JIMMAUNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE

Management outcome and prognostic Factors of chest injury in Aksum St Marry Hospital, and Referral Hospital in Northern Ethiopia, 2018.

By:AbdiselamAhmedHirsi

Advisor :Dr.MehariAbraha (MD,G.surgeon)

JULY, 2018

, ETHIOPIA

JIMMA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF MEDICINE

Management outcome and prognostic factors of chest injury in Aksum St Marry Hospital, and Referral Hospital in Northern Ethiopia, 2018.

By:AbdiselamAhmed Hirsi(Bsc)

Advisor :Dr.MehariAbraha (G.surgeon)

Mekelle University

College of Health Sciences

Advisor's Approval Sheet

This is to certify that the thesis entitled "**Management outcome and prognostic factors of chest injury**, three years retrospective analysis at Aksum St. Mary and referral Hospital, northern region, Ethiopia. It is submitted in partial fulfillment of the requirements for the degree of masters in Integrated Emergency Surgery, obstetrics and gynecology to the graduate program of the College of Health Sciences of Mekelle University and has been carried out by **Abdiselam Ahmed Hirsi** under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the Department.

Dr. Mehaw Abrha

Name of Major Advisor	Signature	Date

Name of Co advisor	Signature	Date

Declaration

I hereby declare that this MSc thesis is my original work and has not been presented for a degree in any other university and all sources of material used for this thesis have been duly acknowledged.

Name: Abdiselam   Signature: _____   Date: 5/11/2018

This MSc thesis had been submitted for examination with my approval as thesis advisor.

Name: Mehaw Abrha   Signature: _____

i

ACKNOWLEDGMENTS

List of Acronyms and abbreviations

AOR	Adjusted Odd Ratio
CBC	Complete Blood Count
CI	Confidence Interval
COR	Crude Odd Ratio
CXR	Chest X-Ray
Hgb	Hemoglobin
IEOS	Integrated Emergency Obstetrics, Gynecology and General surgery
MRN	Medical Record Number
RTA	Road Traffic Accident
SPSS	Statistical Package for the Social Sciences
SSI	Surgical Site Incision
Us	Ultrasound
V/S	Vital Signs
WHO	World Health Organization
#	Fracture

Contents

List of tables

List of figures

Abstract

Background: Chest injuries are major public health problems that commonly appear on the Morbidity and mortality reports of the health institutions in Ethiopia. Despite this prevailing Phenomenon, limited attention has been given to chest injuries as health problems and which is continuing challenge for the health professionals.

Objective: The objective of this study is to determine the **magnitude and management outcome** of chest injury in Aksum St. Marry and Referral Hospital.

Method: A Three year institutional based retrospective cross-sectional study design was conducted at Aksum St. Marry and referral hospital on 82 patients with chest injury. Data were collected by using interviewer administrated structured questioners by trained data collectors and analysis was done using SPSS version 22. Descriptive analysis was performed to describe number and percentage to assess the magnitude and management outcome of chest injury.

Result: Chest injury was found to be 4 %(n=82) in the hospital. And most victims ware males69 (84.1%) with the peak age range in between 30-39 years 34%(28). And fighting was the leading cause of chest injury witch accounts 41.5%. And patients who sustained animal injury were 13 times more likely to have bad outcome than patients who sustained chest injury by smuggling.

Blunt type of chest injury was the prevalent 68.3 %(56). And 39% of the patients had associated Injury, commonly fracture injury (17)20.7%. Hem pneumothorax is the leading diagnosis with was made on 58.5% of the patients. 79.3% of the patients managed only by inserting chest tube. 74 (90.2%) had good outcome having been improved without complication. And 2(2.4%) patients died. pneumonia is the prevalent post injury complications 5(6.1%). And 65.9% patients were stayed for 2 to 7 days in the hospital.

Conclusion &Recommendation: Fighting founded to be the major etiological factor with a higher rate of blunt chest injuries. The majority of the patients were successfully managed by Thoracotomy,Urgent preventive measures targeting at reducing the occurrence of inter personal violence and avoidance of Sharpe materials handling by the civilians, RTA, animal injury, and occupational injuries, and also improve management of surgical emergencies from the place of accident to the hospital will decrease the overall morbidity and mortality.

Key words: Chest injury, Magnitude, Aksum St. marry and referral hospital, outcome.

CHAPTER ONE: INTRODUCTION

1.1 Background

Trauma, or injury, is defined as cellular disruption caused by an exchange with environmental energy that is beyond the body's resilience which is compounded by cell death due to ischemia/reperfusion (1).

Globally more than 5 million people die each year as a result of injuries. This accounts for 9% of the world's deaths, nearly 1.7 times the number of fatalities that result from HIV/AIDS, tuberculosis and malaria combined. Ever y day the lives of more than 14,000 people are cut short as a result of an injury. Every six seconds someone in the world dies as a result of an injury (4).

Injuries affect all age groups but have a particular impacton young people and people in their prime working years. For people between the ages of 15 and 29 years, Road traffic injuries are the leading cause of death in this age group. About 90% of injury related deaths occur in low- and middle-income countries (2).

