

## TRAUMATIC INJURIES PRESENTING TO THE EMERGENCY DEPARTMENT IN A LEVEL-1 TRAUMA CENTER, SAUDI ARABIA

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### ABSTRACT

**Objective:** Traumas are a major health concern in Saudi Arabia, and they can result in many injuries burden. Furthermore, it is one of the main causes of morbidity and mortality in the worldwide. As a result, the awareness of physicians who are the first to see trauma is critical. The study aims to determine the prevalence of traumatic injuries in emergency department.

**Methods:** It is a retrospective study that used the trauma registry of the King Abdulaziz Medical City, Trauma Center to analyze data from January 2015 to January 2020 on trauma patients admitted to the hospital. Demographic features, date and time of admission, type and mechanism of injury, patterns of transportation, and rates of severity were analyzed.  $p < 0.05$  was considered statistically significant.

**Results:** A total of 6095 patients, the majority were male (79.9%). Blunt trauma was the most prevalent type of injury (85.7%,  $p < 0.001$ ). A motor vehicle accident was the most prevalent mechanism of injury (37.5%). The highest proportion of trauma per age group was in the 21–30 year age group (28.7%). The mean of Injury Severity Score in the current study was found to be 10.7 and the injured patients' Glasgow coma scale (GCS) mean was 13.4. The ICU stay average was 3.6 days while the hospital stay was 17.2 days.

**Conclusion:** This study revealed trauma injury patterns in a tertiary hospital in Riyadh, Saudi Arabia, demonstrating the local variation across genders, age groups, types of injury, and mechanisms of injury. These demographic data would be useful for local resourcing of the healthcare system to full impact.

**Keywords:** Blunt trauma, Motor vehicle accidents, Saudi Arabia.

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### INTRODUCTION

Traumatic injuries are a significant health problem and one of the causes of morbidity and mortality worldwide. The incidence of traumatic injuries is expected to exceed that of all other disability-adjusted years of life (DALY) causes. For many countries around the world, traumatic accidents are now identified as the leading cause of death [1,2]. Road traffic accidents (RTAs) have become a major public health issue. Annual estimates by the World Health Organization and the International Transport Forum estimate around 1.35 million people are died and around 50 million are injured in RTAs, costing more than USD 520 billion worldwide. Current statistics show that if adequate preventive steps are not taken, then RTAs are expected to be the seventh leading cause of death for all age groups by the year 2030, which is currently the leading cause of death for the aged 15–29 [3].

Road traffic accidents (RTAs) present a serious socio-economic burden in Saudi Arabia (SA) not only for the victims but also for their families, hospitals, trauma centers, and the Saudi government. The country's projected annual cost of RTAs is 21 billion SAR, a loss of 2.2%–9% of gross domestic product. Statistically, trauma is known as the first cause of death in SA, with road traffic accidents responsible for 80%–85% of these traumas. In 2008, SA reported 484,805 road traffic incidents with 6142 fatalities, equivalent to 17 RTA-related deaths per day in SA [1]. Saudi Arabia is the largest country with an area of some 2,149,690 km<sup>2</sup> in the Arab states. The country is a part of major world economies of the "Group of Twenty" (G-20). The SA motorization rate has risen rapidly since the oil discovering of the early 1970s. Due to the migration of expatriates from different parts of the world, it has increased by nearly 67% in the last decade, resulting in rapid urban expansions of major cities. Such expatriates have varied backgrounds and personalities, programs of assessment and training to receive licenses and conduct behaviors [3].

A trauma registry is an effective tool for enhancing outcomes for people. A very well-designed trauma registry program accumulates useful data to be measured and related to outcomes of patients. Besides, doctors should use the data to promote the implementation of preventive measures to reduce the mortality and morbidity associated with these preventable traumatic injuries. It includes cooperation with the Saudi Ministry of Education and the Saudi Department of Traffic to educate students on general traffic laws and traffic accident avoidance.

The study worked to classify the type and mechanism of trauma as well as the distribution of gender and age groups to provide proof of the statistics associated with such traumatic injuries.

### METHODS

This retrospective observational study was carried out by King Abdulaziz Medical City (KAMC) and is located in Riyadh, which represents the largest hospital in Saudi Arabia. The KAMC is considered a specialist trauma center because it provides emergency treatment 24 h a day, giving multiple services access to care plans. In addition, the KAMC is one of the few SA medical institutions accredited by the American College of Surgeons to provide specialized training for emergency life support.

The dataset used in this analysis was derived from the database of KAMC trauma. The database has provided detailed information of all admitted acute traumatic patients seen from January 2015 to January 2020.

