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RETROSPECTIVE ANALYSIS OF 32,749 PATIENTS: A PILOT ORTHOPEDIC TRAUMA REGISTRY STUDY IN ANKARA PROVINCE

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Abstract

Objectives: Musculoskeletal injury is a public health concern that substantially increases the workload of emergency healthcare providers and hospitals in developing countries. Successful management of the diagnosis and treatment processes reduces healthcare costs and shortens the duration of preventable disabilities in patients with musculoskeletal injuries. Here, we aimed to investigate the musculoskeletal trauma distribution within five years within the borders of Ankara province.

Materials and Methods: In this study, preliminary diagnoses of the patients with musculoskeletal injury made within five years (2014 – 2018) by emergency healthcare providers in Ankara were retrospectively screened through the Emergency Health Automation System – EHAS. The patients were classified according to age, gender and diagnosis.

Results: This study included data for the time period between 2014 and 2018 from 32,749 patients, i.e., 19,523 male and 13,226 female patients in Ankara province. The number of patients was recorded for each year, and it was found that there was an increase in the number of patients between years. Musculoskeletal trauma was most commonly seen in the 19-64 (adult) age group, and the highest number of cases was observed in April. Hips and thighs were the most common trauma regions in the body.

Conclusion: This study is the first to analyze data obtained from emergency healthcare providers in Turkey, and it can be considered a pilot study that can be utilized to eliminate the existing drawbacks and optimize registry systems by updating them.

Keywords: Musculoskeletal injury, national registry, trauma, emergency healthcare.

Introduction

Musculoskeletal injury is a public health concern that substantially increases the workload of emergency healthcare providers and hospitals in developing countries.[1,2] Such injuries have a greater impact, particularly in developing countries, due to resulting labor and economic losses. Therefore, it is important to investigate the demographic distribution of musculoskeletal injuries in developing countries and determine new treatment strategies and the necessary measures.[3,4]

Successful management of the diagnosis and treatment processes reduces healthcare costs and shortens the duration of preventable disabilities in patients with musculoskeletal injuries.[5,6] Therefore, updating existing infrastructure and service conditions after thoroughly evaluating emergency healthcare providers' orthopedics and traumatology databases would be highly beneficial.[7,8,9]

National registries are increasingly becoming important sources of data, and therefore all recorded data should be thoroughly analyzed in today's studies.[7,8] Proper registry of musculoskeletal injury data involves various challenges from both regional and national aspects.[9,10] It is particularly challenging to ensure that emergency healthcare providers in Turkey keep up-to-date and accurate records since multiple registry processes take place simultaneously for a high number of patients. On the other hand, more accurate data in Turkey has become available in the last five years because service provider registry systems have been revised and updated.

The aim of this study was to answer the following questions:

1. What is the number of trauma patients who presented to emergency healthcare providers within the borders of Ankara within the specified five-year period?

2. What is the distribution of trauma patients by month-year and affected body region?

3. How did the emergency response cases end up?

Materials and Methods

In this study, preliminary diagnoses of the patients with musculoskeletal injury made within five years (January 2014-December 2018) by emergency healthcare providers in Ankara were retrospectively screened. Data were obtained from the registry of the Ankara Provincial Directorate of Health (Emergency Health Automation System – EHAS). The ethical approval was obtained from the local ethics committee. According to the inclusion

criteria, all patients registered in the EHAS system with trauma complaints were included in the study. Patients with incomplete EHAS records and those who died were excluded. Patients were initially diagnosed by emergency healthcare personnel according to their complaints. Patient complaints were broadly classified as upper and lower extremity traumas and torso traumas. In addition, extremity traumas were also classified into subgroups. Data were analyzed by grouping the patients according to age, gender, and the time and month when the trauma occurred. To ensure standardization, the cases defined according to the ICD-10 codes were grouped under certain categories. Upper extremity traumas were classified as wrist and hand injuries, elbow and forearm injuries, and shoulder and upper arm injuries. Lower extremity traumas were classified as ankle and foot injuries, knee and calf injuries, and hip and thigh injuries. Injuries to the body parts were classified as multiple injuries.

Statistical Analysis

Statistical analysis was performed using SPSS (version 17.0, SPSS Inc., Chicago, IL, USA). The Wilcoxon test was used to make comparisons between average mean values. The reliability of the implementations was tested using a reliability test and correlation coefficients. $p < 0.05$ was considered statistically significant.