Despite growing awareness of the prevalence of the problem, attention to injury prevention and control among policy–makers and those funding global public health programming remains disproportionately low. Deaths from many communicable diseases are declining more rapidly than injury-related deaths. It will be possible to lower the current, unacceptably high burden of injury globally by following the steps in the prevention and control of injuries: SURVEILLANCE: Using data to understand the extent and nature of the injury problem then, RISK FACTOR IDENTIFICATION: Researching the causes of particular injuries, then INTERVENTION DEVELOPMENT: Developing strategies to address the causes and evaluating the effects of these measures, and finally IMPLEMENTATION: Putting into place effective prevention programs (2).

Globally10% of all trauma admissions result from chest injuries and 25% of trauma-related deaths are attributable to chest injuries (3).

1.2 Statement of the problem

According to Incidence, mortality and burden of disease of injuries in 2013, injuries accounted for 10.1% of the global burden of disease in 2013. And it estimated that 973 million people sustained injuries that warranted some type of healthcare and 4.8 million people died from injuries (4).

According to global statistics, thoracic injury accounts for 25% of all injuries. In a further 25%, it may be a significant contributor to the subsequent death of the patient. In most of these patients, the cause of death is hemorrhage. Chest injuries are often life-threatening, either in their own right or in conjunction with other system injuries (5). And the majority of these deaths 91% occur in underdeveloped countries (6). In Africa a study in Nigeria shows chest injury constitutes about 40% of the workload of most thoracic surgery units and accounts for about 20% of deaths in thoraco surgery units (7).Chest injuries are one of the three leading causes of trauma-r elated deaths in South Africa with a rate of 27.4% (8). A study in Egypt shows from all trauma related death, chest injuries accounts 17.7% (9). In Ethiopia studies shows that 7% of the patients died due to chest injuries (10), (11).

Prevention of injuries is an essential part of primary health care. Treatment is relatively expensive, often lingering and not always successful in preventing permanent disability. It is therefore, essential to strengthen the efforts of injury prevention.

In Ethiopia chest trauma is not well studied even if it is a major public health problem. Therefore, the present study attempted to contribute in filling the gap by determining the management outcome and prognostic factors of chest injury.

2.4 Significance of the Study

This study is help full to have knowledge on complex problem of chest injury and to gain information about the injury characteristics and its burden in the area of study and the county at large. It could help to develop countermeasures that could reduce the number and severity of accidents. In addition, the study may provide base line information to carry out further researches on chest injury. The data obtained in this study, may be used by concerned bodies for planning and evaluating on preventive measures. The recommendations given if considered are going to benefit the public at large on prevention of chest injury. Medical personnel's must therefore understand not only the incidence of the disease but also the patterns of injury , the management outcome of chest injury and how to prevent

complications peculiar to their environment. This would aid not only individual patient's management, but also help in the formulation of policies geared towards preventive measures from deductions from the studies. This formed the basis for this study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of chest injury

On a global scale every minute nine people die from traumatic injuries; approximately 5.8 million people die ever y year from non-intentional traumatic injuries and violence. Traffic accidents make up 1.3 million, suicides 844,000, and homicides 600,000 are the leading cause for these numbers.

The majority of these deaths (91%) occur in underdeveloped countries (6). And it is responsible for an estimated 6% of all years lived with disability and also it is the leading cause of death worldwide among those aged 15–29 years (2). The incidence of trauma in urban and rural areas was 47.4% and 52.6%, respectively. Blunt chest trauma constituted 47.8% and 83.3% of all injuries in urban and rural areas, respectively, and penetrating chest injuries were 52.2% and 16.7%, respectively (12).

Thoracic injuries are the primary factor in up to 75% of all trauma related deaths in USA (13). In the European Union about 25% of traumatic deaths are secondary to thoracic injuries (14). In UK from all trauma patients admitted 4.57% patients had chest injury (15). In Korea it accounts 13.4% of all trauma and 33.6% died due to this (16). A study in Iran shows the prevalence of chest injuries was 35.5% (12). A study in India shows from all trauma patients 45% of the patients were admitted primarily because of chest injury (17).

A study in South Africa shows 27.4% died due to chest injuries (8).In Nigeria at University of Uyo Teaching Hospital chest injury is 40% of cardiothoracic unit workload (7). A study in Egypt shows from all trauma related death, chest injuries accounts 17.7% (9). In Ethiopia according to WHO Proportional mortality of non-communicable diseases, injury accounts 10% of the cause of mortality (18).

2.2 Risk factors of chest injury

2.2.1 Socio demographic factors

Injuries affect all age groups but have a particular impact on young people and people in their prime working years. More males than females are killed by injuries and violence. Worldwide, about three-quarters of deaths from road traffic injuries, four fifths of deaths from homicide, and nine tenths of deaths from war are among men (2). In USA injury is one of the three leading causes of death four teenagers and young adults, elderly people have the highest rates of injury death.