In this study, the analysis will be based on the following variables: Demographic data, type of injury, injury mechanism, transportation patterns to the emergency department, disposition patterns from the

ED, patients disposition from the hospital, injury severity score (ISS), Glasgow coma scale (GCS), intensive care units (ICU) length of stay, and hospital length of stay. Meanwhile, the patients will be divided into male and female. In addition, the types of injuries were classified as blunt, penetrating, and gunshot injury. The mechanisms of injury were allocated to MVA, pedestrian, homicide, or injury intentionally caused by another person, fall, motorcycle, suicide, and self-inflicted injury, and burn.

All analyses of the data were performed using SPSS Statistics (version 25; IBM Corp., Armonk, NY, USA).

## RESULTS

A total of 6095 patients reported from January 2015 to January 2020 in the King Abdulaziz Medical City trauma registry. The 21–30 age group had the highest proportion of trauma in the study (28.7%, n=1749), followed by the 14–20 age group with 17.1% (n=1040) and 15.1% (n=923) 61 plus age group (Table 1). The mean of age groups is 34.15 with range from 1 to 110 years. Many of the samples were male (79.9%, n=3262), but the female was (22.1%, n=1345).

Blunt trauma was the most common type of detected traumatic injuries among the patients (85.7%, n=5221), followed by penetrating injuries (8%, n=486) and burn injuries (6.3%, n=388) (Table 2). Motor vehicle accident was the most common mechanism of injuries (37.5%, n=2288), followed by fall (29.5%, n=1799) and those caused by other accidents (12.3%, n=747) (Table 2).

The most common transportation patterns to the emergency department of the hospital of recorded traumatic patients were private vehicles (52%, n=3171), followed by ambulance (47%, n=2865) and helicopter (0.8%, n=49) (Table 3).

After emergency department physicians assessment and managements of admitted traumatic patients, the most patients going to the wards

(68.8%, n=4193), followed by intensive care units admissions (14.5%, n=884) of critically ill patients, followed by patients needed surgeries (10.9%, n= 665), and the patients died in the emergency department (2.4%, n=149) (Table 3).

The hospital outcome of traumatic patients was (91.8%, n=5596) patients discharged to the home after the treatment, followed by (3.8%, n=232) deaths in the hospital, and (2.4%, n=146) patients transferred to another hospital (Table 4). The injured patients' Glasgow coma scale (GCS) mean was 13.44 but the injury severity score (ISS) mean was 10.7. The ICU stay average was 3.6 days while the hospital stay average was 17.2 days.

## DISCUSSION

KAMC's trauma database is an important resource to promote trauma-related studies and the trauma-related mortality rate. Information access helps researchers, the Ministry of Health and the Saudi General Traffic Department to examine the issue and improve safety measures to minimize the incidence of such preventable injuries in Saudi Arabia. Trauma is known as one of the most prevalent causes of permanent disability and death [2]. The goal of this study was to demonstrate the types, characteristics, and outcomes of trauma in the area of Riyadh, SA. Unlike chronic illnesses that arise late in life, trauma affects young people and the middle ages [3].

Trauma occurs more commonly in people aged 21–30 years, resulting in hospital patients a fatality rate of 5.8% for both dead on arrival and death in the hospital patients. Many patients are left with permanent disability for every trauma of death and pose a significant economic burden for society [4]. Results from this research found that males were more likely to be affected by trauma injuries than females. This result is consistent with that of global researches [5,6], which we conclude is related to males' propensity to participate in risky and dangerous behaviors.

Blunt trauma was the most prevalent injury cause, accounting for 85.7% of all cases more common than penetrating or burn injuries, and among all types of injuries, a male predominance trend was found. MVAs were the most common cause of blunt trauma in the present study at 37.5%, followed by fall 29.5%, and those caused by another physical object at 12.3%. This result is consistent with the trend found in an earlier study

**Table 1: Demographic characteristics of the patient's age**

Category	Frequency	Percentage %
1–13	656	10.8
14–20	1040	17.1
21–30	1749	28.7
31–40	822	13.5
41–50	472	7.7
51–60	433	7.1
61+	923	15.1
Total	6095	100

**Table 2: Demographic characteristics of the types and mechanisms of injuries**

Variables	Frequency	Percentage
Types of the injury		
Blunt	5221	85.7
Penetrating	486	8
Burn	388	6.4
Total	6095	100
Mechanism of injury		
Burn	200	3.3
Fall	1799	29.5
Homicide and injury purposely inflicted	280	4.6
Motor vehicle accident	2288	37.5
Motorcycle accident	301	4.9
Other accidents	747	12.3
Pedestrian	341	5.6
Scald or burn due to liquid	115	1.9
Suicide and self-inflicted injury	23	0.4
Total	6095	100.0

