

ORIGINAL ARTICLE

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Analysis of inmate patients admitted to emergency department of a tertiary education and research hospital: A retrospective cohort study**ID**Fatih Selvi, **ID**Fevzi Yilmaz, **ID**Cihan Bedel, **ID**Omer Faruk Karakoyun, **ID**Gulsum Caliskan, **ID**Gizem Gulcan*Antalya Training and Research Hospital, Department of Emergency Medicine, Antalya, Turkey*

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**Abstract**

Inmates represent a special minority population susceptible to various health disorders that require special healthcare. Emergency departments (EDs) almost always provide the initial healthcare service for inmates, particularly in Turkey. We aimed herein to assess inmates' health problems necessitating ED admission and their effect on emergency department crowding. This was a retrospective cross-sectional study performed in the ED of a tertiary healthcare center with some 750.000 yearly admissions. We grouped emergency admissions referred from prisons into surgical, medical, psychiatric, traumatic, and musculoskeletal pain disorders. We reviewed 1250 patients, 95% (n=1187) of which were male and 5% (n=62) female. The most common causes of presentation of inmate patients were internal disorders (51.5%; n=643) and injury (19.6%; n=245). The patients with internal and surgical disorders were higher while those presenting with injury and psychiatric disorders had a significantly lower age ($p<0.05$). Among patients with internal disorders, the most common disorder was lung infection (12%); those presenting with injury most presented after self-harm (40.4%); those presenting with surgical disorders most presented with non-specific abdominal pain (21.0%); and those presenting with psychiatric disorders most presented with drug intoxication (33%). EDs are the first units of referral for every health problem of this sensitive population in Turkey. Therefore, prisons must provide critical on-site healthcare services of this medically vulnerable population.

Keywords: Prison medicine, emergency medicine, minority group**Introduction**

Prison inmates exceed a number of 10 million worldwide, and their number is constantly rising. They are a minority population particularly susceptible to health diseases and their need for special healthcare services and healthcare providers is high [1]. Inmates usually lack a good overall health since healthcare opportunities offered to them are substantially inferior to that provided for general population [2]. Inmates suffer a poor overall health due to lack of access to a decent sanitation, leading an unhealthy lifestyle, and poor access to medical services and medications, which altogether lead to a heightened hospital presentations among inmates than the populations of similar age and same sex [3].

Although inmates suffer a variety of health disorders, prisons of outside hospitals, especially ED [4]. EDs have a high patient

turnover and are under bombardment of almost incessant unexpected patient presentations. In Turkey inmates are referred to ED from prisons almost every day [5].

We performed a literature review using PubMed and the Cochrane Databases searching for relevant keywords, only to find scarce studies examining inmates' ED presentations [1,3,6-7]. Thus, to our opinion, inmates' ED admissions due to inappropriate healthcare systems they are offered are poorly reported. Hence, we aimed to investigate inmates' ED presentations at a domestic tertiary care hospital; we also aimed to determine ED-admitted inmates' demographic and clinical features and to find out the effects of those admissions on ED.

Materials and Methods**Study design and setting**

After being approved by local hospital ethics committee, this retrospective cross-sectional descriptive study was performed in inmate patients referred to the ED of Antalya Training and Research Hospital between 1 January 2016 and 31 December 2018. The study hospital was a tertiary care hospital with a yearly

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ED admission numbering 700.000.

The hospital also provides patients with Emergency Surgery and Emergency Internal Medicine services as well as their subspecialties. The hospital also possesses a 12-bed ward specifically assigned to inmates. Therefore, it is considered as the reference hospital and its ED as the initial service of care for inmate referrals in the province of Antalya and from neighboring provinces.

Patient population and data collection

This study enrolled inmates aged 18 years or older having an ED admission and meeting the inclusion criteria. The exclusion criteria included age below 18 years, having no ED admission, missing hospital records, and being no prison inmate during study period. Patients' medical data were extracted from hospital records and written patient files. We recorded demographic properties (age and gender), reason of ED admission, final diagnosis, consultation records, duration of hospital stay, discharge data, and death rate on a pre-prepared study sheet.

