ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
DEPARTMENT OF EMERGENCY MEDICINE

CLINICAL PROFILE AND OUTCOME OF TRAUMA AMONG ADULT PATIENTS TREATED AT ALERT HOSPITAL TRAUMA CENTER EMERGENCY DEPARTMENT, ADDIS ABABA, ETHIOPIA (2021)

PRINCIPAL INVESTIGATOR: TESFAYE ABEBE (BSc in ECCN)

A PROPOSAL TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES, DEPARTMENT OF EMERGENCY MEDICINE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

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ACRONYMS AND ABBREVIATIONS

ATLS……. Advanced Trauma Life Support

AVPU ……Alert, Verbal, Pain, Unresponsive

C.P.R.……. Cardiopulmonary Resuscitation

C.N.S.……. Central Nervous System

ED……..…. Emergency Department

EMS……. Emergency Medical Service

G.C.S.……...…. Glasgow Coma Scale

I.C.U.……...Intensive Care Unit

LMIC ……. Low Middle-Income Country

MV……. Mechanical Ventilation

OR ……. Operating Room

IPV……. Inter-personal violence

ROSC……. Return of spontaneous circulation

RTA……... Road Traffic Accident

SPSS……...……Statistical Package for Social Sciences

THI…… Traumatic Head Injury

WHO …… World Health Organization

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ABSTRACT

Introduction: A traumatic injury can be caused by a wide range of blunt, penetrating, and other mechanisms. As a result, after a patient has sustained this injury, he/she may require immediate care. So, all aspects of trauma care systems, such as a powerful prehospital care system, skilled human power, facilities, equipment, and continuous supplies, must be in place for a successful outcome.

Objective: This study is aimed to assess the clinical profile and outcome of trauma among adult patient treated at ALERT hospital trauma center emergency department Addis Ababa, Ethiopia, from January 1/2019 to December 1/2020.

Methods: A retrospective chart review study was performed during the time period of January 2019 to December 2020 on trauma patients treated to the trauma and emergency department of ALERT hospital. For statistical analysis, Epi-data version 4.6 and SPSS version 25 were employed, and Fisher's exact test was performed to determine the statistical association.

Results: Male to female ratio was 259:103, with the 24–33 age group predominantly affected by trauma. The most common time of injury was 8–6 a.m., and the taxi was the predominant mode of arrival to the hospital (59.7%). Inter personal violence (IPV) is the most common accident, accounting for 31.8 %. Road traffic injury (R.T.I.) is the second most common cause of injury accounted for 30.7% of victims, three wheelers or Bajaj (45%) dominated over others vehicles. Mostly pedestrian was affected 62.1%. The Kampala severity score II (KTS II) were show milled trauma (82.3%), moderate trauma (11%), and severe trauma account (6.6%). Open wound/ Soft tissue injury (44.2%) and Extremity fracture (24%) were the frontrunners injury, with 11.3% of the victims were polytrauma. The mortality rate was 3.6%.

Conclusions and recommendation: The injury was prominently IPV and RTA, the trauma victims were young. The focus should be directed to injury prevention and safety measures. Future studies can be directed to long term outcomes and follow up of injury victims to account for exact mortality and morbidity due to such unfortunate events.

Keywords: Clinical profile, trauma, outcome

CHAPTER ONE

1. INTRODUCTION

1.1. Background

Trauma injury is any sudden onset physical or body part injury that requires immediate medical attention, resuscitation and interventions to save life and limb. Trauma and injuries are one of the leading causes of death and disability across the world, and every population, irrespective of their age, ethnicity, sex, income or geographical location, are affected.[1]

A traumatic injury can be caused by a wide range of blunt, penetrating, and other mechanisms. As a result, after a trauma patient has sustained this injury, he/she may require immediate care. So, all aspects of trauma care systems, such as a powerful pre-hospital care system, skilled human staff, facilities, equipment, and continuous supplies, must be in place for a successful outcome. [6]

Injuries in every country around the world are a health issue, causing over 5 million deaths per year or 16,000 deaths per day. [2]

Global deaths due to injuries are more than the combined deaths from HIV/AIDS, malaria, and tuberculosis, which is more than 5 million deaths per year, and is estimated to be the seventh leading cause of death in the world by 2030.[3]

In countries around the world, trauma is seen as a significant economic burden. In the United States, trauma is the third and leading cause of death among people aged 1-44, accounting for 59% of deaths in this age group, and it accounts for 20% of the total death in the country. Due to trauma, there is37 million emergency room visit per year, which costs 671 billion dollars annually.[4]

Trauma is an underappreciated health problem in developing countries that needs immediate policy attention.[5]

In the case of low- and middle-income nations, the burden of morbidity and mortality is severe. There are discrepancies among the outcome of trauma or injuries. The outcome and death distribution depend on the economic level of the country. The mortality rate, including pre-hospital and in-hospital deaths, is 35% in high-income countries, 55% in middle-income countries, and 63% in low-income countries [6]

According to data from a hospital-based injury surveillance registry in Sub-Saharan Africa, the average age of trauma patients is 27 years old, and the majority of them are male, 76%. The mortality rate is higher in the elderly than in the younger. Overall, 4.2 % of people died during the study period. The most common causes of injury that resulted in in-hospital admission were road traffic accidents, falls, and assaults.[7]

In Ethiopia, little is known about the burden of trauma-related disability, but an injury to the lower extremities is common and associated with R.T.A. The length of hospital stay associated with trauma is more than seven days.[3]

In Addis Ababa injury-related death affect most of the productive group of the society and attributed to 7% of all death and the majority of them are male.[8]

The most frequently witnessed trauma and the leading cause of death and disability from accidents in Ethiopia is a road traffic accident. Epidemiological studies in Ethiopia have shown that injury rates and findings are variable in different regions of the country.[3]

"Ethiopia is considered one of the worst countries in the world where RTA kills and injures large numbers of road users every year". Nearly 2000 people die from road traffic collisions where 48 per cent are pedestrians, 45 percent are passengers, and 7 percent are drivers and this costs over 400 to 500 million ETB every year.[9]

In Ethiopia, with 1.73 days of hospital stay, one head injury patient average cost is 4,673.43 ETB. including direct medical, non-medical and job lost expense; if the patients are with moderate and severe injury levels, a cost rise of 6,351.67 ETB and 7736.21 ETB, respectively, and for each additional day, the cost will increase by 1,022.853 ETB. [10]

To improve the trauma care system in general, data and additional research that shows the pattern and outcome of injury-related illness in the trauma system of the country is mandatory. In Ethiopia, there are many challenges related to the trauma care system which will affect the outcomes of trauma patient's treatment.

In Addis Ababa and its area, with the presence of a weak trauma care system and population differences, weather patterns, industrial aggregation, vast construction activities, geographical features, cultural differences, and heavy traffic and other variables, will create a difference in

approximate figure of traumatic injury profiles and outcomes findings between the regional and other tertiary hospitals of the country.

As my level of knowledge and an extensive search found, no studies is conducted on clinical profile and outcome of trauma among patients treated ALERT hospital trauma center emergency department. So, my research will be the first, and its contribution will be high to show the profile and outcomes for improvement.

This research will offer a summary of the profile of the patient and the outcome of traumatic injury in Ethiopia and aims to address the following questions: What are the determinants of the outcome of traumatic injury? What is organ/system injuries typical during emergencies? What is an injury mechanism common?

1.2. Statement of the problem

The pre-hospital system is essential to transport trauma patients to the health care facilities and have a positive impact on the patient's outcome when the response time or transfer time to the ED or definitive management door is shorter.[11]

Related to infrastructure and resource, trauma patients treated in rural ED had a higher mortality rate and more likely to die pre-hospital compared to a patient treated at an urban trauma center.[12]

Like other developing African country, "Ethiopia also has a poor, haphazard, and decentralized pre-hospital care system".[13]

In Addis Ababa, most emergency patients are transported by taxi and private car, which could affect the outcome of patients negatively.[14]

According to an institutional-based report, in most the hospitals found in Addis Ababa, human resources and facilities for trauma care are not proportional to the number of trauma patients, and there is a lack of coordination between pre-hospital, a sustainable material supply, and quality improvement programs within the hospital. And the caring staff also doesn't have standardized ATLS training, which could affect the outcome of patients. [15]

Therefore, it is essential to provide various information on the patterns of trauma patients and their outcomes to help make decisions on the measure. Much of the research performed in tertiary hospitals in different areas and regional states of Ethiopia using patient data registries is done on specific cases such as R.T.A., fall down the injury, chest injury and on other specific body part injuries that do not show the collective figure of trauma.

As a result, my study hypothesizes that the trauma trend and outcome in ALERT hospital's trauma center will vary from the findings of previous studies.

1.3. Significance of the study

In order to re-adjust the policies of various stakeholders and to take action to strengthen Ethiopia's trauma care systems, the importance of updated information, especially from the country's second-most trauma center is vital.