**Table 3: Transportation patterns of the patients**

Variables	Frequency	Percentage
Transportation patterns to the emergency department		
Private vehicle	3171	52
Ambulance	2865	47
Helicopter	49	0.8
Police	10	0.16
Total	6095	100
The emergency department disposition		
Burn unit	204	3.3
ICU	884	14.5
Morgue	149	2.4
OR	665	10.9
Ward	4193	68.8
Total	6095	100

**Table 4: The hospital disposition**

Disposition	Frequency	Percentage
Home	5596	91.8
Transfer to another hospital	146	2.4
Death in the hospital	232	3.8
Death on arrival	121	2.0
Total	6095	100

of adult patients, where the most common cause of blunt trauma was traffic-related injuries [7-9].

The WHO has reported that Saudi Arabia's mortality rate due to MVAs was 24.8 per 100,000 population (more than 130,000 deaths annually). The mortality rate differs among Gulf countries due to MVAs. In Bahrain it was 10.5/100,000 people, in Kuwait it was 16.5, in UAE it was 12.7 and in Oman, it was 30.4 [4]. This finding highlights the importance of setting up a multidisciplinary team to address this problem and to prevent MVAs mainly through modifying drivers' behavior in Saudi Arabia and engaging drivers through awareness campaigns such as those conducted through social media.

Many patients were not hospitalized because they were not transported by ambulance. Given excellent epidemiological evidence, the usefulness of pre-hospital procedures, methods of transportation, and training of first responders working with trauma patients are debated [9]. New practice prioritizes pre-hospital time-saving strategies by treating only life-threatening injuries by bleeding control, cervical-spine stabilization, and similar procedures [10,11]. Based on our data, the most common transport patterns of observed traumatic patients to the hospital's emergency department were 52 % private cars, 47 % ambulance followed, and 0.8% helicopter, which is more than previous studies.

The present study found that the majority of admitted patients transferred to the wards were 68.8%, followed by intensive care units admitting 14.5% of critically ill patients, followed by patients needing surgery 10.9%, and patients died in emergency room 2.4%, these are similar to the international admitted trauma patients [1,6,12,13].

The hospital admitted trauma patients from the ER department provided the required diagnosis and severity treatment. We found that there were 91.8%, patients discharged after treatment to the home, followed by 3.8% deaths in the hospital, and 2.4% moved patients to other hospitals. These findings are similar to Abdel-Salam *et al.* and different from Hokkam *et al.*, showing that 48.2% of patients were discharged to their homes, 17% were moved to other hospitals, and only 2.6% died [4,9]. The variation between various studies may be attributed to the differences in the medical equipment and services used.

GCS among our patients averaged 13.44 which are considered a mild injury [14]. Nevertheless, the ISS mean was 10.72. The length of stay of a hospitalized patient (LOS) may have a direct effect on a health-care facility's efficiency and operating costs [11,15,16]. In the current study, the mean LOS was 17.23 days, which is similarly quiet to Alghnam *et al.* [2,12]; however, the Icu's admission was 3.67.

Our study highlighted the types of traumatic injuries that pose a higher mortality risk. Because of recent protocol changes in the Saudi system, the study provides useful baseline data for future studies in this field. The study presented evidence that a motor vehicle accident was the most prevalent cause of injury.

## CONCLUSION

It can avoid and predict various diseases even before they can occur. The same idea applies to trauma, too. This study has shown that RTI is responsible for major life loss, disabilities in the population of Saudi Arabia because it affects the young male and economically active age group. Against the context of the Government of Saudi Arabia's recent involvement in addressing RTI, these findings may help to raise the profile of RTI as a public health concern that needs to be addressed as a preventable cause of mortality and morbidity and to prepare effective strategies for it. The results illustrate the need to develop an effective multidisciplinary program to address the causes of trauma and to develop a strategy to reduce the burden of this disease, especially in Saudi Arabia. When part of the solution to trauma challenges, doctors

are now expected to provide their patients with anticipatory advice, in accordance with these findings.

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## AUTHOR CONTRIBUTIONS

Nasser Alrashidi: Conceptualization; Data curation; Formal analysis; Methodology; Supervision; Validation; Writing—Original draft.

## CONFLICT OF INTEREST

The author declares that he has no conflict of interest.

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## ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

The study was done with the permission of the Qassim University, SA, Ethics Review Committee. Hospital officials were notified about the study and its goals. All information was ensured of privacy and confidentiality.

