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OUTCOME OF PEDIATRIC TRAUMA IN LEVEL 1 TRAUMA CENTER, KING ABDULAZIZ MEDICAL CITY, RIYADH, SAUDI ARABIA

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Abstract-

Background: Pediatric trauma remains the leading cause of emergency department (ED) presentation and death around the world.¹ In 2016, the WHO estimated that injuries accounted for 644,855 death and between 10 million and 30 million suffered non-fatal injuries among children under the age of 15.

Objective: Was to assess the outcome of pediatric trauma in level 1 trauma center KAMC, Riyadh, kingdom of Saudi Arabia .

Method: This study was conducted in the King Abdulaziz Medical City (KAMC). Data was collected from the medical records of all patients admitted during the study period who meet the inclusion criteria. The study was cross sectional involving chart review with a retrospective design.

Results: Between January 2010 to December 2015, 1372 cases was presented to pediatric emergency department. Between ages 0 to 14 years old as a trauma cases. The most common mechanism of injury is Fall followed by Motor Vehicle accident. Severity of injury which manifested by Glasgow coma scale which showed 183 cases (13.3%) was <9 and 96 cases (7%) is 9-12, respectively. Musculoskeletal injuries is the most common involved system 514 cases (37.5%), followed by others injuries

Conclusion: This study found that the most affected pediatric age is from 4 to 14 years. Also, found the majority of the cases survived the injuries. The commonest mechanism is fall followed by motor vehicle accident. Finally, 37% of the patients suffered from musculoskeletal injuries.

INDEX TERMS- TRAUMA, PEDIATRIC, MECHANISM OF INJURY, EPIDEMIOLOGY, MORTALITY RATE

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INTRODUCTION:

Pediatric trauma remains the leading cause of emergency department (ED) presentation and death around the world.¹ In 2016, the WHO estimated that injuries accounted for 644,855 death and between 10 million and 30 million suffered non-fatal injuries among children under the age of 15.² Every hour a child dies from an injury or violent act, and around 30% of all mortality among children age 1–19 years are from unintentional injury in the United States.³ A prior study conducted locally showed that the highest rate of pediatric trauma is a motor vehicle accident (MVA). In Saudi Arabia, pediatrics were more likely to die from traffic accidents in comparison to their counterparts in the United State.⁴ Cleves et al reported that violence has been observed to be a major cause of trauma and linked with mortality in the pediatric population.⁵ Common mechanisms of injury have been identified and include: motor vehicle collisions (MVCs), abuse, burn, drown and falls.⁶ Burn injury of children can only happen due to careless behavior, yet high prevalence could be due to abuse. A prior study stated that 10% of burn cases were abuse cases.⁷ According to the injury location, the most frequent and lethal trauma was a head injury. Head trauma continues to be the leading cause of death and disability.⁸ A study conducted on 1219 patients reported that one-third of trauma patients required admissions suffered from head injuries.⁹ On the other hand, a study conducted on pediatric patients showed that the most common causes of nonlethal unintentional injury were falls, being struck by/against, overexertion, and transport.¹⁰ Many factors can contribute to childhood injuries, including age, gender, behavioral pattern, and environment. Age and gender are the most deterministic factors influencing the patterns of injury. Male children are more prone to higher injury and mortality rates, likely due to their increasingly aggressive behavior and susceptibility to contact sports than female children.¹¹ Several studies have shown in-hospital mortality of pediatric trauma patients ranging from 0.3% to 8.5%.⁷ In 2018, Adeloye et al found that asphyxiation and suffocation were the leading causes of deaths among children aged 0–11 months with an estimated mortality rate of 189.1 and 18.7 per 100 000, respectively.¹² For children aged 1–4 years were at higher risk for drowning, homicides, and MV traffic.³ The primary aim of this study was to provide the following: (1) all fatal injuries from trauma-related causes among pediatric patients; (2) the most affected groups to determine the risk factors and (3) new strategies leading to a decrease in the burden through prevention initiatives in Saudi Arabia.

OBJECTIVE OF THE STUDY

To assess the outcome of pediatric trauma in level 1 trauma center KAMC, Riyadh, kingdom of Saudi Arabia. SPECIFIC OBJECTIVES:

- 1- To determine the mortality rate of pediatric trauma in level 1 trauma center KAMC.
- 2- To predict the risks factors of death in pediatric trauma
- 3- To describe the pattern of trauma and the organ/system distribution in pediatric trauma.

MATERIAL AND METHODS:

This study will be conducted in the King Abdulaziz Medical City (KAMC). Data will be collected from the medical records of all patients admitted during the study period who meet the inclusion criteria. The study will be cross sectional involving chart review with a retrospective design.

