients with clouding of consciousness. In addition, it is not surprising that cerebral MRI was performed on patients with unexplained clouding of consciousness. The decision to perform direct X-ray, USG, CT or MRI in patients presenting due to trauma must lie with the clinician.

Compatibly with previous studies, the most common cause of presentation for non-traumatic reasons was clouding of consciousness. The second most common cause was respiratory difficulty. Presentation symptoms of clouding of consciousness and respiratory difficulty may be expected since these patients frequently live under poor hygienic conditions, have chronic diseases and engage in substance abuse. These findings support those of several studies in the previous literature.<sup>10–12</sup>

We observed that, in general, homeless people presented to the emergency department with a clinical condition requiring hospitalization. Vuillermoz et al. determined similar findings to those of our study. They also observed higher mortality and morbidity among homeless people presenting to the emergency department compared to the normal population.<sup>13</sup> They reported that there may be several causes of death compared to the normal population, but that these generally involved diseases of the circulatory system and nutrition diseases, mental impairments or unknown causes. Contrary to expectation, they determined no deaths from hypothermia related to cold weather conditions. Almost all the patients in our study were admitted to hospital for treatment, and 22.8%

died. More than half of patients were treated and discharged, but as large a group as 18.6% absconded from hospital. This may be due to mental and behavioral disturbances. The mortality rate among the homeless in various studies from Europe and America varies, but is reported at 2–13 times higher compared to the normal population.<sup>14–17</sup> It is unsurprising that we also determined a high level of mortality.

The majority of patients were male, in agreement with several previous studies.<sup>18,19</sup> The mean age of non-trauma patients was slightly higher than that of the trauma patients. The most frequent time of presentation among these patients was 21:00–02:00, while presentations were least frequent at 02:00–09:00. The most common season of presentation among non-trauma homeless patients was Spring, followed by Winter. More presentations might be expected during Winter due to weather conditions. However, since the homeless are housed in various forms of accommodation by the Istanbul Metropolitan Municipality during Winter, presentations to the emergency department at this time are not as high as might be anticipated. The season with the lowest level of presentations among non-trauma homeless patients was Summer. However, Summer was the most common season for presentations among homeless trauma patients, peaking in July. Levels were low in the other months of Summer. We think that living in open spaces during Summer represents a probable cause of exposure to trauma. These patients being able to use the city's social facilities and covered spaces during the Winter reduced their exposure to trauma.

Although cardiovascular diseases are common among homeless patients, the level of arrhythmia at ECG was low among the patients included in our study, with sinus rhythm being determined at the highest level.<sup>20</sup> Few studies have investigated myocardial infarction and stroke among homeless patients, and this may be now examined in more comprehensive research.

## 5. Limitations

The main limitation of this study is that it is retrospective, and the low patient number involved. We might have elicited broader data from a prospective study. In addition, patients' nutritional status might have been investigated by analyzing patients' height, weight and body mass indices.

## 6. Conclusion

Due to the growing problem of homelessness in Istanbul, Turkey's largest metropolis, the number of homeless individuals presenting to emergency departments may be expected to increase on a continuous basis. The data from this study indicate that homeless patients are exposed to not inconsiderable levels or exposure to trauma and chronic disease, and have high levels of hospitalization and even mortality. Emergency department physicians must be aware that homeless patients may present with many acute or chronic problems and must take the appropriate precautionary measures.

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## Conflicts of interest

The authors had no conflicts of interest to declare in relation to this article.

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