This study result will provide information about the trauma care system impacts that may contribute to outcome, help to provide data or information for private sectors, public sector agencies, international agencies, ministry of health, and other stakeholders, including the ALERT trauma center administrative structure, on the trend and outcome of trauma patients among treated at ALERT trauma center Emergency Department.

In general, this study will be intended to illustrate the clinical profile, burden and factors influencing the outcome of patients with trauma that will help planners respond to the issue by developing new or reinforcing existing policies and strategies for prevention or intervention.

CHAPTER TWO

2. LITRATURE REVIEW

2.1. Sociodemographic characteristics of patients

The study investigates trends and outcomes of trauma in Oklahoma, in the united states using ten years trauma registry shows, From 107,549 patient's Male trauma patient accounts 62.6%, and the mean age is 43.3 ± 26.1 years[4].

Similar research was conducted in an Indian tertiary care hospital, and the results revealed that the majority of trauma patients are males (82%) and females (about 18%), with the most affected age groups being 21-30 years[16].

Study done in Canada the biographical data analysis section showed that the mean age is 22 years, the proportion of patients aged 65 and above is 33.9%, and males account for 71.3 % of trauma patients. And females are accounting 28.6% of total trauma[17].

A retrospective trauma registry was examined in a single center in Korea from January 1, 2010, to December 31, 2012, and a total of 17007 patients were evaluated. The findings show that the average trauma patient age was 35.2±22.4, and the male trauma prevalence was high at 66.2 percent. Trauma mainly affects children under the age of ten[18].

In Saudi Arabia's Jazan General Hospital A total of 1 050 emergency trauma patients took part in the research. The patients' average age was 25.3±16.8 years, according to the report. The majority of the patients 45.1% were between the ages of 18 and 30. Trauma affects more males 64.3%, and among trauma patients in urban areas, more than half 60.6% are females[19].

The average age of the inpatient trauma population in Sub-Saharan Africa was 27 years, with a male predominance of 76 % and female 24 %, according to an analysis of a Hospital-Based Injury Surveillance Registry in Sub-Saharan Africa. Patients who died were generally older than those who lived, and men had a higher mortality rate.[7]

A retrospective chart study examination was performed at Kilimanjaro Christian Medical Centre over a seven-month period among traumatic injuries presenting to a referral hospital emergency department in Moshi, Tanzania, and the findings showed that 1224 patients had injuries. Males and people aged 15 to 44 years old are the most wounded, accounting for 73.4 percent and 57.8%, respectively.[20]

In our country, a similar study was conducted on Trends of trauma inpatients seen at public hospital emergency in Mekelle, Tigray, northern Ethiopia, using one-year retrospective data, and the results show, 16-25-year-old age group was the most commonly affected age group, accounting for 38.5% followed by the 26–35-year-old group 21.4% of the cases. Males are more frequently involved than females 74.3%) vs 25.7%. Patients from urban areas make up 83 % of the number.[9]

The study done in Ethiopia at Dilla University Teaching and Referral Hospital the result shows the majority of victims were in the age range of 20-40 years, 52.1% whereas 7.7% greater than 40 years old. Mortality is higher in the 20-40 age group 56.5% and among males 52.2%, with more deaths in rural people 69.6% compared to urban people 30.4%. The majority of cases experiencing trauma were rural areas 59.8% compared to urban areas 40.2%.[3]

2.2. Baseline clinical information of patients

Study conducted in the United States of America in the state of Maryland was discovered an 8 % increase in the odds of death with every 5-mile addition in distance to the nearest trauma center. The average distance to a trauma center was 9.9 miles, the average overall pre-hospital time was 64.6 minutes, and 82.5% of trauma patients were transported by ambulance or helicopter.[21]

A similar research was conducted in an Indian tertiary care hospital study result shows the most common time for injuries is between 2 and 6 p.m., and 57% of victims are taken to the hospital by ambulance. Road traffic injuries account for 75% of all injuries, with two-wheelers accounting for 68% of all modes of transportation used by patients during incident. Twenty-five percent of drivers admitted to drinking alcohol and driving.[16]

A retrospective cohort analysis on mortality and trauma treatment in 26 rural EDs and 33 level 1 and 2 urban trauma centers in Quebec, Canada, found that mortality rates were higher in rural EDs compared to urban trauma centers (13.3 percent vs 7.9%), and they were more likely to die prehospital or in the ED compared to patients treated in urban trauma centers[12].

In Saudi Arabia's Jazan General Hospital the estimated time from the time of the incident to when the patient arrived at the hospital was 41.3±79.8 minutes[19].

2.3. Clinical profile of patients

Similar study investigates trends and outcomes of trauma in Oklahoma, in United States using 10 years trauma registry shows fall down accident are a leading cause of morbidity and mortality among older adults in the United States.[4].

Similar study in India revealed Poly trauma was seen in 52 % of cases, extremity injury 54 % fractures and head injury 50% were the leading among the injury patterns reported. The procedure and treatment detail were Sutures and casting (38 %), suturing and dressing (33 %), chest tube insertion (6.4 %), and rapid sequence intubation (3 %) [16].

In Germany, a multicenter data base is used and the outcome and predictors for adequate resuscitation in the emergency room of adult patients in traumatic cardiorespiratory arrest are evaluated, and the results show that out of 38,499 patients, 5.5 % of all admitted patients received CPR in the E.R., and 3.1 % of those patients were only resuscitated in the ER The highest risk for mortality in the emergency room was associated with preclinical resuscitation, accompanied by shock on admission, coagulopathy, preclinical thorax drainage, preclinical catecholamines, moderate hypotension with preclinical blood pressure less or equal to 90mmHG, preclinical GCS less than or equal to 8, and related injuries of the extremities, according to the results of a multivariate logistic regression[22].

In In Quebec, Canada Fall down accident is the most common mechanism of injury in both settings. Urban trauma centers saw a greater proportion of fall-related traumas (69% vs 66%). Traumas from motor vehicle collisions (15% vs 19%). Injuries occurred most frequently to the limbs, followed by the head and thorax[12].

In Korea blunt injury was the most common form of trauma 90.8%, followed by slip-and-fall injuries, motor vehicle accidents, and others. The most common major trauma sites of admitted patients are on the extremities 38.4%, followed by craniocerebral, abdominopelvic, and thorax. The study's conclusion is that trauma mortality and morbidity rates in Korea have steadily decreased as a result of advances in medical technology, national interest in healthcare, and advancements in antibiotics and surgery techniques. And in other way expansion of various activities, industrialization, rapid growth of transportation are among the reason for the increment of trauma cases[18].

In Saudi Arabia's Jazan General Hospital Minor injury was the most common form of injury 60%, followed by blunt trauma 30.9%, and then penetrating trauma 9.1 %[19].

In Sub-Saharan Africa patients who died had lower levels of consciousness when they arrived. Hypotension, hypoxia, and severe head injury can all cause a trauma patient's mental state to change. On admission, the average heart rate of none survivors is 83, their average systolic blood pressure is 124, and the respiratory rate of 22 percent of none survivors is 27. The average GCS score of un survivors is 12 and the average Kampala trauma score is 13.9. On admission, abdominal/pelvic injuries were more likely to have a higher shock index. The most common causes of injury resulting in in-hospital admission were road traffic accidents, falls, and assaults. Road traffic accidents killed 62 percent of patients and were the only injury mechanism linked to higher-than-average mortality (6.9%) as compared to an overall mortality rate of 4.2 percent. The most common injuries were head/spine injuries and extremity injuries (39 percent and 47 percent, respectively). Patients with polytrauma or head/spine injuries had the highest mortality rates. On admission, patients with head/spine and abdominal/pelvic injuries had a high chance of dying. The most significant association with mortality was injury to the head and spine area, which accounted for more than 70% of inpatient mortality.[7]

A retrospective chart study examination was performed at Kilimanjaro Christian Medical Centre and according to the report, the most common mechanism of injury is a car accident, which accounts for 43.9% of all accidents. The most common forms of injuries were head injuries 36.5% and extremity injuries 59.5%.[20]

Study done in Mekelle, Tigray, northern Ethiopia the most common causes of injuries are interpersonal abuse 31%, which is caused by stones in 29.9% of cases and sticks in 13.4% of cases, accidental falls 19.2%, and RTA 14.1%. The most frequently affected part of the body was the head 33.5%, followed by the knee and lower leg, which were both involved in 10.6 percent of cases. Burns is responsible for 2% of the number. Dog bites were responsible for the majority of animal-caused injuries 87%.[9]

The pattern and outcome of trauma patients who visited the emergency department at Dilla University Teaching and Referral Hospital were analyzed over a five-year period in a hospital-based retrospective chart study. The overall prevalence of trauma was 46.6% and RTA is the commonest 47.3% followed by assault 30.1% and burn are the lowest5.9%. The commonest types of injury were lower extremity injury 35.9% followed by upper extremity 19.7% and

Polytrauma 15.4% whereas chest trauma was the found to be the lowest types of injury. Road Traffic Accident was the commonest cause of death 52.2% followed by assault 34% and the least was found in burn patients. Polytrauma was responsible for the majority of death 43.5%followed by head injuries 39.1%. The mortality of cases with lower trauma score at admission was very high. The mortality of cases that arrived in a health institution after one hour was very high Patients with an associated abdominal injury, lower extremity injury, time to arrival> 24hrs, being admitted for more than 7 days in the hospital, revised trauma score <10, decrease GCS and operation had higher odds of mortality and those with time to arrival <1hr and 1-24hr were associated with less likely to have hospital mortality compared with the time to arrival >24hr.[3]

2.4. Patient outcomes from emergency department

The study investigates trends and outcomes of trauma in Oklahoma, in United States using 10 years trauma registry shows, mortality rate during this period was 5.3%, the three leading causes of death in registry were injuries related to falls, motor vehicle crashes and gunshot wounds, totaling 29.0%, 28.2% and 15.7% of deaths, respectively[4].