## REFERENCES

1. Albabtain I, Alfahaid O, Alghunaim M, Mamoon A, Alshaibil S, Albaqami M, *et al.* Epidemiology of adult trauma at a tertiary hospital in Riyadh, Saudi Arabia. *Int J Med Res Health Sci* 2019;8:101-7.
2. Alnasser A, Othman A, Mobairek O, Alharthy N, Aljerian N, Al Zamel H, *et al.* Epidemiology of pediatric trauma at a tertiary hospital in Riyadh, Saudi Arabia. *J Nat Sci Biol Med* 2018;9:247-51. doi: 10.4103/jnsbm.JNSBM\_230\_17
3. Jamal A, Rahman MT, Al Ahmadi HM, Mansoor U. The dilemma of road safety in the eastern province of Saudi Arabia: Consequences and prevention strategies. *Int J Environ Res Public Health* 2020;17:157.
4. Abdel-salam DM, Alruwaili RR, Alhablani FS, Alfahel NH, Alblawi AA. Epidemiologic aspects of trauma in AL-JOUF region, Saudi Arabia: A retrospective study. *Asian J Pharm Clin Res* 2019;12:261-4. doi: 10.22159/ajpcr.2019.v12i18.33792
5. Dixon JR, Lecky F, Bouamra O, Dixon P, Wilson F, Edwards A, *et al.* Age and the distribution of major injury across a national trauma system. *Age Ageing* 2020;49:218-26. doi: 10.1093/ageing/afz151, PMID 31763677
6. Karbouji MA, Alrashidi YA, Kashkari MI, Turjoman MA, Madani SF, Almukhlifi FA. Awareness of dealing with multiple trauma patients in Madinah, Saudi Arabia. *Egypt J Hosp Med* 2018;73:6661-5. doi: 10.21608/ejhm.2018.15859
7. Barrimah I, Midhet F, Sharaf F. Epidemiology of road traffic injuries in Qassim Region, Saudi Arabia: Consistency of police and health data. *Int J Health Sci (Qassim)* 2012;6:31-41. doi: 10.12816/0005971, PMID 23267302
8. Alghnam S, Alkelya M, Al-Bedah K, Al-Enazi S. Burden of traumatic injuries in Saudi Arabia: Lessons from a major trauma registry in Riyadh, Saudi Arabia. *Ann Saudi Med* 2014;34:291-6. doi: 10.5144/0256-4947.2014.291, PMID 25811200
9. Hokkam E, Gonna A, Zakaria O, El-Shemally A. Trauma patterns in patients attending the emergency department of Jazan general hospital, Saudi Arabia. *World J Emerg Med* 2015;6:48-53. doi: 10.5847/wjem.j.1920-8642.2015.01.009, PMID 25802567
10. Alghnam S, Alsulaim HA, BinMuneif YA, Al-Zamil A, Alahmari A, Alshafi A, *et al.* Injuries following motorcycle crashes at a level-1 trauma center in Riyadh. *Ann Saudi Med* 2019;39:185-91. doi: 10.5144/0256-4947.2019.185, PMID 31215223
11. Abolfotouh MA, Hussein MA, Abolfotouh SM, Al-Marzoug A, Al-Teriqi S, Al-Suwailem A, *et al.* Patterns of injuries and predictors of in-hospital mortality in trauma patients in Saudi Arabia. *Open Access Emerg Med* 2018;10:89-99. doi: 10.2147/OAEM.S166026, PMID 30104908

12. Alghnam S, Towhari JA, Al Babbain I, Al Nahdi M, Aldebasi MH, Alyami M, *et al.* The associations between injury mechanism and extended hospital stay among pediatric patients: Findings from a trauma center in Saudi Arabia. *BMC Pediatr* 2019;19:177. doi: 10.1186/s12887-019-1559-7, PMID 31159773
13. Stonko DP, Dennis BM, Callcut RA, Betzold RD, Smith MC, Medvecz AJ, *et al.* Identifying temporal patterns in trauma admissions: Informing resource allocation. *PLoS One* 2018;13:0207766.
14. Heim C, Schoettker P, Gilliard N, Spahn DR. Knowledge of Glasgow coma scale by air-rescue physicians. *Scand J Trauma Resusc Emerg Med* 2009;17:39. doi: 10.1186/1757-7241-17-39, PMID 19723331
15. Alghnam S, Alkelya M, Alfraidy M, Al-Bedah K, Alabbtain IT, Alshenqeety O. Outcomes of road traffic injuries before and after the implementation of a camera ticketing system: A retrospective study from a large trauma center in Saudi Arabia. *Ann Saudi Med* 2017;37:1-9. doi: 10.5144/0256-4947.2017.1, PMID 28151450
16. Morgan A, Mohammed A, Sultan AM, Al Harbi AM, Al Hatlan OA, Aljuhayyim SM, *et al.* Burn injuries and associated causes in Al Kharj province of Saudi Arabia: Are they preventable? *Int J Adv Res* 2017;5:1885-91.