SPSS version 20 will be used to analyze the data.

STUDY AREA/SETTING:

This study will be conducted in the King Abdulaziz Medical City (KAMC) tertiary hospital, level 1 trauma center. King Abdulaziz Medical City in Riyadh, with a bed capacity of 1501 commenced its operations in May 1983. Since then, it has continued expanding, while providing services for a rapidly growing patient population in all of its catchments areas. The Emergency Care Center at KAMC continues to be the best Trauma Care Center in the Kingdom of Saudi Arabia. It is ranked as the 4th Emergency Care Center outside the United States of America, to provide (PHTLS) Pre-Hospital Trauma and Life Support program. Ambulatory Care Services and Primary Health Care Services provide Preventive Health Services including health education and behavioral modifications to adopt healthy lifestyles. Surgical and Critical Units include an outstanding Burn Unit, Surgical ICU, Endoscopy Unit, Operating Rooms, and Neuro-Surgical and Surgical Units.

STUDY SUBJECTS:**Inclusion criteria:**

- Trauma patients that admitted from emergency room (ER) until age of 14 years old.
- The data of study between 2010 to 2015

Exclusion criteria:

- Transferred patients from other hospitals because of the lost documentation.
- Burn victims
- Penetrating trauma patients

STUDY DESIGN:

The study will be conducted by a cross sectional study involving chart review with a retrospective

design. This design will allow us to review the cases and their outcomes.

STUDY SAMPLE:

The confidence level is 95%, and the margin of error is 5%. The estimation sample size is 500 subjects based on previous study that shows same inclusion criteria .

SAMPLING TECHNIQUE:

Convenient sampling technique will be used. All study subjects available during study period who meet the inclusion criteria will be included.

DATA COLLECTION:

After taking permission the required data well be collected from king Abdulaziz Medical City's trauma data registry for every patient who achieves the inclusion criteria in a data collection sheet. The patients data needed are : case ID, patient's demographic data (Age, Gender), mechanism of injury, trauma severity score, systems injury and there degree of injury, length of hospital stay, ICU admission, intervention that was done and the outcome of injury (mortality, morbidity).

DATA MANAGEMENT/ ANALYSIS PLAN:

We are going to use SPSS version 20 to analyze the data. Numerical data "age" will be presented by means and standard deviation. Qualitative data "gender, mechanism of injury, trauma severity score, systems injury, the degree of injury, length of hospital stay, ICU admission, intervention that was done and the outcome of injury" will be presented by frequencies and percentages. Chi Square test will be used for the comparison of categorical variables (gender, mechanism of injury, location of injury and outcome of injury). A p-value of <0.05 will be considered to show a statistically significant difference / association for all the statistical tests.

RESULTS:

1.demographic data:

Between January 2010 to December 2015, 1372 cases was presented to pediatric emergency department. Between ages 0 to 14 years old as a trauma cases. Of which male was 996 (72.6 %) of total trauma cases. The median age is 7.5 (range between 0 to 14 years old and the standard deviation 4.5). the children between age 4 to 10 account for the majority of the cases 614 (44.8%).

The most common mechanism of injury is Fall 528 (38.5%) followed by motor vehicle accident 332 (23.5%), respectively. Private vehicle is the major transportation method 883 (64.4%). Severity of injury which manifested by Glasgow coma scale which showed 183 cases (13.3%) was <9 and 96 cases (7%) is 9-12, respectively. Most of the patients was shifted to the ward 586 (42.7%) after the management in the Emergency Department, followed by 487 (35.5%) patients pushed to OR, 253 (18.4%) patients admitted to intensive care unit, 43 (3.1%) patients to the morgue and 3 (0.2%) patients shifted to burn unit, respectively.

2.mechanism of injury by age:

fall is the commonest mechanism of injury in the infant 57 out of 117(48.7%), toddler 146 out of 342 (42.7%) and child 235 out of 614 (38.3%), respectively. The adolescent showed the majority is motor vehicle accident 113 out of 299 (37.8%).

3.outcomes among cases:

Musculoskeletal injuries is the most common involved system 514 cases (37.5%), followed by others injuries (includes drowning, burn, combined system injuries) 465 cases (33.9%), Spinal and neurological injury 329 cases (24%) and torso injury (pneumothorax, abdominal injury) 64 cases (4.7%), respectively. The mortality rate showed a total 73 patients died. This represents 5.3% of all major pediatric trauma. Of total mortality 35 (2.6%) patients died on the arrival, 38 patients (2.8%) were died in the hospital.