Males have higher rates of injury death than those for females, regardless of age group (19). In the European Union, trauma is the most frequent cause of death in the population between 15 and 45years (14). A study in India shows 62% patients was in the age group of 21-30 years and the next common decade was the 4(i.e., 31-40) years which is 13.4% of which 88.22% are male and 11.78% female patients (17). A study in Malaysia shows thoracic trauma seen in victims with ages ranged from 1 to 89 years with a mean age of 39.67 years(SD=20.50). With a male to female ratio of 4.5:1 (20). A study in Brazil shows the patients' ages ranged between 13 and 89 years, with a mean of 37.9 years and a SD of 17.3. The mean age of the women was 43.2 years (±20.0 years) and of the men it was 36.4 years (±16.3 years). In this study the t-test demonstrated that women and older men had a statistically significant higher risk of being involved in accidents (P= 0.08)(21). In Sudan 54.7% were males and 45.3% were females with a male to female ratio of 2.5:2.1,The age ranged from 4 80 years with a mean age of 27.41(SD ± 13.5 years) most of the patients were in the third decade of life (22). In Ethiopia the patients' ages ranged between 2-58 years with a mean of 25.3 years. The majority of patients were aged between 11- 30 years accounting for 70.8% of all cases (10). In another Ethiopian study Majority of the chest injury victims were males 90.9% and the young were mostly involved (11).

2.2.2. Cause& Mechanism of injury

In UK Road traffic accidents were overall the most common mechanism of injury accounting for 57.01% of the patients (15). A study in India also shows RTA were the most common reason for blunt chest injuries 79.72% followed by fall from height 11.50% and assault 6.43% (17).

A study in Malaysia shows Commonest cause of chest injury was involvement in RTA, making up 84.3% of the cases, followed by falls 11.5%, and assault 4.2% (20). A study in Brazil shows the causes of thoracic trauma are secondary to 24.4% car crashes, 20.1% falls, 12.3% motorbike accidents, 10.7% stabbings, 5.9% accidents involving pedestrians, 5.6% bicycle accidents, 4.6% shootings, and 14.5% other types of accident (21).In Sudan 73% of the patients were involved in road traffic accident 37.3% were either driver or occupant and 36% were pedestrians. While 14 % are involved in attacks and 8% in stab wounds, 4% sustained trauma from falls and 0.7% was a gunshot (22). In Ethiopia homicides accounted for 74.2% of the patients (11).

In Sudan 94.7% presented to the hospital in the time period of 1 to 6 hours, while 4% presented in less than one hour and 1.3% presented in more than six hours (22). In Ethiopia Most patients 71.2% arrived later than two hours from the time of injury (11).According to WHO in over 40% of the countries in the world, fewer than half of seriously injured people are transported to hospital by ambulance. In over a quarter of countries, 10% or less of the seriously injured was transported by ambulance (23).

In Malaysia As for the mechanism of injury y, 97.0% of the patients had blunt trauma, whereas only 3.0% had penetrating injury (20).A study in Pakistan shows 58% of patients had blunt chest injury as compared to 42% who had penetrating injuries (24).In Iran Among the patients with chest trauma, 35.4% had penetrating and 64.6% blunt lesions (12).In Ethiopia Penetrating injuries were the predominant types of injuries 72.7%-75% (11) (10).

In India the right side was involved in 70%, left side in 22.3% patients and bilateral involvement in 7.7% patients with blunt injury (17).

A study in Malaysia shows 72.6% patients had associated extra thoracic injuries. Most common was musculoskeletal 54.4% involving vertebral spine, pelvis and long bones 30.6% patients had neurotrauma and 11.5% patients had intra-abdominal injury as the common association (20). In Sudan 26.7% of the cases were isolated thoracic injuries while73.3% were multiple injuries, 37.3% the injuries included the extremities, 19.3% in the abdomen, 13.3% were in the head and neck ,the head was 9.3% while the neck 4%, 2.7% the pelvis was involved and 0.7% had injury to the spine (22). In Ethiopia 50% had associated injuries the commonest being to the extremities (11).

In Ethiopian another study about 30% of our cases has associated injuries to other organs (25). Also In another Ethiopian study 19.4% had associated injuries. Abdominal injuries occurred in 5.6%, skeletal in 5.6% and neurological injuries in 4.2% (10).

A study in India shows Chest pain and dyspnea were the most common symptoms at presentation whereas tenderness over the chest wall, bone crepitation and subcutaneous emphysema were the most common findings on physical examination (17). In Sudan Most of the were clinically stable 61.3%, while 26.7% experienced Dyspnea and 12% were shock, no patient reported as cyanosed at the time of presentation (11).In Ethiopia the presenting clinical features are chest pain 100.0%, shortness of breath 91.7%, bleeding from injury site 34.7%, fever 6.9% and cough 4.2% (10).

2.3 Management Outcome of chest injury

A study in India shows a Mean hospitalization time was 7.5 days, ranging from 1 to 35 days (17). In Iran The average length of hospitalization was 10.78± 12.53 days in patients with blunt chest trauma, and 5.74 ± 3.73 days in patients with a penetrating chest injury (P < 0.002) (12).

A study in Malaysia Overall LOS (length of stay) ranged from 1 to 94 days with a mean stay of 10.2 days(SD=12.4) (20). In Sudan The duration of hospital stay was 12% stayed less than 3 days while 48% stayed between 3 to7 days ,6% stayed for 8 to 14 days Only 1 .3% required a hospital stay of more than 2 weeks (11).