The study done in India shows that from totally seen patients 52% of cases were released from the emergency room, referred in 9% of cases, admitted to the ward in 29% of cases, and admitted to ICU in 6.4% of cases. cases. In the Emergency Department, there were 1% deaths and 1% patients who left against medical advice.[16] . In Germany hospital mortality was 83.4% for patients who received C.P.R, and the average time to death after admission was 2.3 days[22].

A similar research was performed in Canada on 80,353 trauma patients admitted for major trauma during the study period, of which 1.2 percent died on arrival, 87.6% were treated and discharged, the mortality during the study period was 9.9% [17]. In Quebec, Canada, study found that the odds of prehospital or ED mortality were over three times greater for patients treated in a rural ED[12].

A retrospective trauma registry analysis done in Korea shows After primary care, 56 percent of all trauma patients were treated and discharged from the emergency department, while 15.6 percent were moved to a regional hospital. In total, 27.4 percent of the patients were taken to the emergency department for further care. Furthermore, 21.4 % of patients were admitted to the general ward for in-hospital treatment, while 3 % were admitted to the intensive care unit for close vital sign monitoring without needing emergency surgery. Just 3 % of patients have to

have emergency surgery. After undergoing cardiopulmonary resuscitation CPR at the emergency department, the remaining 0.6 % died.[18]

The study done in Saudi Arabia's Jazan General Hospital shows, the majority of patients 48.2% was discharged after mild trauma was treated, while 2.3% were admitted to the ICU, 7.7% were moved to inpatient wards, and 17.7% were observed and then discharged. The patients' mortality rate was 2.6%.[19]

In Sub-Saharan Africa total mortality for inpatient trauma was 4.2 % over the study period, but mortality declined over time, from 6.5 % in 2010 to 3.1 % in 2012.[7]

At Kilimanjaro Christian Medical Centre, the majority of injured patients, 59.3 %, were admitted to hospital wards from the emergency room, and 5.6% needed admission to an intensive care unit. Injured patients died in 5.4 % of the cases.[20]

The study done in Ethiopia at Dilla University Teaching and Referral Hospital shows mortality rate was 6% death.[3]

CHAPTER THREE

3. OBJECTIVES OF THE STUDY

3.1. General objective

To assess Clinical profile and outcome of trauma among adult patient treated at alert trauma center emergency department Addis Ababa, Ethiopia (January 1/2019 – December 1/2020).

3.1. Specific objective

To assess the outcome of trauma patient

To determine the prevalence of mortality and identify mechanism of injury

To find the factors which are associated with outcome.

CHAPTER FOUR

4. METHODS AND MATERIAL

4.1. Study area

ALERT is a medical facility on the edge of Addis Ababa located around Zenebwork area, specializing in Hansen's disease, also known as “leprosy”. It was originally the All-Africa Leprosy Rehabilitation and Training Center (hence the acronym), but the official name is now expanded to include tuberculosis: All Africa Leprosy, Tuberculosis, and Rehabilitation Training Centre. There is currently a 280 bed, which provides for dermatology, ophthalmology, and surgery departments, also an orthopedic workshop, and a rehabilitation program (from ALERT hospital official website)

ALERT trauma center is the second largest trauma center in Addis Ababa, Ethiopia. It was established in 2015 as part of the ALERT institution. ALERT hospital trauma center provides care to the residents of Addis Ababa and all over Ethiopia and currently provides health care service in specialties like; orthopedics, neurosurgery, plastic and reconstructive surgery, and emergency and critical care. ALERT hospital trauma center has its own ICU, Wards, OR, CT-scan, laboratories, pharmacy, and on average treats around 20 trauma case per day and provides an emergency, outpatient services, elective and emergency surgeries of the respective departments with a total of 68 beds including 12bed (4-resuscitation beds, 6-beds for yellow-green patients and 2- triaging coach), 4- ICU beds with mechanical ventilator and 4-Semi ICU beds without MV and monitor, and 38 beds for admission and treatment ward beds.

Over 7,500 patients are evaluated annually in this setting. The facility is staffed by 3 guards, 8 porters, 10 cleaners, 24 nurses, 6 general practitioner, and 4 residents with 6 consultant seniors, and one emergency physician, provide care during the day, and night shift 8 nurses, 2 general practitioner, and 3 residents provide care over overnight. The trauma center has ambulances for inter-facility transfer, after communication and the ambulance is reserved for the most severely injured patients.

4.2. Study design and period

The study was performed using institutional based retrospective cross-sectional study, by reviewing patient chart and electronic medical records of patients presenting with traumatic injuries to the ALERT trauma Centre emergency department from January/2019 – December /2020.

4.3. Sampling technique

Systematic random sampling technique were used, using a computer list of patient registries, by sampling fraction (k)= N/nf = 7,500/382 =20 the first chart review was selected using lottery method, then the subsequent patient's chart review was obtained by adding the sample fraction.

4.4. Source population

The source population were all trauma patient chart, treated at ALERT trauma center

4.5. Study population

The study population were all adult trauma patients chart treated to ALERT trauma center that fulfill the inclusion criteria during the study period.

4.6. Sample size determination

The required sample size was calculated using single proportion formula to obtain the sample size needed to estimate the prevalence injury. The Prevalence of injury was taken from the previous study conducted in Gedeo region, P = 0.466 (29), confidence interval = 95%, margin of error = 5% and non-response rate 5 %. Hence, the required sample size was 382injury patients visiting the trauma center emergency department.

Sample Size= $\frac{Z_{\alpha/2}^2 \times P(1-P)}{E^2} = \frac{(1.96)^2 \times 0.466(1-0.466)}{0.05^2} = 382$

n= the required sample size, P= 0.466(prevalence of trauma outcome), z= the standard normal distribution value of 95 % CI= 1.96, E= margin of error (0.05)

Since the population size is below 10,000 using correction formula (n*N/n+N) =382*7,500/382+7500= 363

The calculated final sample size plus 5% of incomplete chart which is 18 = 382

4.7. ELIGIBILITY CRITERIA

4.7.1. Inclusion criteria

All Injured adult patients' charts and medical records with complete clinical and socio-demographic information during the study period.

4.7.2. Exclusion criteria

Non-traumatic patients visiting the emergency department, age less than or equal 13year and incomplete medical records were excluded.

4.8. STUDY VARIABLES

4.8.1. Dependent variable

The outcome of trauma patients

4.8.2. Independent variables

Sociodemographic variables (Age, gender, residence), baseline information and clinical profile of patients such as severity score, mechanism of injury and triage categories, place of residence, date and time of injury, referral region, types of injury, mode of transportation, time to arrive at the institution, hospitalization, treatment, Mode of transport, Intent of trauma, Distance and alcohol or substance use.

4.9. Data collection tools and procedure

In order to answer the research questions and achieve the study goals, specific, accurate, and valid enough pre-structured and tasted data collection form was adopted and Necessary modifications were made to the questioner tool from the WHO injury surveillance guideline.[23]

The questionnaire was composed of four parts (sociodemographic characteristics of the patients, baseline clinical information, clinical profile of patients, and Emergency Departments visit outcomes.

4.10. Data quality assurance

Data collection form were adopted from WHO injury surveillance guideline and Necessary modifications were made to the tool. The structured questionnaire was prepared in English, Pretest was done at AaBET hospital on 5% of the sample size. Two data collectors and one supervisor were used. The training was given to the data collectors and supervisor regarding the aim of the study, the data collection tool and the procedures. During data collection, regular supervision and follow up was made. Investigator were cross-checked for completeness and consistency of data on daily basis.