Results

This study included data from 32,749 patients, i.e. 19,523 male (59.61%) and 13,226 female (40.39%) patients (Table 1). The patients were evaluated according to age distribution, and the highest incidence of musculoskeletal trauma was observed in the 18-49 age group in both genders (Figure 1). Considering the total number of traumas observed within the specified five-year period, the highest number of patients admitted with trauma was observed in 2017 (8,951), and an increase of 37.90% was observed in the number of patients admitted with trauma between 2015 and 2016 (Figure 1). Moreover, considering the distribution of traumas by month, the highest number of patients with trauma was observed in the fourth and eighth months (April; 3,284 and August; 3,251), without any significant difference between the years (10%) (Figure 2).

The distribution of the number of patients by month was also analyzed separately for each year, and it was reported that 386 patients were admitted in the 8th month (August) of 2014, 577 patients in the 10th month (October) of 2015, 803 patients in the 5th month (May) of 2016, 1335 patients in the 8th month (August) of 2017 and 1412 patients in the 4th month (April) of 2018 (Figure 2). Accordingly, it was found that the highest incidence of musculoskeletal trauma was observed between the 4th and 10th months within the specified five-year period. Considering the distribution of the number of patients by time of trauma, the highest number of patients admitted with trauma was observed between 12:00-18:59, i.e., 14,596 cases, and there was no significant difference between genders ($p > 0.05$) (Figure 3). According to patient follow-up results obtained

from emergency healthcare providers, the most common incident was the transport of patients with musculoskeletal trauma to the hospitals (20,883 patients) and the least common incident was the death in 33 patients (0.10%) within five years (Table 2).

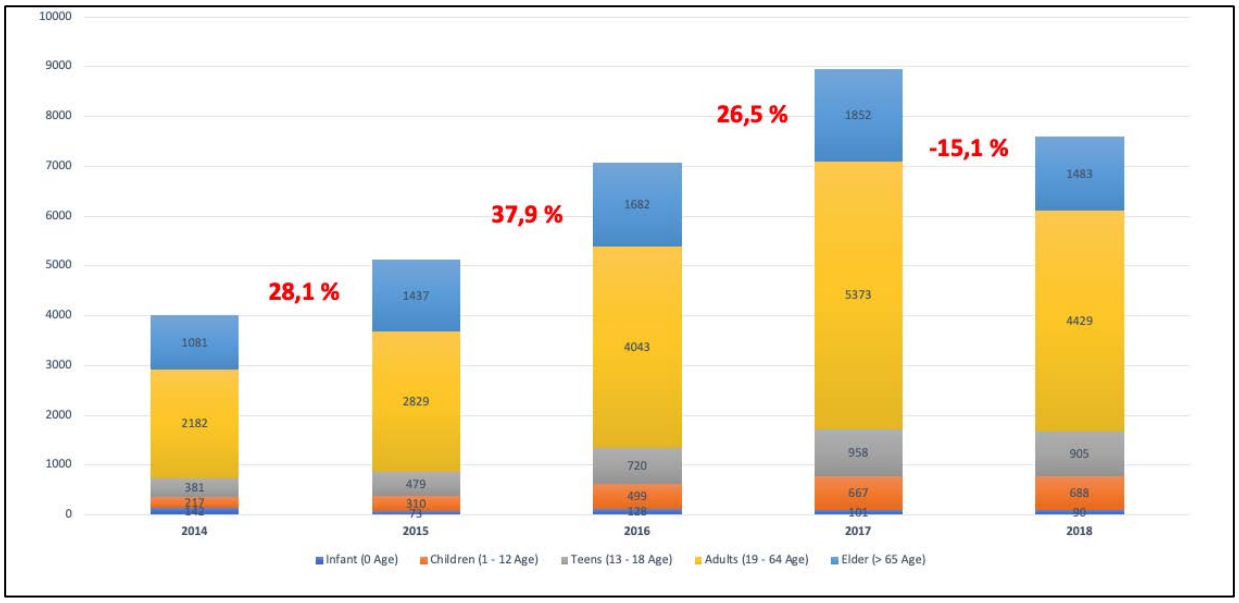

Figure 1. Total number of cases by age groups

Table 1. Total number of cases by gender

	2014 n (%)	**2015 n (%)**	**2016 n (%)**	**2017 n (%)**	**2018 n (%)**	**Total n (%)**
Male	2.286 (%57.10)	2.905 (%56.64)	4.298 (%60.77)	5.488 (%61.31)	4.546 (%59.85)	**19.523 (%59.61)**
Female	1.717 (%42.90)	2.223 (%43.46)	2.774 (%39.23)	3.463 (%38.68)	3.049 (%40.15)	**13.226 (%40.39)**
Total	**4.003 (%100)**	**5.128 (%100)**	**7.072 (%100)**	**8.951 (%100)**	**7.595 (%100)**	**32.749 (%100)**