In Ethiopia LOS ranged between 4 and 60 days, with a mean of 11.8 days. 55.5% of the patients had a hospital stay of 10 days or less. Only two patients stayed in hospital for longer than 40 days (10) (12).

In Iran the outcome of patients at discharge was 95.7% recovery and 4.3% mortality. Overall, 4.9% of patients with blunt and 2.2% with penetrating chest traumas died (12).

In India From chest injury patients, 84.25% patients were discharged in satisfactory condition within 7-9 days, while hospital stay was prolonged in 13.42% patients because of multiple rib fracture associated with other extra thoracic injury and various complication (17). In Malaysia the overall mortality was 6.9% (20). In Sudan 87.3 % had uneventful course while 10.7% developed complications and deaths accounted for 2%. The complication which were 3.3% developed pneumonia, 3.3% had non-functioning chest tube, 2.7% developed surgical emphysema, 2% had sepsis and 1.3% developed wound infections. Those who sustained rib fracture 62.6%, 18.8% of them developed complications while those withHaemopneumothorax 35.1%, 6.5% died and 23.9% developed complications, 6.3% of patients with flail chest or diaphragmatic injuries developed complications.

The causes of death were as follows one patient developed pulmonary embolism, one died from septicemia and one patient had brain death (11). In Ethiopia 7.6% died. 83.2% of the patients recovered   fully without any residual effects.9.8% had complications (Pneumonia + sepsis 2.8%, Empyema 2.8%, Pneumonia alone   1.4%, Medastinitis 1.4%, Epiduralhematoma +   coning1.4%). There were 5 deaths, giving a mortality rate of 7 %(10

Conceptual framework
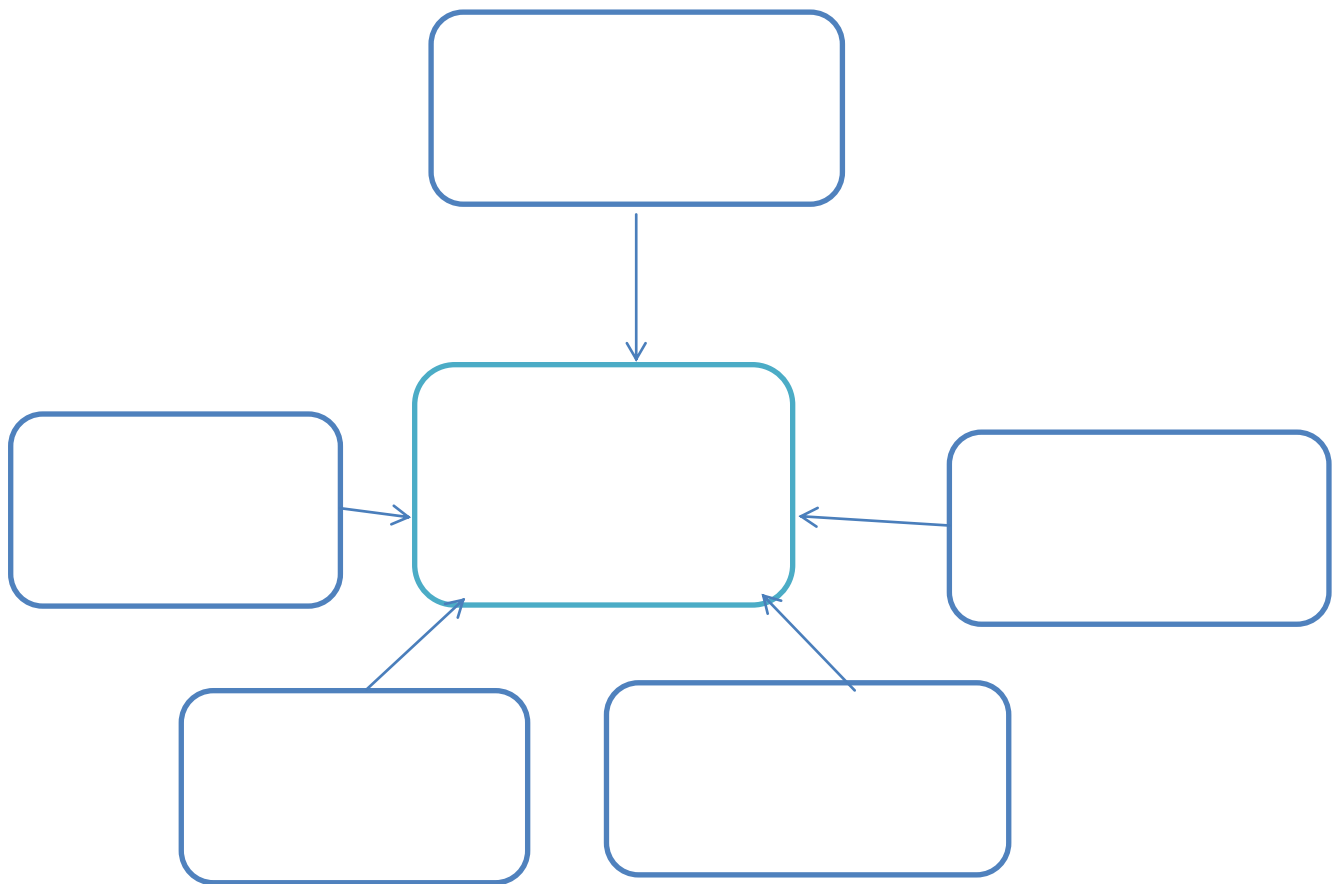
Figure 1: conceptual framework

CHAPTER THREE: OBJECTIVES

3.1 General objective

The objective of this study is to assess magnitude and management outcome of chest injuries in Aksum St. marry and referral hospital, Northern region, Ethiopia.

