

## Original Article

## The Frequency of Attending the Emergency Department According to Seasons and Working Hours

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### Abstract

**Objective:** It is unclear whether admissions to the emergency department and administration of medical interventions at this clinic increase in different seasons and working shifts.

**Aim:** The goal of this retrospective and cross-sectional research was to determine the frequency of attending the emergency department according to seasons and working hours, and also to determine the frequency of non-real emergency visits and the frequency of medical procedures performed on patients in a touristic town in Turkey.

**Methods:** The ED visits of 116306 adult and paediatric patients between 1 January and 31 December 2013 were examined retrospectively. The data was obtained from hospital admissions records.

**Results:** Non-emergency visits accounted of 19010 of all ED ( $p= 0.000$ ). Visits to the emergency department increased in the summer season and in the evening between 16:00 and 24:00 p.m. Non-real emergency visits increased in the summer season and in the 24:00-08:00 p.m. shift ( $p= 0.000$ ).

**Final remarks:** Hospital management should make personnel planning according to the seasons and shifts in which emergency services are intense for patient and staff safety.

**Key words:** Emergency, Hospital, Seasons, Nurses

### Introduction

The hospital emergency department (ED) is a medical unit which provides services to acutely ill or injured patients and to those suffering from life-threatening diseases (Cevik & Tekir, 2014). It has round-the-clock accessibility: it is open 24 hours a day, seven days a week (Oktay et al., 2003). People attend an emergency department to resolve critical or life threatening conditions (Lee et al., 2000), because of their perception of the urgency of their health problems, or on advice from their friends (Nystrom, Dahlberg, Carlsson, 2003).

Emergency departments are one of the most exhausting units to work in, and are places in which patients who come to the hospital and their relatives acquire positive or negative perceptions

of the hospital (Aydin et al., 2010). Emergency hospital admissions have been rising in some countries for many years (Bottle, Aylin, Majeed, 2006; Lowthian et al., 2012). This increase affects the financial status of hospitals and national health care budgets (Bottle, Aylin, Majeed, 2006). Emergency department crowding represents an international crisis that may affect the quality of and access to health care (Hoot & Aronsky, 2008). In a study conducted in a state hospital over the course of one year, it was determined that 12.59% of all admissions to the hospital had been made to the emergency department (Cevik & Tekir, 2014). In another study it was shown that emergency department presentations increased from 550 662 in 1999–2000 to 853 940 in 2008–2009 (Lowthian et al., 2012). Yim et al. (2009), concluded that ED

utilization by the elderly would increase and that elderly patients required significantly more emergency care resources than younger adults (Yim et al., 2009). A study by Cecil et al (2016) determined 3 074 616 ED visits by children during one year and they concluded that children registered with more accessible family practices were less likely to visit EDs. In another study, researchers concluded that hospital and ED overcrowding was associated with increased mortality (Sprivulis et al., 2006).

'ED overcrowding' means an extreme volume of patients in ED treatment areas, forcing the ED to operate beyond its capacity (Cowan & Trzeciak, 2005). It has become a serious problem in recent years (Derlet, 2002; Trzeciak & Rivers, 2003; Olshaker, Rathlev, 2006). Non-urgent utilization (Lee et al., 2000; Afilalo et al., 2004; Olshaker, Rathlev, 2006; Boran et al., 2008 ) using instant health services for problems that do not require emergency care (Boran et al., 2008; Edirne et al., 2008), growing numbers of uninsured and deceased reimbursement for uncompensated care (Olshaker & Rathlev, 2006) are some of the factors which cause ED overcrowding. The results of a study showed that the perceived urgency of the visit was the most important predictor of a non-urgent visit to an ED (Shah, Shah, Behbehani, 1996). Various cultural and psychosocial reasons play a role in the non-urgent utilization of the ED (Lee et al., 2000). In a study by Oktay et al. (2003) was found that the main reasons for inappropriate use of the emergency department were proximity (19.8%), satisfaction with care (12.5%), pain and worsening symptoms (11.5%), and unavailability of clinic care (11.3%) (Oktay et al., 2003).