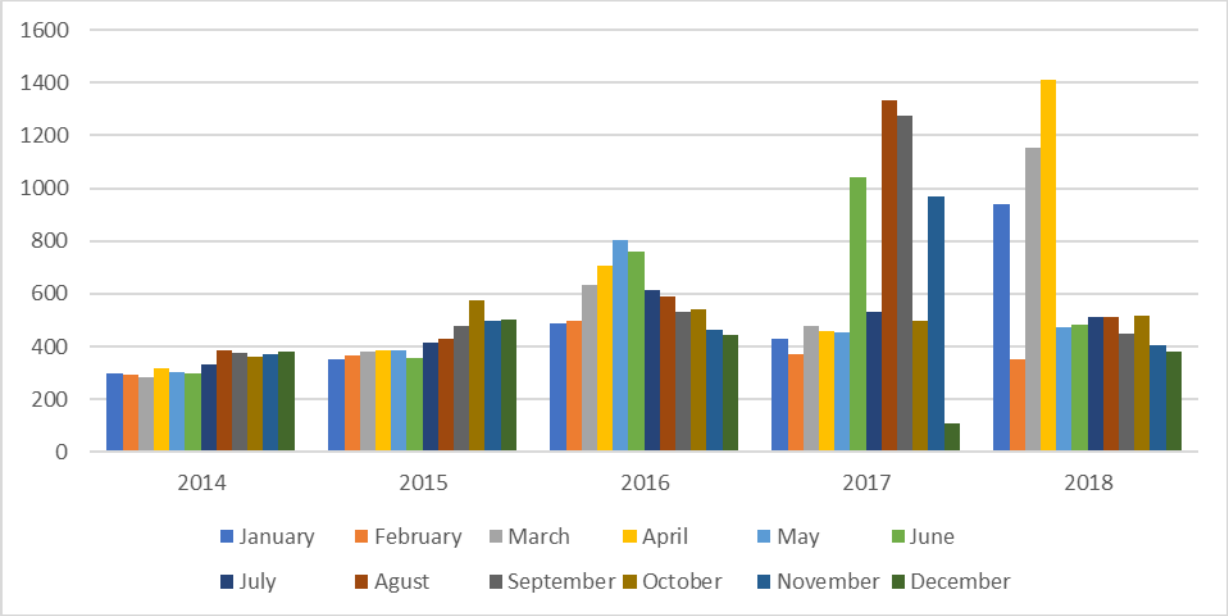

Figure 2. Total number of cases by months-year

Table 2. Total number of cases by results

	2014 n (%)	**2015 n (%)**	**2016 n (%)**	**2017 n (%)**	**2018 n (%)**	**Total n (%)**
Transfer to the Hospital	2.220 (%55.45)	2.968 (%57.87)	4.379 (%61.92)	6.262 (%69,95)	5.200 (%68.46)	**21.029 (%64.21)**
Transfer Between Hospitals	875 (%21.9)	929 (%18.11)	1.128 (%15.95)	1.180 (%13.18)	1.205 (%15.86)	**5.317 (%16.23)**
Transfer to the Home	560 (%13,98)	727 (%14.17)	851 (%12.03)	401 (%4.47)	360 (%4.73)	**2.899 (%8.85)**
Rejection of Transport	230 (%5.74)	367 (%7.15)	508 (%7.18)	775 (%8.65)	632 (%8.32)	**2.512 (%7.67)**
Others	40 (%0.99)	59 (%1.15)	109 (%1.54)	217 (%2.42)	116 (%1.52)	**541 (%1.65)**
On-Site Intervention	72 (%1.79)	73 (%1.42)	93 (%1.31)	110 (%1.22)	70 (%0.92)	**418 (%1.27)**
Exitus	6 (%0.14)	5 (%0.09)	4 (%0.05)	6 (%0.06)	12 (%0.15)	**33 (%0.10)**
Total	**4.003 (%100)**	**5.128 (%100)**	**7.072 (%100)**	**8.951 (%100)**	**7.595 (%100)**	**32.749 (%100)**

According to the case distribution by affected region within the specified five-year period, hip and thigh injuries had the highest incidence rate (23.34%), followed by ankle and foot injuries (18.58%), multiple injuries (16.48%) and elbow and forearm injuries (1986 cases, 6.09%), respectively (Figure 4).