3.2 Specific objectives

--To assess the magnitude of chest injury in Aksum St. marry and referral hospital, Northern region, Ethiopia.

-To assess the management outcome of chest injuries in Aksum St. marry and referral hospital, Northern region, Ethiopia.

4. METHODS

4.1 Study area and period

The study was conducted by reviewing records of patients with chest injury who were in Axum St. Merry general hospital and Referral Hospital from January 2015 up to August 2018 and the study period would be fromSeptember to December 2018 G.C. Aksum is the most ancient town of Ethiopia. Found in Tigray national regional state about1024 km from Addis Ababa and 247 km from Mekelle, which is the capital city of Tigrayregion the town has a total population of 74,007 of which 35,524 are males and the rest 38,483 are females. There are different eye catch areas in the town including the obelisks and ancient churches (Tigray health bureau profile of 2001 E.C p.14).

Regarding health institutions in the town- there is one Referral and Teaching hospital, one Zonal hospital (Axum St. Mary), two Health centers, and seven different level private Clinics Aksum St. Mary hospital is a governmental zonal hospital established in 1958 E.C equipped with four main departments internal medicine, pediatric, Gyn./ Obs and Surgery. It has also dental, physiotherapy and psychiatric departments.

4.2 Study design

Institution based Retrospective descriptive cross-sectional study design was used. .

4.3 Population

4.3.1 Source population

All trauma patients who were present and was managed in Aksum St Marry Hospital, and Referral Hospital in Tigray, Ethiopia in the last 3 years (2016, 2017, 2018)

4.3.2 Study population

All chest injured patients who were admitted and managed in Aksum St Marry Hospital and Referral Hospital during the last three years.

4.4 Sample Size determination

The sample size of the study of all patients who were admitted to Aksum St Marry Hospital and Referral with a diagnosis of blunt and penetrating chest trauma during study last 3 years. Since the entire patient during the study period was included, no need to calculate sample size and no need to use sampling procedures.

4.4 Sampling technique

Consecutive sampling technique was used in which all presented patients with chest injury was Included in the study.

4.5 Inclusion & Exclusion Criteria

4.5.1. Inclusion criteria

All selected chest injury records of adult patients visited at Aksum St Marry hospital and Referral Hospital during the study period, which aged 12 years and above was included to the study.

4.5.2 Exclusion criteria

Chest injury patients' chart that had incomplete data, greater than 20% of the variables, was excluded.

4.6 Study variables

4.6.1 Dependent variable:

Management outcome of chest injury

4.6.2 Independent variables:

- ➤ Socio demographic variables
  - Sex,
  - age,
  - marital status,
  - occupation,
  - educational status,
  - residence
- ➤ Mechanism of chest injury
  - RTA,
  - Fighting,
  - Animal injury,
  - Falling down accident,
  - Violence, Smuggling)
- ➤ Type of chest injury
  - Blunt,
  - Penetrating

- ➢ Associated injuries
  - • Head injury,
  - • Abdominal injury,
  - • Fracture,
- ➢ Length of hospital stay (6hrs-1day,2-7days, >1wks)

4.7 Data collection tools and technique

Patients who were admitted with a diagnosis of chest trauma were initially identified from the log books of the triage, intake and procedure room of emergency department of Aksum St Marry Hospital, and Referral Hospital in Tigray, Ethiopia.

To extract relevant information from the patient records about sex, age, duration of presentation, duration of hospital stay, circumstance of injury, identified chest injury, post-procedure complication of patients and outcome English language check list was developed.

4.8 Data quality

The supervisors and data collectors were trained by principal investigator for one day. The qualifications of data collectors were BSc Nurses and they were recruited based upon their data collection experiences and competence. Pretest was done at Aksum university referral and specialized hospital prior to data collection and possible corrections to the check list was made. The collected data was first checked for completeness and edited every day after data collection by the principal investigator and supervisors. Then, was double entered to EPI data software with two data clerks independently and consistency between the two data sets was checked. Then mismatched data was cross checked with the hard copy and was corrected accordingly.

4.9 Data analysis

The collected data was   checked for its completeness, entered and analyzed using SPSS database programs. Data analysis and association tables between variables were   done to assess the relative effect of determinants. Association between dependent and independent variables were checked by using SPSS version 22.

4.10 Data quality management

To assure the quality of the data, data collectors and supervisors were trained and a regular supervision and follow up was made by supervisors. In addition, regular checkup for completeness and consistency of the data were also be made on daily basis.

4.11 Ethical consideration

Ethical clearance and permission letter were obtained from Ethical committee ofMekelle University institute of health, medical faculty post graduate research program and letter of cooperation was sent to the institution from Aksum Administrative office.