ED crowding may impair the quality of care (Powell et al., 2012), lead to poor patient care and outcomes (Schull et al., 2004; Olshaker & Rathlev, 2006; Olshaker, 2009; Lowthian et al., 2012), impact the ability of emergency physicians to provide optimal care in the ED (Schull et al., 2004; Cowan & Trzeciak, 2005), lead to delays in triage and in bringing patients into treatment rooms (Cowan & Trzeciak, 2005), lead to extremely long waiting times (Cowan & Trzeciak, 2005; Derlet, 2002), increase waiting times and ED length of stay (Cowan & Trzeciak, 2005; Kose et al., 2011; Lowthian, 2012), cause ambulance diversion (Derlet, 2002; Cowan & Trzeciak, 2005; Sprivulis et al., 2006; Olshaker

& Rathlev, 2006; Lowthian et al., 2012) threaten patient safety, and raise the risk of adverse events (Lowthian et al., 2012). In a study, Schull et al. (2004) concluded that ED crowding was associated with increased door-to-needle times for patients with suspected acute myocardial infarction and that it might hinder cardiac care in EDs.

Sprivulis et al. (2006) found that hospital and ED overcrowding was associated with increased mortality. In a review study, the authors concluded that overcrowding in EDs threatened public health by compromising patient safety and that the main cause was inadequate inpatient capacity for a patient population with an increasing severity of illness (Trzeciak & Rivers, 2003). In a retrospective review, Rathlev et al. (2007) concluded that hospital occupancy and the number of ED admissions were associated with daily mean length of stay. Researchers have retrospectively evaluated admissions to a hospital emergency department in terms of sociodemographics (Aydın et al., 2010; Cevik & Tekir, 2014), diagnostic codes and triage (Cevik & Tekir, 2014). Also, researchers retrospectively have evaluated the profiles, admission appropriateness (Kose et al., 2011) and clinical features (Aydın et al., 2010) of patients attending hospital. Several researchers retrospectively evaluated admissions to hospital emergency departments according to months and seasons (Cevik & Tekir, 2014) and the time of day (KılıCaslan et al., 2005; TurkCuer et al., 2010). A number of studies have been conducted to evaluate the most common medical diagnoses and diagnostic tests in admissions to hospital emergency departments (Kose et al., 2011) and according to medical procedures (Kleinpell, 2005). The environment in which care is offered affects the patients and nursing and institutional outcomes (Aiken & Patrician, 2000). Nurses give professional bedside care in hospitals around the clock and what nurses do or do not do directly relates to patient outcomes (Aiken, Smith, Lake, 1994). Those who come to work in tourism and those who come to retire in a seaside settlement increase the city's population. However, in summer the population of this district reaches 700 000, that is it increases by 6-7 times in summer compared to the winter (Chamber of Commerce, 2018).

Emergency department (ED) overcrowding is common in coastal areas in Turkey especially in holiday seasons because of local people and foreign tourists holidaying there. However, the number of health team members working in the emergency departments does not increase. The level of nurse staffing in the summer season is recognized to be significantly lower than in other seasons because of annual leave. It is unclear whether admissions to the hospital and nursing interventions in the emergency clinic are increased in the summer season. Nurses form the majority of the medical personnel in hospitals who are responsible for providing medical care to patients (Kleinpell, 2005; Arakawa, Yuka Kanoya, Sato, 2011). The population of the district in which the study was conducted was 94 995 in 2013 (Turkish Statistical Institute, 2013). There is a need to examine patient numbers in emergency departments in coastal areas, especially during holiday periods and during different working hours. However, no study in this country has examined the percentage of any of the medical interventions implemented in the emergency service. This retrospective and cross-sectional research was conducted to determine the frequency and the reasons for attending the emergency department, the frequency of medical procedures and nursing interventions which were made to adult and paediatric patients who attended the emergency service in a tourist town on the western coast of Turkey, and the factors which affected the frequency of nursing interventions.

### Method

The research was conducted in the emergency department of a state hospital in a tourist town on

the western coast of Turkey. Patients were not enrolled as subjects, and official data relating to admission to the emergency service were examined retrospectively and included in the study. A total of 116 306 adult and paediatric patients whose data were recorded in the MEDULA (Medical+Messengers) system program and who attended the hospital's emergency department between 1 January 2013 and 31 December 2013 constituted the research data. ED visit records were obtained from the ED admissions registry. Data relating to the demographic properties of the patients and the medical procedures applied to them according to the seasons and working shifts were examined.