4.11. Statistical analysis and procedure

Data were first checked manually for completeness, then coded and entered into Epi-Data version 4.6. The entered data were transferred to SPSS version 25. The data were cleaned by visualizing, calculating frequencies and sorting. Frequencies and proportions were computed for a description of the study population. The statistical association was done for categorical variables using Fisher's exact test. Fisher's exact test is practically applied only in the analysis of small samples, but actually, it is valid for all sample sizes. Fisher's exact test is one of the exact tests. Especially when more than 20% of cells have expected frequencies < 5, we need to use Fisher's exact test because applying the approximation method is inadequate. Fisher's exact test assesses the null hypothesis of independence involving hypergeometric distribution of the numbers in the table's cells.[24] The association between the dependent and independent variable were investigated by Fisher's exact test estimating of association. We stated the exact P-value of significance <0.05 to recognize highly relevant associations. Data were summarized using tables and figures and statistical summary measures used for presentation.

Operational definition

Trauma: - Any instance of physical injury or damage to the body or body part.
Adult: - According to institution age greater than or equal 14 is considered as adult
Baseline clinical information: - The baseline clinical information for this study is defined as the patient's initial state, as well as any information or condition that indicates a prehospital scenario.
Clinical profile: - The clinical profile of a trauma patient is defined in this study as any trauma-related information received after the patient has arrived for treatment.
Outcome: - Since the aim is to determine the outcome of trauma patient with in the emergency department, it determined by five mechanisms (treated and discharged, death with in the emergency department, admission and referral with different reason).

Mortality: - will be defined as an injury-related death before arrival to the hospital, and death from the emergency department.

The severity of the injury

The Kampala trauma Severity scoring (KTS II) method was used to measure trauma severities and predict their outcome. It was developed to create an injury severity score for resource-limited settings that requires minimal data. To quantify injury severity, patient age, systolic blood pressure on admission, the respiratory rate on admission, neurological status (AVPU), and score for serious injuries was collected and calculated to scale the severity of trauma. Which is accurate in assessing severity.[25]

Table 1 Description of Kampala Trauma Score (KTS II)

Description	Score
A. **Age (in years)**	
▪ 5–55	1
▪ <5 or > 55	0
B. **Systolic Blood Pressure on admission**	
▪ More than 89 mm Hg	2
▪ Between 89–50 mm Hg	1
▪ Equal or below 49 mm Hg	0
C. Respiratory rate on admission	
▪ 0-29/minute	2
▪ 30+	1
▪ ≤9/minutes	0
D. **Neurological status**	
▪ Alert	3
▪ Responds to verbal stimuli	2
▪ Responds to painful stimuli	1
▪ Unresponsive	0
E. **Score for serious injuries**	
▪ None	2
▪ One injury	1
▪ More than one	0

(KTS II) Score total = A + B + C + D + E; Scores, 9– 10: Mild injury; 7– 8: Moderate injury; 6 or less (≤6): Severe injury [10]

Surgical intervention: - The definition of a surgical intervention included fracture reductions, laceration repairs, and all procedures requiring intervention in the operating theatre.

Duration of hospitalization: - were measured in time and days; it is defined as time spent in the ER from evaluation in the emergency department to the time or day of discharge or disposition or death from the ER Patients observed and treated in the ER for less than 24 h or who died in less than 24 hours were considered a 1-day length of stay within the ER.

4.12. Ethical consideration

The Ethical Review Committee of the Addis Ababa University College of Health Science's Emergency Medicine department were consulted first. Permission was received from the ALERT hospital's head office through a formal letter of cooperation, and patient confidentiality was held anonymously. All information were kept confidential, and the organization was ensured that no information was shared with any third parties or institutions without their permission.

4.13. Dissemination of results

The findings of this study will be shared with staff members of the ALERT Trauma Center, Emergency Directorate, MOH, Addis Ababa University College of Health Science Department of Emergency Medicine, and for various decision makers and participants in the trauma care system for the management of the system. An early review of this data will be presented at the Annual Meeting of the Ethiopian Society of Emergency Professionals (ESEP) families.

CHAPTER FIVE

5. Result

5.1. Sociodemographic characteristics of patients

Over one year, a total of 7500 trauma patients were treated at the trauma center emergency department of ALERT Hospital from January 2019 - December 2020, in this study 382 patient card were systematically selected for further analysis, and of 382 only 362 of trauma patient cards were found to have complete records, which gave a response rate of 95.3%. The majority 259 (71.5%) of trauma patients in this study were male, and 129(35.6%) of patients were aged between 24-33 years, with a mean age of 30.1 with SD 11.4. Regarding their place of residence, the majority 306(84.5%) of trauma patients were from Urban. ***(See table 2)***

Table 2*: sociodemographic characteristics of patients visiting ALERT trauma center emergency department.*

Variables		**Frequency**	**Percent**
Sex	Male	259	71.5
	Female	103	28.5
	Total	362	100.0
Age	14 – 23	120	33.1
	24 – 33	129	35.6
	34 – 43	58	16.0
	44 – 53	24	6.6
	54 – 64	21	5.8
	≥65	10	2.8
	Total	362	100.0
Place of residence	Urban	306	84.5
	Rural	56	15.5
	Total	362	100.0

5.2. Baseline clinical information of patients

The majority of trauma patients, 261 (72.1%), arrived at the hospital after one hour of injury. Most of the accidents, 98 (27.1 percent), occurred during the daytime, between 08:00. a.m. and 11:59 a.m. Out of 362 patients, 251 (69.3%) were to live in Addis Ababa, and Oromia 85(23.5%), which surrounds Addis Ababa, as the second most prevalent place of patient's residency. Mode of arrival to the hospital showed that 90(24.9%) of patients were transported by ambulance, 216 (59.7%) by taxi, and 115 (31.8 %) by walking. Patients' triage category showed that: red 21 (5.8%), orange 37 (10.2%), yellow 267 (73.8%), green 37, (10.2%). Approximately half of the patients were referred to a hospital from a health center 187 (51.7%), while others were either private 36 (9.9%) or referred from another regional hospital 24 (6.6%). Of patients referred to the hospital, 247(68.2%) of patients received pre-hospital treatment. The majority of patient, 157 (43.4%), live within less than a 5-kilometre radius of the hospital. About 53 (14.6%) patients drank alcohol, and intoxicated at the time of trauma.

Table 3 *baseline clinical information of patients visiting ALERT trauma center emergency department.*

Variables		Frequency (%)
Duration of trauma		
	Less than 1 hours	53 (14.6)
	Greater than 1 hour	261 (72.1)
	1 day	34 (9.4)
	Greater than 1 day	14 (3.9)
	Total	362 (100)
Time of injury		
	00:00 – 03:59 am	38 (10.5)
	04:00 am – 07:59 am	72 (19.9)
	08:00 am – 11:59 am	98 (27.1)
	12:00 pm – 15:59 pm	73 (20.2)
	16:00 pm – 19:59 pm	47 (13.0)
	20:00 pm – 23:59 pm	34 (9.4)
	Total	362 (100)
Region of referral		
	Addis Ababa	251 (69.3)
	Amhara	12 (3.3)
	Benishangul Gumuz	1 (0.3)
	Diredawa	1(0.3)
	Oromia	85 (23.5)
	SNNPE	12(3.3)
	Total	362 (100)

Mode of arrival to the hospital		
	Ambulance	90 (24.9)
	Bajaj	2 (0.6)
	Taxi	216 (59.7)
	Private car	31 (8.6)
	Walking	22 (6.1)
	Others	1(0.3)
	Total	362 (100)
Triage Categories	Red	21 (5.8)
	Orange	37 (10.2)
	Yellow	267 (73.8)
	Green	37 (10.2)
	Total	362 (100)
Intent of trauma		
	Unintentional(accidental)	233 (64.4)
	Intentional self-harm (suicide)	5 (1.4)
	Assault (interpersonal violence)	121 (33.4)
	Undetermined (awaiting result of investigation)	2 (0.6)
	Unknown	1 (0.3)
	Total	362 (100)
Distance of patient's injury site and hospital in kilometer		
	Less than 5 km	157 (43.4)
	5–15km	153 (42.3)
	16–25km	6 (1.7)
	26–35km	2 (0.6)
	36–45km	1 (0.3)
	Greater than 45km	43 (11.9)
	Total	362 (100)
The interval between injury and arrival		
	Immediate(<1hr)	52 (14.4)
	Within hrs.(1-24hrs)	260 (71.8)
	Within days(>24hrs)	50 (13.8)
	Total	362 (100)
Referral source		
	Self	115 (31.8)
	Health center	187 (51.7)
	Private clinic	36 (9.9)
	Government	24 (6.6)
	Total	362(100)
Treatment given before arrival		
	Yes	247 (68.2)

	No	115 (31.8)
	Total	362 (100)
Is the patient used alcohol?		
	Yes	53 (14.6)
	No	309 (85.4)
	Total	362 (100)