4.12 Operational definitions and definition of terms

1. **Chest injury**: A chest injury is any form of physical injury in a region between the neck and abdomen which includes both chest wall and thoracic cavity organs injury.

2. **Chest wall injuries**. Lacerations of the chest without pleural space involvement require simple irrigation, debridement, and closure.

3**. Flail chest**: The result of two or more ribs being fractured in two places or are fractured posterior with sternochondral dislocation anteriorly. The flail segment renders the chest wall unstable interfering with the mechanics of ventilation.

4. **Pericardial temponade**: The presence of blood into the pericardial sac, to such an extent that heart function is impaired.

5. **Lung contusion**: Injury to lung parenchyma resulting in edema and hemorrhage.

6. **Tube Thoracotomy**: Urgent insertion of chest tube in the plural cavity.

7. **Length of hospital stay**: the duration of time from admission to discharge or death of the patient.

8. **Management outcome**: the condition of the patient after the procedure that means whether he developed complication or not, discharged alive or died in the hospital.

a. **Good outcome**: -favorable final outcome of patient after treatment like discharge after improvement without any complication.

b. **Bad outcome**: - unfavorable final outcomes who develop complications like (anemia, sepsis, pneumonia, malfunction tube, SSI) and Death following treatment.

9. **Postoperative pneumonia**: suspected in a patient with clinical findings of infection including fever, cough or purulent sputum in the post-operative period.

10. **Surgical site infections** (SSI): Infection following surgical incisions and classified as

a. **Superficial Incision SSI**: Infection occurs within 30 days after the operation and involves only skin or subcutaneous tissue of the incision.

b. **Deep Incision SSI**: Infection occurs within 30 days after the operation and infection involves deep soft tissues (e.g., fascial and muscle layers) of the incision.

11. **Urban**: Peoples from Aksum town.

12. **Rural**: Peoples from outside Aksum town

CHAPTER FIVE: RESULTS

5.1 General characteristics of injury

In Aksum St. Marry and referral hospital trauma is the first cause of emergency attendance, second cause of morbidity next to Acute febrile illness in OPD & IPD, and the sixth cause of mortality in the hospital. In the study period a total of 66,700 patients seen at EOPD of this a total of 7,850 patients admitted. From the total of patients seen at EOPD 4,715 (7%) patients were trauma victims and from those 974 (21%) managed as inpatient. And from all trauma patients 82 patients were chest injured patients, 59(72%) were managed at EOPD level and 23 (28%) patients admitted.

5.2 Socio demographic characteristics of chest injured patients

In this study the peak age incidence of chest injury was seen in between 30-39 years 34.1%(n=28).It is more dominated in males 69(84.1%). And also it was common among married patients67(81.7%), employees 5(6.1%), and college/TTI educational status leveled individuals8.5%(n=7). And 57(69.5%) were from rural residency (Table

Table 1: Socio-demographic characteristics of Chest injured patients in Aksum St. Marry and referral hospital from February, 2018-July, 2018.

VariablesLabelsFrequencyPercent (%)

SexMale   69   84.1

     Female   13 15.9

Age	Frequency	Percent
0-15	3	3.7
16-19	3	3.7
20-29	22	26.8
30-39	28	34.1
>40	26	31.7

Marital status		Frequency	Percent
	Underage	4	4.9
	Single	9	11.0
	Married	67	81.7
	Divorced	1	1.2
	Windowed	1	1.2

Occupation		Frequency	Percent
	Student	15	18.3
	Employee	5	6.1
	Farmer	50	61.0
	Merchant	6	7.3
	Unemployed	6	7.3

Educational level		Frequency	Percent
	Illiterate	25	30.5
	Pre school	9	11.0
	Can read and write	18	22.0
	Primary school	7	8.5
	Secondary school	7	8.5
	Preparatory school	5	6.1
	College or TTI	7	8.5
	Higher education	4	4.9

Residence		Frequency	Percent
	Rural	57	69.0
	Urban	25	30.5

5.3 Causes and mechanism of chest injury

In this study the majority of the injuries were happened in the afternoon and in the evening31(37.8%) & 8(9.8%) respectively. Among studied patients fighting is the leading cause of chest injury which accounts 41.5 %(n=34) next to this RTA 25.6% (n=31). And those injuries were happened29.3 %(n=24) in the streets. 28(34.1%) chest injured victims came to hospital less than6 hrs. And 20(24.4%) patients came to the hospital directly from the scene. And from those who camefrom health facilities only 67.1 %(n=55) of the patients received pre-referral treatment, which was 8(9.8%) patents given first aid. 1.2%(n=1) of the patients arrived to the hospital carried. Among 82 patients 29.3%(n=24) of the patients sustained penetrating type of chest injury and47%(n=86) sustained blunt type of chest injury. And 56(68.3%) patients injured on the anterior rightside of their chest. 1.2 %(n=1) of the patients had associated injury to the other sights,

Which was 13.4 %(n=11) of the patients had associated head injury. 2(2.4%) patients presented with a chief complaint of bleeding. And for 74(90.2%) patient's chest x-ray and hemoglobin doneas part of investigation. From the x-rayed patients 6(24.4%) had rib fracture among them 6(7.3%)had less than 3 rib fracture. And from lab investigated patients 50 %(n=41) of the had hemoglobin value between 8-12 gm./dl

(Table 2).Hem pneumothorax is the leading diagnosis with was made on 58.5% of the patients (Fig. 2).From 82 chest injured patients for 79.3 %(n=68) of the patients managed only by inserting chest tube (Table 3).