Table.1. Demographic information

	N (%) 1372 (100)
Gender:	
Male	996(72.6)
Female	376(27.4)
Age: mean±SD	7.54±4.6
Age:	
Infants	117(8.5)
Toddlers	342(24.9)
Children	614(44.8)
Adolescents	299(21.8)
Mechanism of injury:	
Motor Vehicle Accident	322(23.5)
Motorcycle Accident	113(8.2)
Pedestrian	202(14.7)
Fall	528(38.5)
Other	207(15.1)
Transportation:	
EMS	476(34.7)
Private vehicle	883(64.4)
Not available	13(0.9)
GCS: mean±SD	13.26±3.58
<9	182(13.3)
9-12	96(7)
>13	1094(79.7)
ER Disposition:	
ICU	253(18.4)
Ward	586(42.7)
Morgue	43(3.1)
OR	487(35.5)
Burn Unit	3(0.2)

Table.2. mechanism of injury by age

Mechanism of injury by age		MVA	Motorcycle accident	pedestrian	fall	others	total	
Age (Category)	Infant	20	4	12	57	24	117	
		17.1%	3.4%	10.3%	48.7%	20.5%	100%	
	Toddler	54	38	36	146	68	342	
		15.8%	11.1%	10.5%	42.7%	19.9%	100%	
	Child	135	39	117	235	88	614	
		22%	6.4%	19.1%	38.3%	14.3%	100%	
	Adolescent	113	32	37	90	27	299	
		37.8%	10.7%	12.4%	30.1%	9%	100%	
Total		322	113	202	528	207	1372	
		23.5 %	8.2%	14.7%	38.5%	15.1%	100%	

Table 3. outcomes among cases

	N (%) 1372 (100)
Type of isolated system injuries	
MSK injuries	514(37.5)
Torso injuries	64(4.7)
Spinal/Neurological injuries	329(24.0)
Other injuries	465(33.9)
Main outcome:	
Survived	1299(94.7)
Death	73(5.3)
ISS: mean±SD	8.75±12.72
Intubation (in days): mean±SD	1.19±3.825
ICU Stay (in days): mean±SD	2.19±8.5
Hospital Stay (in days): mean±SD	13.41±43.4

DISCUSSION:

This paper reports the most recent cases of trauma in pediatrics classified by age, gender and mechanism of injury. Most injuries and injury deaths happened in the youngest and oldest age groups. Adolescent suffered the most from motor vehicle accidents.

This research is highlighting on all admitted traumatic origin cases, between the age 0 to 15, to King Abdullah Specialist Children's Hospital.

Falling was the most common mechanism of injury among all age groups (with exception to adolescent), it accounts between 38.3 to 48.7 per cent of all admitted trauma cases. This consistent among other published literature reviews in united states and World health organization, which vary between 29 up to 37.5 per cent of all injuries in pediatric population (1-3). It remains one of the most single preventable types of injury, across all children's age groups. A special, dedicated efforts should be direct to address this matter.

Recommendations:

The majority of trauma in pediatric populations falls in preventable category incidents; MVA, Motorcycle accidents and falls. Certain and dedicated efforts should be utilized to decrease the incidents of these trauma. Helmets, child seats and safety rails have shown impressive results in minimizing the severity of trauma. Yet, further investigations may help to form comprehensive thoughts for best measures in pediatric trauma.

Limitations:

There are certain limitations with these presented data; the retrospective methodology limits the

amount of information can be infer; lack of documentations for the location of incident as an example; likewise, more details in certain mechanisms of injury, like: the height of fall or approximate speed of vehicle. Another limitation is surrounding type of included data in this registry, it only included the cases the required admission for further investigations or managements, which omit the cases managed solely in emergency department. Finally, the registry only covers a single trauma center, in which may limit the generalization of obtained information. Despite these limitations, this report may be GOOD base for future research in the field and highlights the need for national level for trauma registry.

CONCLUSION:

Our result indicates that, to reduce the incidence of a preventable cause of injury and to provide the policy and programs to decrease the mortality and morbidity. Providing the prevention solution to address the environmental measure that extends to education of the population, implementation of prevention concepts in the environment, and application of necessary safety measures. The frequency, severity of the trauma, morbidity, and mortality together is a high potential to decrease with the application of proper prevention measures to provide a safe and appropriate environment for the child and adolescent future.

APPENDIX

TRAUMA, PEDIATRIC, MECHANISM OF INJURY, EPIDEMIOLOGY, MORTALITY

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