**Statistical analysis:** The Statistical Package for the Social Sciences (SPSS, Version 17.0) was used for the analysis. Chi-square tests and Fisher's test were used in analysing the data.

**Ethical approval:** Ethical approval was obtained from the ethics committee and written permission and record linkage approvals were obtained from the Directorate of the State Hospital and the Directorate of the Emergency Department.

### Results

The mean age of the patients who attended the emergency department in the study year was  $49.21 \pm 28.70$  (min: 0 - newborns, max: 99) years. Table 1 shows the distribution of demographic variables among the 116 306 admissions. Males accounted for 52.9% of the admissions, and females 47.1%. Table 2 shows the frequency of application of nursing according to seasons and the frequency of referral to emergency department according to working hours.

**Table 1. Sociodemographic and visit characteristics of patients**

Descriptive Characteristics	n	%
<b>Age Group</b>		
0-5 age group	7292	6.3
6-12 age group	8009	6.9
13-17 age group	5608	4.8
18-64 age group	55305	47.6
65-74 age group	11693	10.0
≥75 age group	28399	24.4
<b>Gender</b>		

Female	54755	47.0
<b>Season</b>		
Spring	26054	22.4
Summer	43249	37.2
Autumn	25596	22.0
Winter	21407	18.4
<b>Working Hours</b>		
24:01-08:00	16639	14.3
08:01-16:00	44810	38.5
16:01-24:00	54857	47.2
<b>Non-Urgent attendance</b>	19010	16.3
<b>Forensic cases</b>	8048	6.9
<b>Total</b>	<b>116 306</b>	<b>100.0</b>

**Table 2. Distribution of medical interventions according to seasons and working shifts**

Seasons	IM injection %	Oxygen Therapy %	IV infusion %	IV catheterisation %	Blood pressure monitoring %
Spring	0.45	0.01	0.06	0.09	0.15
Summer	0.46	0.02	0.06	0.09	0.13
Autumn	0.45	0.01	0.06	0.08	0.16
Winter	0.45	0.01	0.06	0.08	0.16
	( $X^2=17.616$ , p=0.001)	( $X^2=10.191$ , p=0.017)	( $X^2=4.560$ , p=0.207)	( $X^2=18.166$ , p=0.000)	( $X^2=90.248$ , p=0.000)
<b>Working hours</b>					
08:01-16:00	0.39	0.01	0.06	0.09	0.15
16:01-24:00	0.49	0.01	0.60	0.08	0.13
24:01-08:00	0.51	0.02	0.08	0.11	0.19
	$X^2=1075.47$ , p=0.000	$X^2=135.66$ , p=0.000	$X^2=133.51$ , p=0.000	$X^2=199.96$ , p=0.000	$X^2=264.45$ , p=0.000

## Discussion

**Number of admissions to the emergency service:** Emergency departments are one of the most exhausting units to work in, and one where patients and their relatives acquire positive or negative impressions of the hospital (aydın et al., 2010). In our study, we examined a total of 116 306 admissions to the emergency department

during the study year. This result showed that there has a great number of attendance in this settlement. Researchers have found that in different time periods, a different number of patients were admitted to the emergency department (Ross et al., 2003; Oktay et al., 2003; Kılıcaslan et al., 2005; Bottle, Aylin, Majeed, 2006; Sullivian et al., 2006; Sutuluk et al., 2007; Boran et al., 2008;Turkcuer et al., 2010; Niska,

Bhuiya, Xu, 2010; Cevik & Tekir, 2014). A study by Cecil et al. (2016) determined 3 074 616 ED visits by children during one year, and they concluded that children registered with more accessible family practices were less likely to visit EDs.

**Age groups:** In our study the mean age of patients was  $49.21 \pm 28.70$  (min: 0 newborn, max: 99) years. In a study conducted in an emergency department, the researchers stated that elderly patients constituted an important percentage (Ross et al., 2003; Niska, Bhuiya, Xu, 2010) requiring significantly more emergency care resources than younger adults (Grief, 2003; Yim et al., 2009), were less likely to be diagnosed accurately, and consequently were discharged with problems that had gone unrecognized and untreated (Grief, 2003). Our results are similar to those of the literature. In one study, researchers stated that those 20-24 years of age and those over the age of 65 were found to attend the ED more frequently than other age groups (Cevik & Tekir, 2014). Our results are similar to those of this study. According to a study by Boran et al. (2008), paediatric emergency visits peaked in the winter over a one year study period in 2006.