5.3. Clinical profile of patients

The total Prevalence of mortality in this study was 3.6 %. Fighting accident or assault was the most common mechanism of injury, accounting for 115(31.8%), followed by R.T.A., 111(30.7%), and falling 85(23.5%). Gunshot and burn injury were the least common mechanisms of trauma, accounting for 2(0.6%) and 4(1.1%), respectively. Pedestrians 69(62.1%) are mostly affected by R.T.A., followed by passengers 29(26.2%) and commonly vehicle involved on RTA were Bajaj 50(45%) and Minibus 36(32.5%). The most prevalent anatomical site of injury was the head, 107 (29.6%) with followed by upper extremity, 75 (20.7%), and polytrauma, 41(11.3%), while spine trauma was the least prevalent form of injury 3 (0.8 %) (***See table 4).***

Table 4: *Clinical profile of patients visiting ALERT trauma center emergency department.*

Variables		**Frequency**	**Percent**
Mechanism of injury	RTA	111	30.7
	Fall down	85	23.5
	Stab injury	11	3.0
	Gunshot	2	.6
	Industrial (machine injury)	34	9.4
	Burn	4	1.1
	Fighting	115	31.8
	Total	362	100.0
If trauma is due to RTA	Pedestrian	69	62.1
	Motorcyclist	9	8.1
	Passenger	29	26.2
	Driver	4	3.6
	Total	111	100.0
Types of vehicles for RTA	Minibus	36	32.5
	Heavy good vehicle	8	7.2
	Taxi	5	4.5
	Bajaj	50	45
	Motorcycle	12	10.8
	Total	111	100.0
Anatomical site of injury	Head	107	29.6
	Chest	31	8.6

	Abdomen	8	2.2
	Upper extremities	75	20.7
	Lower extremities	64	17.7
	Spine	3	.8
	Pelvic	13	3.6
	Polytrauma	41	11.3
	Maxillofacial	20	5.5
	Total	362	100.0
Kampala trauma severity score	Milled	298	82.3
	Moderate	40	11.0
	Sever	24	6.6
	Total	362	100.0
Duration of hospitalization	Less than 24hr	183	50.6
	Greater than 24hrs	178	49.2
	Unknown	1	0.3
	Total	362	100.0

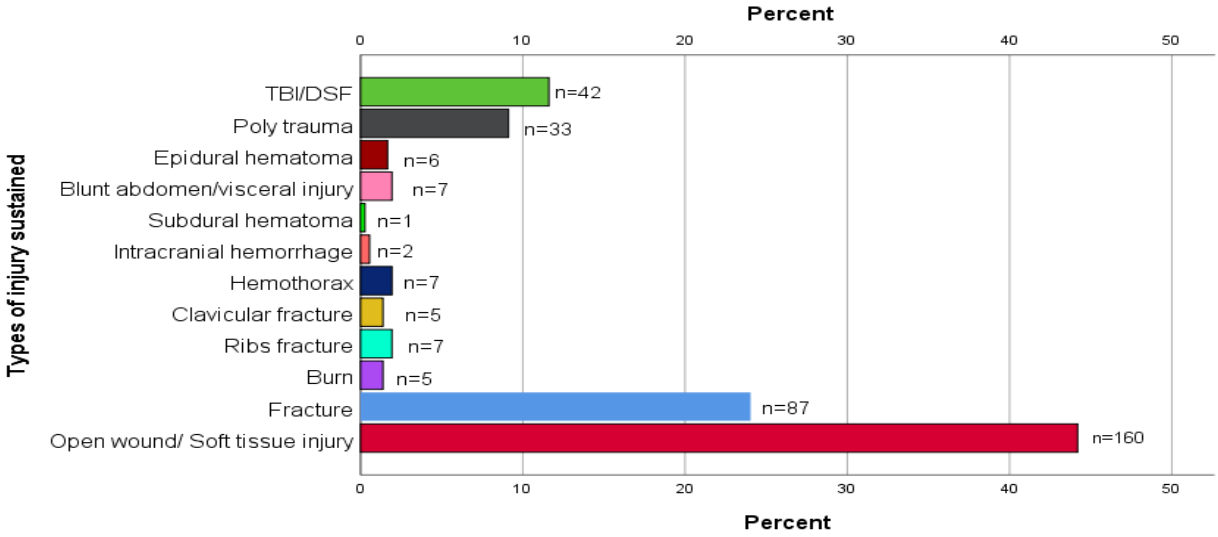

Figure 1;*Bar diagram showing types of injury sustained at ALERT hospital trauma center emergency department.*

Soft tissue injury is the most common injury type, accounting for 160 (44.2%), and extremities fracture is the second most common injury type in ER during the research period, accounting for 87 (24%), followed by TBI/DSF and Polytrauma, which account for 42 (11.6%) and 33 (9.1%), respectively**. (See figure 1)**

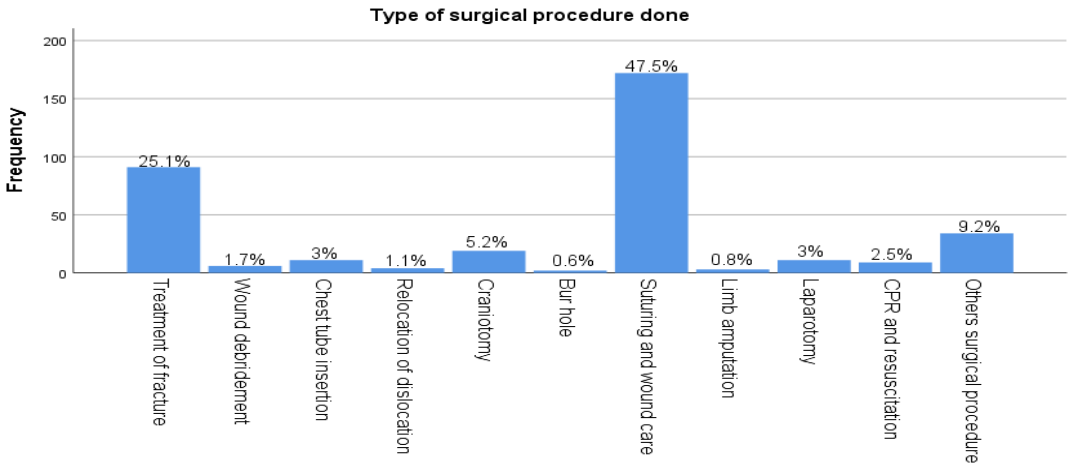

Figure 2 *Bar* diagram showing *surgical procedure done* at *ALERT hospital trauma center emergency department, Addis Ababa, Ethiopia (2021)*

Types of surgical procedure done

The surgical procedural details were the treatment of fracture and application of cast 91 (25.1%), suturing and dressing 172(47.5%), chest tube insertion in 11 (3%). Relocation of dislocation in 4(1.1%), Craniotomy 19(52%), Bur hole 2(0.6%), Limb amputation 3(0.8%), Laparotomy 11(3%), CPR and resuscitation 9(2.5%), and Others surgical procedure with joint management were 34(9.4%).

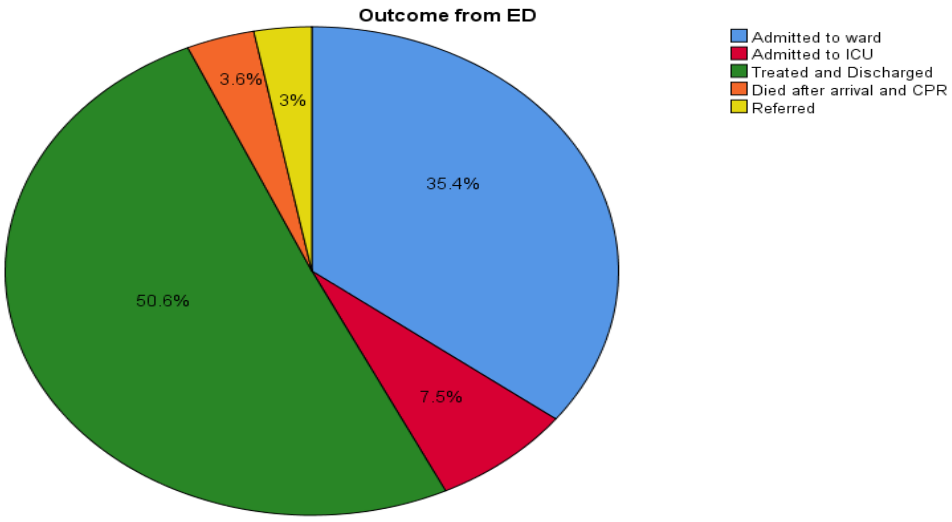

Figure 3: Pie diagram showing emergency department visit outcome at *ALERT hospital trauma center emergency department.*

4.1. Patient outcomes from the emergency department

The majority of injured patients, 183 (50.6%), were treated and discharged, while 128 (35.4%) were admitted to trauma wards. About 27 (7.5%) patients were needed to be admitted to an intensive care unit. The remaining 11(3%) patients were assessed in the emergency room and referred to other hospitals. Thirteen (3.6%) of injured patients died after arriving at the emergency department and receiving C.P.R.