Table 2: Cause & mechanism of chest injury in Aksum St. Marry and referral hospital from February, 2018-July, 2018.

Variable	label	Frequency	Percent
Time of injury	In the morning	40	48.8
	In the after noon	31	37.8
	In the evening	8	9.8
	After midnight	3	3.7

Mechanism of injury	Road traffic accident	21	25.6
	Fighting	34	41.5
	Animal injuries	13	15.9
	Fall down accident	13	15.9
	Machinery	2	2.4
	Violence	1	1.2
	Smuggling	1	1.2

The place of injury	Home	9	11.0
	Street	24	23.3
	Transport	6	7.3
	Work area	12	14.6
	Farm area	30	36.6
	Construction area	1	1.2

Duration from accident (in hrs)	<6 hrs	28	34.1
	6-12hrs	43	52.4
	12-24hrs	8	9.8
	>24hrs	3	3.7

From where the patients came to the emergency department	From the scene	20	24.4
	From hospital	6	7.3
	From health center	51	62.2
	From private clinic	4	4.9
	Unknown	1	1.2

Before arriving to the ED any treatment was given	Yes	26	31.7
	No	56	68.3

Type of treatment given	Chest tube insertion	2	5.1
	First aid	18	46.2
	Resuscitation	11	28.2
	Medications	8	20.5

Means of transportation to the hospital	Ambulance	60	73.2
	Other vehicles	19	23.2
	Carried	1	1.2
	By foot	2	2.4

Types of chest trauma	Blunt	56	68.3
	Penetrating	26	31.7

Place of chest injury	Anterior Right side of chest	51	62.2
	Anterior Left side of chest	12	14.6
	Posterior Right side of chest	13	15.9
	Posterior Left side of chest	5	6.1
	Multiple sites	1	1.2

Associated injury	Head injury	11	13.4
	Abdominal injury	4	4.9
	Fracture	17	20.7
	None	50	61.0

Presenting symptoms	Difficulty of breathing	58	70.7
	Bleeding	2	2.4
	Loss of consciousness	4	4.9
	Chest Pain	18	22.0

Investigation done	Chest x-ray + Hemoglobin	74	90.2
	Hemoglobin only	1	1.2
	CXR only	6	7.3
	No investigation done	1	1.2

No of Rib fracture	< 3 ribs	20	24.4
	> 3 ribs	7	8.5
	None	55	67.1

Hemoglobin result	< 7 g/dl	3	3.7
	8-12 g/dl	41	50.5
	> 12 g/dl	38	46.3

Type of chest injury the Patient suffered	Pneumothorax	17	20.7
	Hemothorax	15	18.3
	Hemopneumothorax	48	58.5

	Filial chest	1	1.2
	Others	1	1.2

What is done for the patient	Chest tube insertion only	65	79.3
	Thoracotomy + Chest tube insertion	11	13.4
	Pericardio synthesis	1	1.2
	Fracture management + chest tube insertion	5	6.1

5.4 Management outcome

Among the 82 managed cases of Chest injury, 73 (89.0%) had good outcome having been discharged without complication, whereas 7 (8.5%) develops complication, 2(2.4%) patients are dead. pneumonia is the prevalent post injury complications 5 (6.1) (Fig-3). 54 (65.9%) patents ware stayed for 2 to 7 days in the hospital (Fig-4). 80(%) had good management outcome.
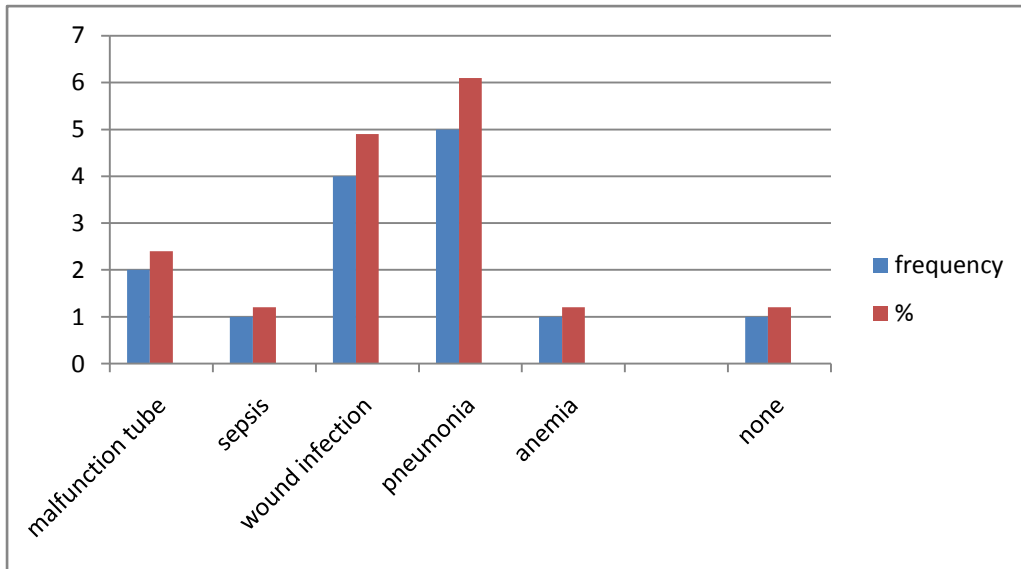
Post management complications