Presentations to ED were classified as surgical disorders (gastrointestinal and genitourinary), medical disorders (cardio-respiratory, neurologic, internal, and dermatologic), psychiatric disorders, injury and Muscle/Joint Pain groups. Each group was then further divided into most common patient complaints treated in ED. When there was more than one cause, we accepted one of them as the major cause of ED admission. Headache and abdominal pain that were unrelated by physical examination to a specific condition and that were relieved solely by painkillers were considered to be non-specific headache and non-specific abdominal pain.

Statistical analyses

The descriptive statistics were reported as frequency, standard deviation (SD), median, minimum (min), and maximum (max). Pearson chi-square test was employed to test any correlation between categorical variables. Normality of the study variables smaller than 50 in number was tested by Shapiro Wilks test and those larger than 50 in number by Kolmogorov-Smirnov test. Both groups were compared with Mann Whitney-U test with respect to variables with non-normal distribution. Kruskal Wallis test with Bonferroni-Dunn post hoc test was used to compare non-parametric variables between three groups. Statistical significance was defined as a p value of less than 0.05 for all comparisons.

SPSS v. 22.0 was used to perform statistical analyses.

Results

Among 1250 inmate patients enrolled in the study, 95% (n=1187) were male and 5% (n=63) were female. The mean age of the patients was 38.99 ± 15.55 (18-92 years). The most common reasons for ED admissions were internal disorders 51.5% (n=644), injury 19.6% (n=245), surgical disorders 13.7% (n=171), psychiatric disorders 8.2% (n=103), and musculoskeletal pain 7% (n=87). The mean age of patients with internal and surgical disorders was high while those with trauma and psychiatric problems were significantly younger than the other groups ($p < 0.05$) (Table 1).

Among patients admitted for psychiatric disorders, the most common causes of admission were drug intoxication (33%) and acute anxiety disorder (32%). The most common diagnoses made in inmates were shown on Table 2. When analyzing referrals regarding consultations from other departments, referrals for 734 (58.7%) patients were requested. The most common consulted departments were internal medicine (11.9%), cardiology (9.2%), and general surgery (9.2%), and most common departments of hospital admission were internal medicine (5.8%), cardiology (5.8%), and general surgery (4.5%) (Table 3).

Patients with internal disorders most commonly presented with lung infections such as pneumonia, bronchitis (12%), renal failure/electrolyte disorders (11.2%), and upper respiratory tract infections (URTI) such as acute otitis media, acute tonsillitis, acute sinusitis etc. The least common presentations were for pneumothorax (0.9%), epilepsy (1.1%), and superficial tissue infections such as cellulitis and erysipelas (1.2%) (Figure 1).

Among patients admitted for injuries, the most common causes of admission were deliberate self-harm (40.4%) and sports injury (21.6%) while the least common causes of admission were burns and sharp object injuries (Figure 2). Among patients admitted for surgical disorders, the most common causes of admission were non-specific abdominal pain (21.0%) and soft tissue infections (STI) requiring debridement while the least common causes were ovarian problems, birth, and inguinal hernia (2.2%).

Among the study population, 76.2% were discharged from ED after tests or treatment whereas 23.8% were admitted to hospital for further tests and treatment. Of patients treated after hospital admission, 83.2% were discharged with full recovery whereas 8.1% died.