**Gender:** Males accounted for 52.9% of the admissions, and females 47.1% (Table 1). In other studies, 49.14% (Cevik & Tekir, 2014), 51.53% (Aydın et al., 2010), and 47.2% (Kılıcaslan et al., 2005) of patients admitted to the ED were male. Our results are similar to the results of those studies.

**Season:** In our study, the greatest number of admissions to the ED was in the summer (37.2%) and in July (14.4%) and August (12.2%), and the smallest number was during the winter in the 16:00-24:00 p.m. shift. Because the population of the town increased due to people coming on vacation in this season and in these months, this is an expected result. In another study, the greatest number of urgent applications were made at the end of October, and the least number of urgent applications were made in February (Cevik & Tekir, 2014). This result is not compatible with the results of our study.

**Shift:** In our study the greatest number of admissions to the ED was between 16:00-24:00 p.m. (47.2%) (Table 1). In a study, it was determined that 53.3% of all patients were admitted to the hospital between 08:00 a.m. and

16:00 p.m. (Aydın et al., 2010). In other study by Kılıcaslan et al. (2005), the most common presentation time period was between 11:00 a.m. and 23:00 p.m. In another study, it was determined that for 64.7% of visits, patients arrived in EDs during non-business hours (17:00 p.m. to 08:00 a.m.) (Niska, Bhuiya, Xu, 2010). The majority of the applications (60.5%) occurred between 08:00 a.m. and 17:00 p.m. (Kose et al., 2011). According to Boran et al. (2008), paediatric emergency visit peaks during a one year period in 2006 were more likely to occur between 08:00 a.m. and midnight. Our patient data were not similar to the current literature on ED patients in studies by these researchers.

The greatest number of those attending the ED was in summer, in July and August, and in the 16:00-24:00 p.m. shifts. This result may be related to the increase in the population of the town in summer season due to people coming on vacation (Table 1). The percentage of non-real emergency visits was higher in the summer (25.4%) than in other seasons. Also, the percentage of non-real emergency visits was higher in the 24:00-08:00 a.m. shift (17.9%) than in other shifts ( $X^2=190.12$ ,  $p=0.000$ ). That is, patients were more likely to attend to the emergency clinic both in the summer and during the night shift (Table 2). This result can be attributed to the absence of a closer healthcare facility in the summer: the study was conducted in a touristic area, so that individuals who are seated in the summer can apply outside the hospital. Also because of this result, it is thought that emergency services are unintended use.

**Non-urgent admissions to the emergency department:** In our study, it was found that emergency departments were used by 19010 patients who were not real emergencies (Table 1). This result suggests that nearly half of patients used the emergency services for non-urgent health problems. It was determined that the seasons affected the non-urgent admissions to the emergency department, and 14.3% of the admissions made to the emergency clinic in the summer were not real emergencies ( $X^2=5994.74$ ,  $p=0.000$ ). Also, it was found that the shift affected non-urgent admissions to the ED, and that 17.9% of the admissions to the ED between 16:00 p.m. and 24:00 p.m. were not real emergencies ( $X^2=190.12$ ,  $p=0.000$ ). This result

can be attributed to patients waiting for daytime health complaints to pass, but then referring to the emergency clinic once they realize that their complaints will not pass by in the evening.

Non-urgent utilization means inappropriate admission to the ED by patients whose conditions are not emergencies and who do not require hospital treatment (Lee et al., 2000). Edirne et al. (2008) found that paediatric emergency departments were used by 19.5% of patients who were not real emergencies. Aydın et al. (2010) determined that 62.3% of all patients admitted to the hospitals were not real emergencies according to physicians. Lee et al. (2000) found that 57% of all patients who were admitted to four accident and EDs were ones who could be managed by general practitioners. Oktay et al. (2003) found that 69% of visits were appropriate. The main reasons for inappropriate users to choose emergency department care were its proximity, satisfaction with care, worsening symptoms, and unavailability of care in a regular clinic (Oktay et al., 2003). In a study by Shah et al. (1996), according to the doctors, 61% of the visits were for non-urgent problems that did not require emergency care. Also, the researchers indicated that the perceived urgency of the visit was the most important predictor of a non-urgent visit to the emergency department (Shah, Shah, Behbehani, 1996).