4.2. Predictors of ED mortality

4.2.1. Effect of sociodemographic factors on trauma patient mortality

The Fischer exact test were calculated to assess the relationship between sociodemographic features and trauma patient outcome. While associating the demographic features and patient's outcome, the resulted findings show that a big number 11(8.5%) of mortality is seen on patients aged between 24-33 and compared to their number of case presence to E.D., female 5(4.9%) has high mortality rate than male 8(3.1%). The resulting numbers show that age with (p-value = 0.037) is a statistically associated factor for mortality than other sociodemographic variables ***(see Table 5)***

Table 5. Fisher exact test analysis of sociodemographic factors associated with mortality of trauma patient in ALERT trauma center emergency department.

Effect of sociodemographic factors on trauma patient mortality				
Variables	Improved (n%)	Death (n%)	Test used	P-value
Sex				
Male	251(96.9%)	8(3.1%)	Fisher's Exact Test	0.531
Female	98(95.1%)	5(4.9%)		
Age				
14-23	119(99.2%)	1 (0.8%)	Fisher's Exact Test	0.037*
24-33	118(91.5%)	11 (8.5%)		
34-43	57(98.3%)	1 (1.7%)		
44–53	24(100.0%)	0 (0.0%)		
54–64	21(100.0%)	0 (0.0%)		
≥65	10(100.0%)	0 (0.0%)		
Place of residence				
Urban	295 (96.4%)	11 (3.6%)	Fisher's Exact Test	1.000
Rural	54(96.4%)	2 (3.6%)		

Note: **Significant at p-value < 0.05, **significant at p-value <0.005*

4.2.2. Effect of baseline clinical factors on trauma patient mortality

The results of a cross-tabulation between ED trauma injury outcome and baseline clinical information of trauma patients are summarized in **table 6**. Regarding mode of arrival to the hospital, patients who came with Ambulance 9(69.2%) had high mortality than another mode of arrival. The Fisher's exact test were calculated to assess the relationship between baseline clinical features and ED mortality. The figured numbers show the mode of arrival to the hospital (P-value= 0.024), and triage categories (P-value <0.000) were statistically associated with ED mortality. Other baseline clinical variables like duration of trauma, time of injury, region of referral, the intent of trauma, distance of patient's injury site in kilometer, interval between injury and arrival, referral source, treatment given before arrival and patient use of alcohol were has no significant statistical association.

Table 6. *Fisher exact test analysis of baseline clinical factors associated with mortality of trauma patient in ALERT trauma center emergency department.*

Effect of baseline clinical factors on trauma patient mortality				
Variables	**Improved (n%)**	**Death (n%)**	**Test used**	**P-value**
Duration of trauma				
<1 hour	51(96.2%)	2(3.8%)		
>1 hour	251(96.2%)	10(3.8%)	Fisher's	
1 day	33(97.1%)	1(2.9%)	Exact Test	1.000
>1 day	14(100.0%)	0 (0.0%)		
Time of injury				
00:00 – 03:59 am	38(100.0%)	0 (0.0%)		
04:00 – 07:59 am	68(94.4%)	4(5.6%)	Fisher's	
08:00 – 11:59 am	96(98.0%)	2(2.0%)	Exact Test	
12:00 – 15:59 pm	71(97.3%)	2(2.7%)		0.317
16:00 – 19:59 pm	45(95.7%)	2(4.3%)		
20:00 – 23:59 pm	31(91.2%)	3(8.8%)		
Region of referral				
Addis Ababa	244(97.2%)	7(2.8%)		
Amhara	12(100.0%)	0 (0.0%)	Fisher's	
Benishangul Gumuz	1(100.0%)	0 (0.0%)	Exact Test	0.373
Diredawa	1(100.0%)	0 (0.0%)		
Oromia	79(92.9%)	6(7.1%)		
SNNPE	12(100.0%)	0 (0.0%)		
Mode of arrival to hospital				
Ambulance	81(90.0%)	9(10.0%)		0.024*

Bajaj	2 (100.0%)	0 (0.0%)		
Taxi	212(98.1%)	4(1.9%)	Fisher's	
Private car	31(100.0%)	0 (0.0%)	Exact Test	
Walking	22(100.0%)	0 (0.0%)		
Others	1(100.0%)	0 (0.0%)		
Triage Categories				
Red	10 (47.6%)	11 (52.4%)	Fisher's	0.000**
Orange	35(94.6%)	2 (5.4%)	Exact Test	
Yellow	267(100.0%)	0 (0.0%)		
Green	37(100.0%)	0 (0.0%)		
Intent of trauma				
Unintentional	221(94.8%)	12(5.2%)		
Intentional self-harm	5(100.0%)	0 (0.0%)	Fisher's	
Assault	120(99.2%)	1 (0.8%)	Exact Test	0.195
Undetermined	2(100.0%)	0 (0.0%)		
Distance of patient's injury site and hospital in kilometer				
< 5 km	154(98.1%)	3(1.9%)		
5–15km	145(94.8%)	8(5.2%)		
16–25km	6(100.0%)	0 (0.0%)	Fisher's	
26–35km	2(100.0%)	0 (0.0%)	Exact Test	0.454
36–45km	1(100.0%)	0 (0.0%)		
>45km	41(95.3%)	2(4.7%)		
The interval between injury and arrival				
Immediate (< or =1hr)	51(98.1%)	1(1.9%)	Fisher's	
Within hrs.(>1-24hrs)	249(95.8%)	11(84.6%)	Exact Test	0.731
Within days(>24hrs)	49(98.0%)	1(2.0%)		
Referral source				
Self	113(98.3%)	2 (1.7%)	Fisher's	
Health center	179(95.7%)	8(4.3%)	Exact Test	0.448
Private clinic	34(94.4%)	2(5.6%)		
Government	23(95.8%)	1(4.2%)		
Treatment is given before arrival?				
Yes	236(95.5%)	11(4.5%)	Fisher's	
No	113(98.3%)	2(1.7%)	Exact Test	0.240
Is patient used alcohol				
Yes	52(98.1%)	1(1.9%)	Fisher's	
No	297(96.1%)	12(3.9%)	Exact Test	0.701

Note: **Significant at p-value < 0.05, **significant at p-value <0.005*

4.2.3. Effect of variables under patient clinical profile on trauma patient mortality

From the mechanism of injury, a road traffic accident was the commonest cause of death, 12(92.3%), and the least was found in patients with assault 1(7.7%). Multiple site injury was responsible for most deaths, 11(84.6%), followed by head injury, 2(15.4%). The breakdown of trauma severity by Kampala trauma severity score II show, Mild (298, 82.3%), Moderate (40, 11%) and severe (24, 6.6%). Twelve (50%) of the severely injured half patients were transported by taxi and private car, while the remaining 12 (50%) were brought by ambulance and arrived at the hospital. Thus, polytrauma affects around 16 (66.6 %) of critically injured patients, while road traffic accidents account for 12 (92.3 per cent) of deaths, with 11 (84.6 percent) coming to the hospital after the golden hour has passed. The Pearson chi-square and Fisher's exact test were calculated to assess the relationship between patient clinical profile and ED mortality. The resulting numbers show that mechanism of injury, Anatomical site of injury, injury type, trauma severity and type of surgical treatment given is statistically highly associated factor for mortality than others, with (p-value = 0.002, 0.000, 0.000, 0.000, 0.000) respectively***.(See table 7)***

Table 7. *Fischer exact test analysis of clinical profile and factors associated with trauma patient mortality in ALERT trauma center emergency department.*