Table 1. Comparison of inmates' diagnostic groups by age

Clinical Presentation	N (%)	Age Median	Mean Rank	p
Medical disorders	644 (51.5)	41	710.75	<0.001
Injury	245 (19.6)	29	431.21	
Surgical conditions	171 (13.7)	38	652.20	
Psychiatric disorders	103 (8.2)	30	498.17	
Muscle/Joint Pain	87 (7.0)	37	633.64	

Table 2. The most common diagnoses among inmates

Diagnosis	% (n)
Deliberate self-harm	7.3% (91)
Sports injury	7.0% (87)
Musculoskeletal pain	7.0% (87)
Lung infection	6.2% (77)
ARF	5.8% (72)
URTI	5.7% (71)
Anemia	5.0% (62)
Nonspecific abdominal pain	4.6% (58)
Chest pain	4.3% (54)
Sharp object injury	4.2 % (53)
Acute coronary syndrome	3.9% (49)
Hyperglycemia	3.4% (42)
Anxiety disorder	2.6 % (32)
Urinary tract infection	2.2% (27)
Allergy	1.4% (18)
Cerebrovascular disorders	1.4% (18)
Vertigo	1.4% (18)
Gastrointestinal bleeding	1.4% (17)
Headache	1.4% (17)
Acute appendicitis	1.1% (14)
Biliary colic	1.2% (15)
Intracranial bleeding	1.1% (14)
Pulmonary edema	1.0% (13)
Hypertension	0.9% (11)
Arrhythmia	0.9% (11)
İleus	0.8% (10)
Abstinence syndrome	0.8% (10)
Renal colic	0.8% (10)
Bipolar disorder	0.6% (8)
Urticaria	0.6% (8)
Trauma	0.6% (8)
Epilepsy	0.5% (6)
Foreign body aspiration	0.6% (8)
Conjunctivitis	0.6% (8)
Pancreatitis	0.5% (6)
Psychosis	0.4% (5)
Burns	0.4% (5)
Depression	0.3% (4)
Pneumothorax	0.3% (4)
Inguinal hernia	0.2% (3)

Table 3. Consultation and hospital admission rates

Clinics	Consultation rate N (%)	Hospital admission rate N (%)
Internal medicine	149 (11.9)	72 (5.8)
Cardiology	115 (9.2)	58 (4.6)
General surgery	115 (9.2)	56 (4.5)
Orthopedics	80 (6.4)	18 (1.4)
Neurosurgery	44 (3.5)	16 (1.3)
Neurology	52 (4.2)	10 (0.8)
Plastic surgery	31 (2.5)	8 (0.6)
Thoracic surgery	15 (1.2)	8 (0.6)
Psychiatry	70 (5.6)	8 (0.6)
Gastroenterology	9 (0.7)	7 (0.6)
Dermatology	33 (2.6)	-
Urology	17 (1.4)	6 (0.5)
Obstetrics and gynecology	8 (0.6)	4 (0.3)
Oncology	11 (0.9)	4 (0.3)
Nephrology	3 (0.2)	3 (0.2)
Anesthesia	14 (1.1)	3 (0.2)
Infectious disorders	15 (1.2)	3(0.2)
Hematology	4 (0.3)	3 (0.2)
Ophthalmology	23 (1.8)	3 (0.2)
Burn	5 (0.4)	3 (0.2)
ORL	35 (2.8)	2 (0.2)
Psychiatry	70 (5.6)	1(0.1)
Hand surgery	1 (0.1)	1 (0.1)
Cardiovascular surgery	3(0.2)	1 (0.1)
Endocrinology	1 (0.1)	-
Total	733 (58.7)	297(23.8)

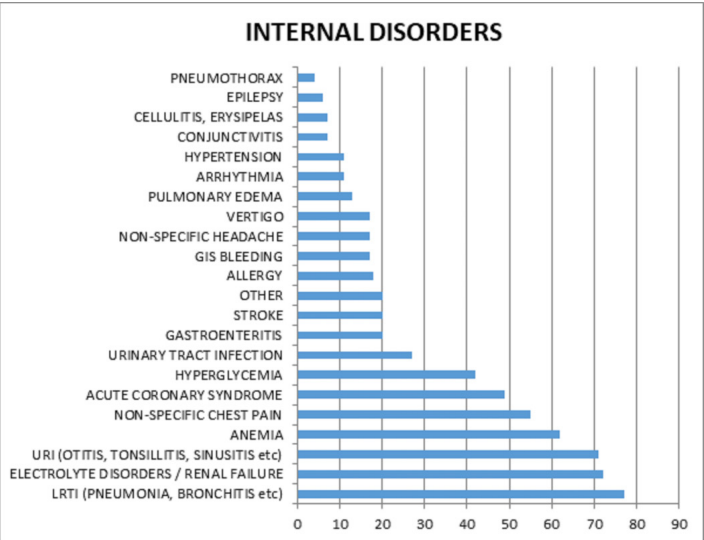


Figure 1. Summary of admissions related to medical conditions (number of patients per category)