**Forensic cases:** Emergency departments of hospitals are the most common places for forensic cases (Turkcuer et al., 2010). Summer and spring were the most common seasons for admissions of medico-legal cases to the emergency department (7.2% of all examinations in summer and 7% of all examinations in spring were found to be judicial cases) ( $X^2=16.040$ ,  $p=0.001$ ). In a study, forensic patients were found to be admitted most frequently in the months of July and August (Turkcuer et al., 2010). In the result of a study by Sever et al. (2010), summer was found to be the most common season for admissions of paediatric medico-legal cases to the emergency department. Our results are similar to the results in the literature.

**Shift and Forensic Cases:** In our study, it was determined that the 16:01 p.m.-24:00 a.m. shift (47.2%) was the most common shift for admissions of forensic cases to the emergency department. This result is thought to be related to

the more frequent intake of alcohol, as the study was conducted in a coastal settlement and in a tourist district. In study by Turkcuer et al. (2010), 22:00-23:59 p.m. hours was the most common time for admissions of medico-legal cases to the emergency department.

**Seasons, forensic cases and traffic accidents:** In Turkey, it is reported that judicial cases of applications to emergency services increase in the summer and that most of them are caused by traffic accidents (Turkcuer et al., 2010; Sungur, Akdur, Piyal, 2014). Turkey is among the ten countries constituting almost half of global traffic accident deaths (Sungur, Akdur, Piyal, 2014). In our study, 5.5% ( $n = 442$ ) of the forensic cases were traffic accidents. It was also found in our study that 0.4% ( $n = 467$ ) of those admitted to the emergency services in the study year were traffic accident cases, and 36.8% ( $n = 42771$ ) of these were trauma. According to statistics, 161 306 traffic accidents occurred in Turkey in 2013, most accidents happened in August (11.3%) and there were the fewest accidents in February (Turkey Statistical Institute, Road Traffic Accident Statistics, 2014). Varol et al. (2006) reviewed the results of patients admitted to the emergency department and found that traffic accidents had happened most in August (17.9%) and least in March (2.1%).

**Medical interventions:** In our study the leading procedure mentioned was intramuscular injection, blood pressure monitoring, intravenous catheterization (Table 2). The results are similar of the study by Niska et al. (2010). It was determined that intramuscular injection and oxygen therapy were performed most frequently during the summer. It was also IV infusions were performed most frequently during the spring and summer. In addition blood pressure monitoring was performed most frequently during the autumn and winter. This result can be attributed to the fact that the hospital is in a tourist district and the population increases during the summer (Table 2).

It was intramuscular injections were performed most frequently during the 16:01- 24:00 p.m. and 24:01-08:00 a.m. shifts. This result can be attributed to parenteral treatment being applied to the patient at night to allow these patients to have these treatments at home. Also, it was determined that oxygen therapy, IV infusion, IV

catheterisation and blood pressure monitoring were performed most frequently during the 24:01-08:00 a.m. shifts. This result can be attributed to the intravenous administration of urgent treatments in order to save the life of the patient, usually because the drugs need to have a rapid effect (Table 2).

**Limitations:** A total of 116306 admissions to the emergency department were examined in our study, but we did not examine the patients who were admitted to the emergency department repeatedly. Identification of crowding and medical interventions in the emergency services according to the seasons, months and shifts will help in planning the number of health workers, especially nurses and physicians, and will prevent an increase in health care costs by delivering the service efficiently and make the service more effective.

**Final remarks:** Visits to the emergency department are increased in the summer season and in the 16:00 p.m.-08:00 a.m. shifts, and non-real emergency visits are increased in the summer. ED visits in the summer and in the 16:00-24:00 p.m. shift may result in poor medical care. And also this situation strain emergency staff and threaten patient safety. The number of staff working in summer and the number of staff working on the 16:00 p.m.-08:00 a.m. shift should be increased in touristic towns. Legal arrangements made to facilitate the management of non-emergency conditions outside the ED could help to use financial and personnel resources more appropriately.

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