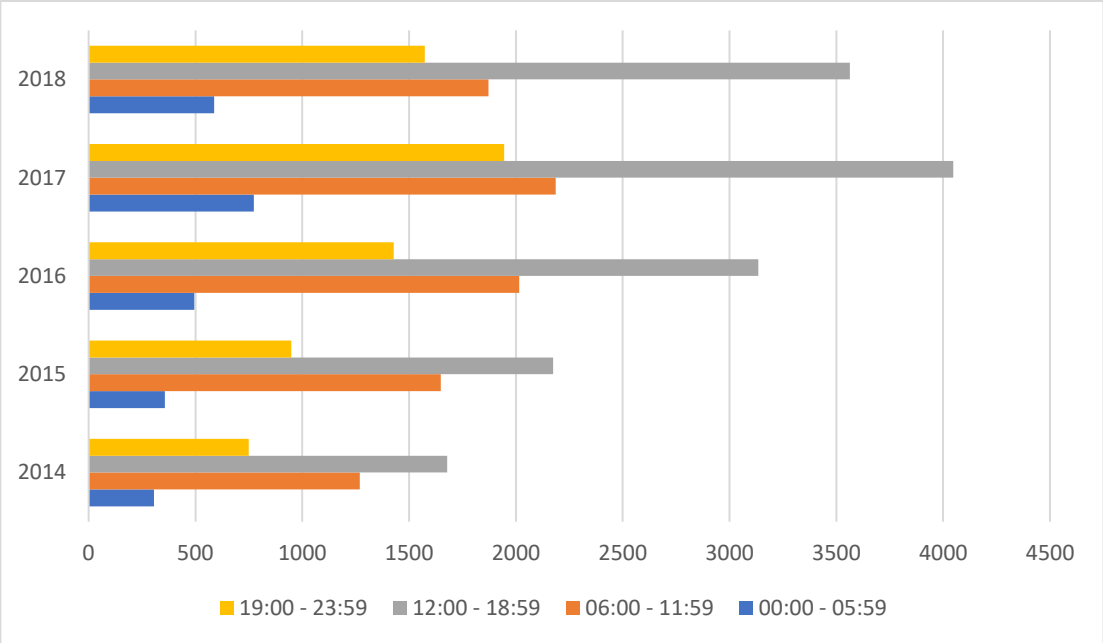

Figure 3. Total number of cases by the hour

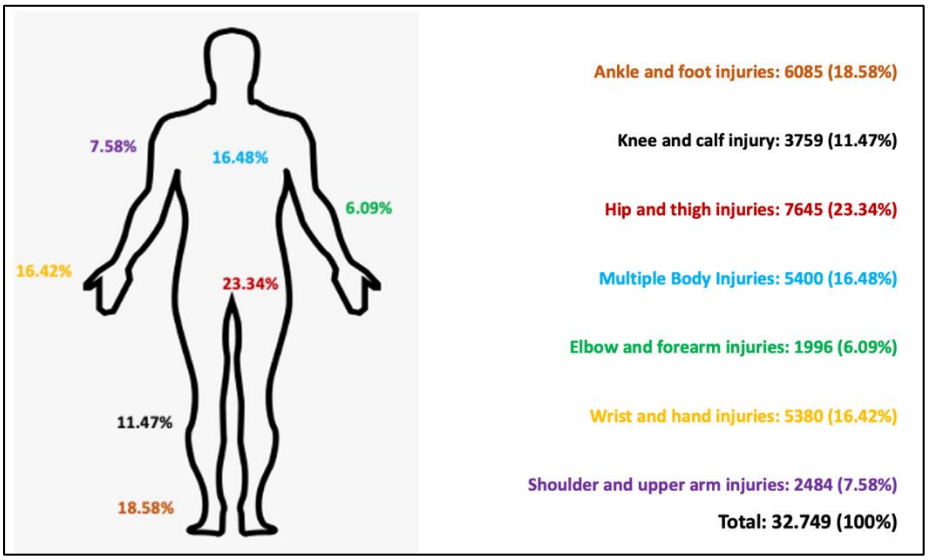

Figure 4. Total number of cases based on diagnosis

Discussion

The purpose of this pilot study was to obtain fundamental data for the effective and reliable design of a Turkish National Trauma Registry System. National Registry Systems provide researchers with reliable data and lead to the description and proper implementation of healthcare policies. The most important finding of this study