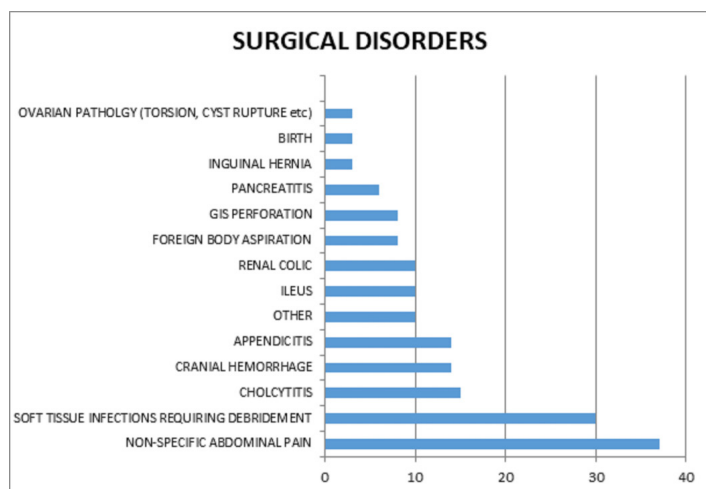


Figure 2. Summary of admissions related to surgical conditions (number of patients per category)

Discussion

There are above 10 million prison inmates worldwide, with the number going as high as more than 11 million when individuals on pretrial detention are considered [8]. As of 2016, 6.6 million people live under correctional supervisory facilities such as jails, prisons, on probation, or on parole in the United States alone, making up 2.6 percent of the adult population. Some 10.6 million people are admitted to jails and 606,000 to prisons each year in the same country [9, 10]. As in the whole world, the number of people entering prisons has been constantly increasing [11]. According to February 2019 data, there are a total of 208,457 convicts and 55,574 detainees in 365 prisons in our country [12].

Prisons have started to host a soaring population in the last decade when ED overcrowding has also become an important public health problem [13]. The number of ED admissions has been constantly increasing year after year, and it has surpassed Turkey's population. The number of ED admissions totaled 94 million 781 thousand and 306 in 2011 whereas it rose to 110 million 915 thousand 407 in 2015, in a country with a total population of 78.7 million [14]. Currently, the number of inmates admitted to ED accounts for 0.5% of all ED admissions [1]. The number of inmates presenting to our ED also increase, increasing the burden of our already overcrowded ED.

EDs are healthcare facilities serving all medical and surgical emergencies including injuries on a 7/24 basis. Emergency physicians come across a wide variety of patients with different psychological and behavioral problems, and inmates are one of the most challenging ones (3) due to security concerns for custodial guards encompassing logistic issues related to security during transfer to and in the ED, accompanied by diagnostic and treatment problems of ED physicians while caring for inmates because of extra burden brought this population to EDs [12]. The problem of ED overcrowding, particularly due to increasingly longer durations in ED, has been growing each day worldwide, limiting the capabilities of EDs to provide appropriate and quality healthcare for patients in need of urgent medical attention [15, 16]. One of the major reasons of our emergency department's overcrowding is inmate admissions.

Disorders among inmate population are affected by many factors. Difficulties related to infrastructure, nutrition, sheltering, and access to healthcare services resulting from increasing inmate population have been gradually mounting [17, 18]. Employing the ward system where inmates live together in many prisons in Turkey not only increases the rate of transmission of infectious diseases, it also adversely affects the adherence of inmates with comorbid disorders to their diets, medications, and physical exercise prescriptions [7]. Frank et al. reported that inmates became more susceptible to diseases due to unfavorable conditions, their chronic disorders worsened, and they even presented to ED more commonly than others after their release [19].