Effect of patient clinical profile on trauma patient mortality

Variables	Improved (n%)	Death (n%)	Test used	P-value
Mechanism of injury				
RTA	99(89.2%)	12(10.8%)		
Fall down	85(100.0%)	0 (0.0%)	Fisher's	
Stab injury	11(100.0%)	0 (0.0%)	Exact Test	0.002**
Gunshot	2(100.0%)	0 (0.0%)		
Industrial (machine injury)	34(100.0%)	0(0.0%)		
Burn	4(100.0%)	0 (0.0%)		
Fighting	114(99.1%)	1(0.9%)		
Patient Activities during RTA				
Pedestrian	61(88.4%)	8(11.6%)		
Motorcyclist	8(88.9%)	1(11.1%)	Fisher's	1.000
Passenger	26(89.7%)	3(10.3%)	Exact Test	
Driver	4(100.0%)	0 (0.0%)		
Types of vehicles for RTA				
Minibus	32(88.9%)	4(11.1%)		
Heavy good vehicle	5(62.5%)	3(37.5%)	Fisher's	
Taxi	5 (100.0%)	0 (0.0%)	Exact Test	0.197
Bajaj	46(92.0%)	4(8.0%)		
Motorcycle	4(8.0%)	1(8.3%)		
Anatomical site of injury				
Head	105(98.1%)	2(1.9%)		
Chest	31(100.0%)	0 (0.0%)		
Abdomen	8(100.0%)	0 (0.0%)		
Upper extremities	75(100.0%)	0 (0.0%)	Fisher's	
Lower extremities	64(100.0%)	0 (0.0%)	Exact Test	0.000**
Spine	3(100.0%)	0 (0.0%)		
Pelvic	13(100.0%)	0 (0.0%)		
Poly site trauma	30(73.2%)	11(26.8%)		
Maxillofacial	20(100.0%)	0 (0.0%)		
Type of injury				
Open wound/ STI	160 (100.0%)	0 (0.0%)		
Fracture	86(98.9%)	1(1.1%)	Fisher's	0.000**
Burn	5(100.0%)	0 (0.0%)	Exact Test	
Ribs fracture	7(100.0%)	0 (0.0%)		
Clavicular fracture	5(100.0%)	0 (0.0%)		
Hemothorax	7(100.0%)			

ICH	1(50.0%)	1(50.0%)		
Subdural hematoma	1(100.0%)	0 (0.0%)		
Blunt abdomen /visceral injury	7(100.0%)	0 (0.0%)		
Epidural hematoma	6(100.0%)	0 (0.0%)		
Poly trauma	23(69.7%)	10(30.3%)		
TBI/DSF	41(97.6%)	1(2.4%)		
Kampala trauma severity score				
Milled	298(100.0%)	0 (0.0%)	Fisher's	
Moderate	38(95.0%)	2(5.0%)	Exact Test	0.000**
Sever	13(54.2%)	11 (84.6%)		
Type of surgical procedure done				
Treatment of fracture	90(98.9%)	1(1.1%)		
Wound debridement	6(100.0%)	0 (0.0%)		
Chest tube insertion	11(100.0%)	0 (0.0%)		
Relocation of dislocation	4(100.0%)	0 (0.0%)		
Craniotomy	19(100.0%)	0 (0.0%)	Fisher's	0.000**
Bur hole	2(100.0%)	0 (0.0%)	Exact Test	
Suturing and wound care	172(100.0%)	0 (0.0%)		
Limb amputation	3(100.0%)	0 (0.0%)		
Laparotomy	11(100.0%)	0 (0.0%)		
CPR and resuscitation	3(33.3%)	6(66.7%)		
Others surgical procedure	28(82.4%)	6(17.6%)		
Duration of hospitalization				
Less than 24hr	176(96.2%)	7(3.8%)	Fisher's	1.000
Greater than 24hrs	172(96.6%)	6(3.4%)	Exact Test	
Unknown	1(100.0%)	0 (0.0%)		

*Note: *Significant at p-value < 0.05, **significant at p-value <0.005*

CHAPTER SIX

5. Discussion

A traumatic injury can be caused by a wide range of blunt, penetrating, and other mechanisms. As a result, after a trauma patient has sustained this injury, he/she may require immediate care. So, all aspects of trauma care systems, such as a powerful prehospital care system, skilled human power, facilities, equipment, and continuous supplies, must be in place for a successful outcome.[6]

This study used retrospectively collected data from patients' card to provide an in-depth picture of the outcome of injury treated at ALERT hospital in Addis Ababa, Ethiopia. These findings can be used to inform future injury prevention measures and efforts to enhance systems.

The findings of this study revealed that the most common injury result was minor injury, which required some expert care 82.3%, followed by mild injury 11%, and severe injury, which required intense medical/surgical management 6.6%. However a study conducted at Tikur Anbessa specialized hospital, were classified as having moderate 71% and severe 14.6% injuries, and a similar study conducted at Jimma hospital reported that 2.7% were classified as having severe, 41.3% as moderate, and 26% as minor injuries.[26][27]. The difference between these three hospitals could be explained by possible difference used to define moderate or severe injury in the respective studies.

This study found that among the total 24 (6.6 %) severely injured half patients 12 (50%) were transported by taxi and private vehicle, while the remaining 12 (50%) were transported and arrived at the hospital by ambulance. This study findings also support the statement that Addis Ababa that indicated Ethiopia, like other poor African nations, has a poor, unplanned, and fragmented pre hospital care system [28]. And lower and has greater variation to a study done at Menelik Memorial hospital 72.7% [26]. The difference can be explained by the fact that Menelik II memorial hospital is close to the Addis Ababa fire and emergency center, which means that more patients are referred to the hospital by the dispatch center than ALERT hospital, which is located in the city's point.

The analysis made among the possible causes of severe injuries showed that 62.5% were due to R.T.A.s and 20.8% were due to fall down accident. A similar finding was noted by Kifle *et al.*

[27] which was 49.7% was caused by R.T.A.s, 12.5% by stab injury and 11.4 % by cut by a sharp tool, whereas B. Tadesse *et al.* reports RTA 38.3% followed by stuck/hit by a person or object 31.5% and fall 21.2% are the possible cause for severe trauma in Tikur Anbessa Specialized Hospital.[26]

In this study the mortality prevalence was 3.6%, this implies that a higher proportion of death is reported at the emergency department which is not comparable with the study that was reported from Tikur Anbessa specialized hospital 1.47%, Menelik hospital 1.5%, India 1%, Canada 1.2%, and Korea 0.6% [18],[29],[16],[17],[18]. However, the result is much lower than the study conducted in Dilla hospital 6%, and sub-Saharan Africa 4.2%. [3],[7]. This inconsistency may be due to variation in the study sample, study settings, lack of prehospital care, availability of different specialty for trauma care and lack of ATLS and emergency care training among health care workers in this study setting.

When we looked at the success rates of CPR for patients exclusively arrested in the E.D., we found ROSC rates of 23.1%, which is close to the 30.2 % ROSC rate of cardiac arrest cases in the ED published by Malaysia University Hospital [30], but lower than a prospective observational study of CPR outcomes in the Emergency Department of the Aga Khan University Hospital, Karachi, Pakistan that found ROSC rate of 59%.[31] The difference could be due to sampling size, study design, or setting, and countries are reporting successful cardiac arrest resuscitation to have effective systems in place to assist and transport patients, including effective point to point communication centers, well-equipped ambulances, and highly skilled and experienced pre-hospital care teams.. [32],[32]. Which is a terrible system in our nation[28],[15],[14], which has a significant negative influence on patient outcomes and, as a result, leads to low success rate on overall patient outcomes.

In this study, the average duration from accident to hospital admission for total trauma patients was 3 hours, with 11 (84.6%) of died patients were arrived at the hospital after 1 hour and the golden hour had gone. which is lower than the study done in Lusaka, Zambia, were large percentage of patients arrived within 6 hours of injury 62.2% [33]. And much higher than the mean time from accident to hospital admission in America 64.6 min [21], German 68 min [34]. Also, this study revealed that 24% of trauma patients arrived in the ALERT hospital ED by ambulance. However, almost all trauma patients arriving at the hospital ED by ambulance were transported from the health center, private hospital, and other regional hospital settings, where

they may have received resuscitation, not directly from the injury scene. This is significantly higher than the 20.3% found in a previous study of emergency medical care utilization in Addis Ababa hospitals, in Lusaka, Zambia 5.8% and much lower than America, which reported 82.5% [14], [33],[21]. These surprise results might be influenced by various variables, including distance to health-care facilities, the idea that private car and taxi is faster, or a lack of awareness of the EMS contact number. More work is needed to promote awareness about using emergency medical services to transport trauma patients to hospitals.

As a result of the Fisher's exact test model, this study found that mechanism of injury, Anatomical site of injury, injury type, trauma severity and type of surgical treatment given is statistically highly associated factor for mortality than others variable. The United Kingdom (U.K.), using chi-square test model trauma patient's mortality or improvement is significantly associated with G.C.S., age and respiratory rate [24]. A study done in German due to the logistic regression model found that shock and bleeding variables and age were strongly predictive of mortality [34]. The difference might be attributable to the association model they utilized, the number of trauma patients, data availability, and the analytic approach.

In this study inter personal violence is the most common accident that brings people to the emergency department, accounting for 31.8 % of all emergency room visits, most violence occurred towards male 87% who were younger aged between 24-33 and 34.8% of those who are alcoholics and intoxicated at the time of trauma, which is comparable with a study done in Ethiopia, Mekelle public hospital 31.1%, in Ethiopian, Gedeo Dila hospital 30.1%, Lusaka, Zambia 38.2% and have a greater variation to a study done at Tikur Anbessa specialized hospital 20%, and South Africa 20.9%, [9],[35],[33] [36], [37]. The inequality might be related to referrals from health centers, where most low-acuity triage referrals are sent to hospitals for medico-legal paperwork and certification purposes rather than therapeutic care, which physicians can only provide.