was that the majority of trauma patients were male and most of the traumas were found in the hip-thigh region. Considering the studies that investigate localized trauma in the literature: Laurila et al. conducted a study in 2019 to investigate the incidence of tibial fractures following isolated acute trauma between 1997 and 2014 in the Finland registry and found that the incidence of acute tibial fractures was 57.3% in males.[11] Moreover, in another study by Shah et al. conducted in 2017, the incidence of shoulder dislocations in England was investigated for the time period between 1995 and 2015, and it was stated that 72% of the dislocations occurring due to acute trauma were observed in males.[12] In this study, the incidence of trauma exposure was significantly higher in the male population as compared to females (59.6% in males, 40.4% in females), which was attributed to the fact that men work at jobs that require higher effort and therefore, have a higher risk of trauma exposure. Considering the publications relating to trauma registries in the literature, it was found that most publications had information about the regional distribution of trauma, increase in the number of cases according to years, gender distribution, and localization, whereas information on the distribution of trauma cases by month of the year was not available.[3, 8, 13] In this respect, our study will contribute to the literature.

There is also the possibility of generalizing on a population basis rather than on a limited group of patients.[14,15] Musculoskeletal traumas become more and more prevalent with the increasingly faster pace of life, and it is important to manage these traumas from various aspects.[16,17] The majority of centers providing healthcare services are highly populated by patients with musculoskeletal trauma.[18,19] Therefore, planning can be more appropriately conducted by management, and cost analyses can be evaluated according to trauma types through proper record keeping and archival of trauma records. There are studies concerning various data registries for health services in the literature.[3,7,8,20] Particularly, there are studies conducted in numerous countries on orthopedics and traumatology concerning trauma, arthroplasty, and arthroscopy.[21-23] These studies have shown that proper analysis of data enables conducting various cost analyses and important managerial planning processes. There is only one study previously conducted by Ceyhan et al. concerning the arthroplasty records in Turkey, even though registries are of utmost importance in healthcare.[24] This descriptive study is the first one to investigate the data concerning services provided by emergency healthcare providers, i.e., the first line of emergency health service delivery for patients with musculoskeletal trauma in Turkey.

The success of the initial intervention depends on the consistency between the initial diagnosis and the final diagnosis made at the center that will provide treatment for the patient.[25-27] Proper use of registry systems would pave the way for various in-service training and planning processes after the analysis of patient data. Therefore, it would be possible to provide training on the approach to the musculoskeletal system and planning processes for emergency service provider personnel. Moreover, the regional distribution of patient volume can be studied when planning emergency healthcare services in order to employ additional service providers during months and time intervals when patient volume is higher.

There is a considerably limited number of studies investigating trauma according to the localization in the literature, wherein research mainly focuses on isolated localized trauma.[7,8,11,28] In this sense, this study will also contribute to the literature in terms of identifying trauma exposure in all parts of the body in the adult population. Trauma to the hip joint generally manifests with hip fractures, especially in the older adult population.[29] The number of patients and age distributions reported in the literature were similar to the figures obtained in this study.[30]

Unlike previous studies on trauma registries in the literature, this study also investigated the time of the day when patients were exposed to trauma. The highest incidence of exposure to trauma was found to be between 12:00-18:59, i.e., within working hours when people become more tired and have less attention with more hours worked. In this respect, it can be recommended to also consider the working periods while taking precautions to reduce trauma exposure. This study also mentioned the outcomes of trauma, on which there is limited information in the literature. The study showed that 64% of trauma patients were transferred to the hospital and a very low proportion of patients, i.e., 0.1%, died at the trauma scene. Therefore, it is possible to say that almost all patients were transferred to a treatment center while they were still alive, regardless of the extent of trauma.

The weakness of our study was that the regional distribution of patients within Ankara and final diagnoses could not be evaluated. On the other hand, our study included a high number of patients, the data loss was low, and the distribution of the patients by month and time of the day could be observed, which were the strengths of the present study.

This study is the first one to analyze data obtained from emergency healthcare providers in Turkey, and it can be considered a pilot study that can be utilized to eliminate the existing drawbacks and optimize registry systems by updating them. Professional use of the existing registry infrastructure can enable further studies that could involve a more thorough investigation of case distributions and more proper data analysis.

Ethical Considerations: This study was organized with the permission of the Ankara Provincial Directorate of Health and was approved by the local Ethics Committee (Ankara Yildirim Beyazit University; approval number 2021 - 36).

Conflict of Interest: The authors declare no conflict of interest.

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