Although former studies on inmates worldwide have reported that the mean age of inmates presenting to ED had a mean age of 36-38 years, albeit with societal differences [1]. In a domestic study by Koç et al. on inmates presenting to ED the mean age of the study population was found 41 years [6]. In line with the literature, we detected a mean age of 39 years. Whereas their ratio has increased within the last decade, women still represent a minority group among inmates [5]. Frank et al. [7] reported that 15% of inmate patients were women; Pfortmueller et al. [1] 22%; and Harris et al [16] 6%. According to the statistics kept by the Ministry of Justice in our country, 3.54% of inmates are women [11]. Similarly, 5% of our patients were women. The ratio of female inmates show variability by society due to societal differences [19]; we believe that the ratio was in favor of men as men are more inclined to commit an offence in patriarchal societies like ours. Additionally, we believe that male inmates are referred to ED due to a higher rate of comorbidities.

Inmates usually suffer a greater rate of psychiatric disorders than the general population. They have been reported to manifest a high rate of depressive and anxious symptoms due to long sentences and poor living conditions in prisons (3, 20-25). This is further complicated by serious mental diseases, substance abuse, and antisocial personality traits [26]. In the United States suicide was the major cause of death among inmates in 2014 [27]. Pfortmueller et al [1] reported that inmates were most commonly admitted to ED for aggressive behavior and drug overdose. Koç et al. [6] reported that inmates presented to ED most commonly due to psychosocial crisis. Boyce et al. [21] found that the potential of drug abuse and deliberate self-harm was high among inmates. We showed that the most common psychiatric disorders among inmates presenting to ED were acute anxiety disorders and drug intoxication. Considering the higher frequency of psychiatric disorders of inmates and increased stress in prisons, a higher drug intoxication rate may be explained in this population. Moreover, our observations in ED suggest it should be remembered that inmates may suffer acute anxiety crisis and try drug intoxication to leave prison.

A domestic study reproductive that non-inmates presenting to ED were consulted with other departments at a rate of 20% and admitted to hospital at a rate of 12.5%, further adding that those patients were most commonly consulted with and admitted to internal medicine, cardiology, general surgery, and orthopedics [28]. We, on the other hand, demonstrated that 58.7% (n=733) of patients were consulted with other departments, with most consulted branches being internal medicine (11.9%), cardiology

(9.2%), and general surgery (9.2%). Boyce et al. found a hospital admission rate of 35.6%, with the most common indications for admission being internal (12%) and surgical (16%) disorders [23]. We similarly demonstrated that 23.8% of our patients were admitted to hospital for advanced tests and treatment, with patients being most commonly admitted to internal medicine (5.8%), cardiology (5.8%), and general surgery (4.5%) clinics. We believe that as a result of incidents in prison developing acutely or patients' statuses deteriorating suddenly results in patients being referred from a poorly equipped healthcare facility to ED, leading to high consultation and admission rates.

The reason why inmates suffer serious health conditions despite having a relatively low mean age is attributed to having an unhealthy lifestyle in their lives prior to entering prison [29]. Literature data indicate that inmates had a comorbidity rate of 65-81%, reporting high admission and mortality rates as a result of inmates having no health insurance and poor living conditions in prison [17, 30-32]. Our study indicated a mortality rate as high as 8% among patients admitted to various clinics, which we attribute to their disease history and poor living conditions in prison.

Conclusion

The result of this study gave the impression that certain improvements in living conditions of inmate patients living in prisons would result in reductions in the incidence of internal disorders or even trauma. Furthermore, considering that 76.2% of patients admitted to ED were discharged, as indicated by our study, we believe that the number of inmate patients referred to ED could be reduced by increasing the number of healthcare facilities and improving the quality of healthcare services.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Ethics approval was obtained before the study (2/1 25/01/2018).

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