Road traffic injuries accounted for 30.7% of all injuries, which is greater than the 14.1% reported by Mekelle Public Hospital and, but far lower than the 36.5% reported by Menelik II Specialized Hospital, 49.1% Tikur Anbessa and Yekatit 12 hospital, 47.3% reported by Gedio Dilla Hospital and India 75%.[9],[29],[38],[35],[16]. RTA was the primary cause of mortality in this study 92.3%, which is greater than the study published in Ethiopian University Hospitals 52.2% [3], and Saudi Arabia 62% of patients died in road traffic accidents[19]. Variation in

RTA prevalence might be attributable to research sample size, geographical location of research setting, and death from RTA is much higher related to multi-factorial, which might be explained by patient presenting with traffic related injuries being more severe than other mechanisms of trauma.

6. STRENGTHS AND LIMITATIONS

6.1. STRENGTHS

Aside from the data's lack of generalization to the general population, the result is crucial to compare it to other sources, such as hospital logs and records, to get a more accurate picture of the community's injury burden. Further studies are needed to correlate access, utilization, and efficacy of pre-hospital care systems to get a more comprehensive picture of trauma burden in ALERT hospital.

6.2. LIMITATIONS

This study has several limitations despite its significant contribution as a source of information for prevention and management strategies. As this is a retrospective institutional-based study, the findings are not generalizable to the general population. Also, the lack of a trauma registry and incomplete patient charts were the major challenges. There are several limitations on charting and poor handwriting of the treating physician and nurses. Missing data on sociodemographic like marital status, occupation and income are a limitation during retrospective chart review.

7. CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion

Due to the trauma care system and other factors, trauma patient outcome in ALERT hospital varied from the findings of other areas of studies. Inter-personal violence is the leading cause of trauma, and mortality due to RTA was much greater than other mechanisms of injury, with the majority of pedestrians being impacted and three-wheelers/Bajaj being the most commonly involved vehicle in trauma. The trauma victims/patients were young males. The findings of these studies revealed that the trauma care system is disorganized, which impacts the outcome of trauma patients either directly or indirectly. There is a need to have urgent injury preventive and management strategies and establish a Pre-hospital Emergency Medical Service System. The results from this study provide clear and convincing support for MOH to expand pre-hospital care service and alarms the road and safety authority and traffic managements to take action on road safety and use of safety measures among the three-wheeler/Bajaj transportation system. Future studies can be directed to long-term outcomes and follow-up of injury victims to account for exact mortality and morbidity due to such unfortunate events.

7.2. Recommendation

7.2.1. MOH

- Half of the severely injured patients arrived at the hospital by taxi and that several patients died while being transferred by ambulance demonstrates the pre-hospital care system's weaknesses and the need for more extensive EMS services to allow for faster patient transfer.
- The Ministry of Health should build a centralized ambulance dispatch call Centre for Addis Ababa, as well as appropriate ambulance "hubs" scattered around the city, for a more coordinated and quick pre-hospital response. The results from this study provide clear and convincing support for this service expansion.
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7.2.2. ALERT hospital

- Because of the large number of soft tissue injuries and low acuity patients treated at ALERT, fast triage and treatment in one of the few designated trauma centers are extremely challenging. In addition, many of these minor injuries may be treated at a lower level of care; as a result, the hospital should effectively communicate with and train the referring health center on how to handle minor injuries, as well as resolve reasons for minor injury referral, such as medico-legal certification, so that the trauma center can focus on more serious injuries.
- Furthermore, over half of critically ill patients died in the emergency room, highlighting the importance of staff trauma training, like ATLS and restructuring of systems, refilling the ER with the resource used to treat immediately on arrival

7.2.3. Road and safety authority

• The findings of this study, notably the R.T.A., should prompt road and traffic authorities and management to take action on road safety and the installation of safety measures, particularly among three-wheeler/Bajaj transportation systems.

7.2.4. Health Center

- The health center should take action to address some of the inappropriate referrals.
- To reduce the load of all minor injury paperwork being completed in the trauma center, the health center should appoint additional general physicians.

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ANEX1: ENGLISH VERSION QUESTIONER

For assessment of Clinical profile and outcome of trauma among patient treated at alert trauma center emergency department Addis Ababa, Ethiopia (January 1/2019 – December 1/2020)

Patient identification.	Card number _____
1. SOCIODEMOGRAPHIC CHARACTERISTICS OF PATIENT	
1.1. Sex	1. Male 2. Female 3. sex is unknown
1.2. Age	1. 14 - 23 2. 24 - 33 3. 34 - 43 4. 44 - 53 5. 54 - 64 6. More than 64(65or more) 7. Age is unknown
1.3. Marital status	1. Single 2. Married 3. Widowed 4. Divorced
1.4. Occupation	1..Student 2. Government employee 3. Driver 4. Farmer 5. Laborer 6. Maid/servant 7. Merchant 8. No formal job 9. Others
1.5. Place of residence	1. Urban 2. Rural 3. Unknown
2. BASE LINE CLINICAL INFORMATION	
2.1. Date of injury	1. DD __ MM___ YYYY__
2.2.Time of injury	1. 00:00 – 03:59 am 2. 04:00 – 07:59 am 3. 08:00 – 11:59 am 4. 12:00 – 15:59 pm 5. 16:00 – 19:59 pm 6. 20:00 – 23:59 pm 7. Unknown

2.3. Region of referral	1. Addis Ababa 2. Afar 3. Amhara 4. Benishangul Gumuz 5. Diredawa 6. Gambela 7. Harar 8. Oromia 9. Somali 10. SNNPE 11. Tigray
2.4. Mode of transportation	1. Ambulance 2. Bajaj 3. Taxi 4. Private car 5. Walking 6. Others
2.5. Intent of trauma	1. Unintentional(accidental) 2. Intentional self-harm (suicide, attempted suicide) 3. Assault (interpersonal violence) 4. Undetermined (awaiting result of investigation) 8. Others (5. Legal intervention 6. Operations of war and civil insurrection) 9. Unknown
2.6. Distance of patient's injury site and hospital in kilometers	1. <5 km 2. 5–15km 3. 16–25km 4. 26–35km 5. 36–45km 6. >45km
2.7. Interval between injury and arrival to the hospital	1. Immediate(<1hr) 2. Within hrs.(1-24hrs) 3. Within days(>24hrs) 4. Unknown
2.8. Referral source	1. Self 2. Health center 3. Private clinic 4. Government
2.9. Treatment given before arrival?	1. Yes 2. No
2.10. Is patient used alcohol or	1. Yes 2. No

substance at time of injury	
3. CLINICAL PROFILE OF PATIENT	
3.1. Mechanism of injury	1. RTA 2. Fall down 3. Stab injury 4. Gunshot 5. Industrial (machine injury) 6. Domestic Violence 7. Burn 8. Others
3.2. If trauma is due to RTA	1. Pedestrian 2. Motorcyclist 3. passenger 4. driver 5. unknown
3.2. Types of vehicle for RTA	1. Minibus 2. Heavy good vehicle 3. Taxi 4. Bajaj 5. Motorcycle 6. Others
3.3. Anatomical site of injury	1. Head 2. Chest 3. Abdomen 4. Upper extremities 5. Lower extremities 6. Spine 7. Pelvic 8. Polytrauma 9. Maxillofacial 10. Skin 11. Others _____
3.4. Types of injury sustained	1. Open wound/ Soft tissue injury 2. Fracture 3. Burn 4. Ribs fracture 5. Clavicular fracture 6. Hemothorax 7. Pneumothorax 8. Intracranial hemorrhage 9. Subdural hematoma 10. Blunt abdomen/visceral injury 11. Epidural hematoma

	12. Pneumocephalus 13. Poly trauma 14. Others
3.5. Kampala trauma score (KTS II)	1. SBP _____ 2. GCS ____ 3. RR _____ 4. Score for series injury (none=2, One injury=1, more than one injury=0) ___ TOTAL SCORE _____
3.7. Types of surgical procedure done	1. Treatment of fracture 2. Wound debridement 3. Chest tube insertion 4. Relocation of dislocation 5. Craniotomy 6. Bur hole 7. Tracheostomy 8. Suturing and wound care 9. Limb amputation 10. Laparotomy 11. CPR and resuscitation 12. Others surgical procedure
3.8. Duration of hospitalization	1. Less than 24hr 2. Greater than 24hrs 3. Unknown
4. EMERGENCY VISIT OUTCOME	
4.1. Outcome from ED	1. Admitted to ward 2. Admitted to ICU 3. Treated and Discharged 4. Died before arrival 5. Died after arrival and CPR 6. Referred 7. Unknown