Figure 2: types of complication developed after the management of chest injury at Aksum St. Marry and referral hospital from May 12015 to May 1 2018.
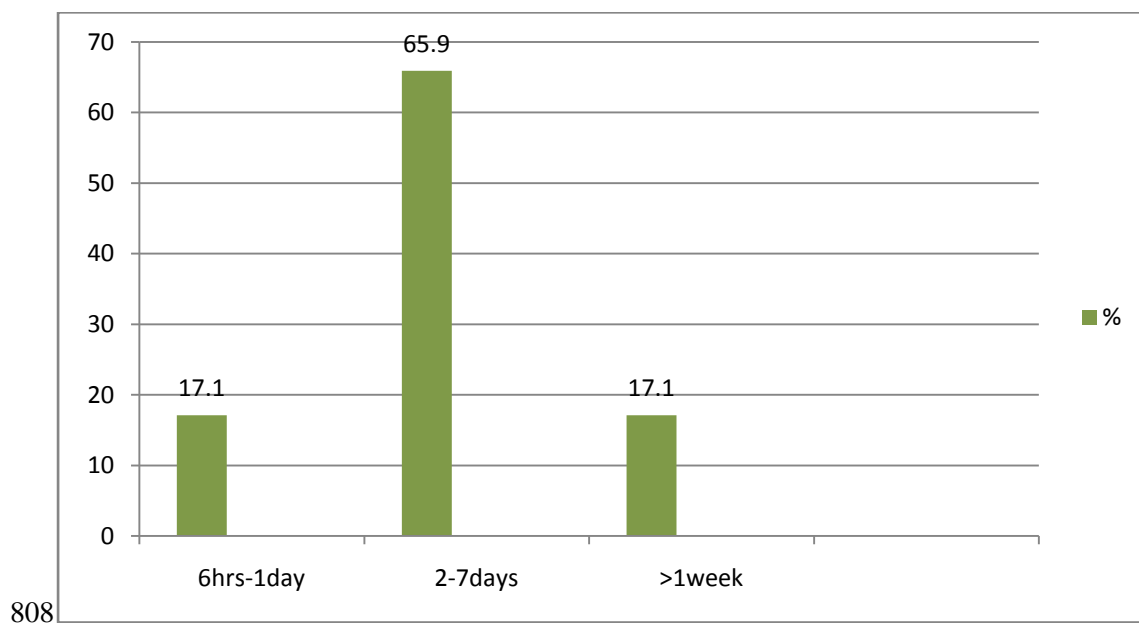
Figure 3: Length of Hospital stays of chest injury patients in Aksum St. marry and referral Hospital

22
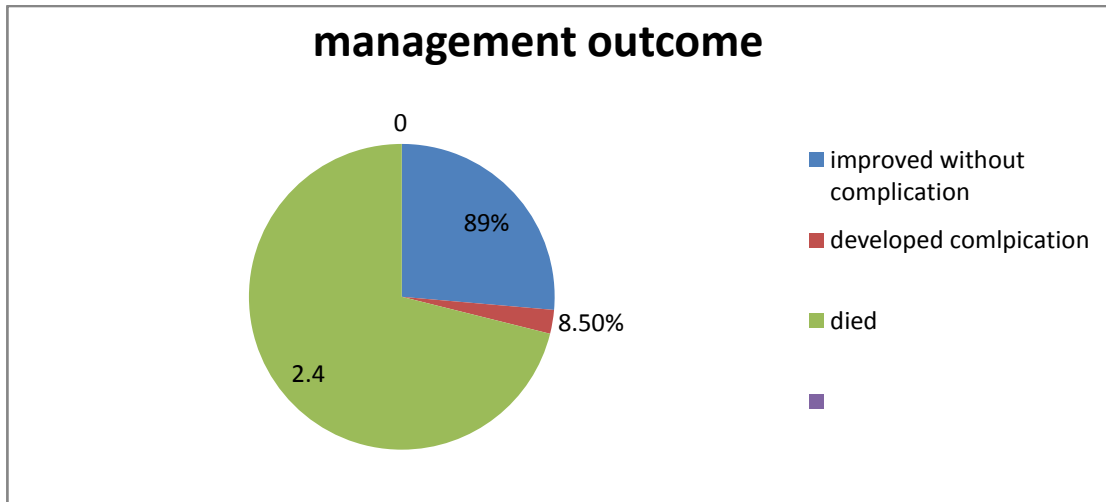
Figure 4: Management outcome of chest injury patients at Aksum St. Marry Hospital and Referral Hospital

5.5 Prognostic factor of management outcome of chest injury

To identify the factors associated with management outcome of chest injury, binary logistic regression was performed on dichotomous dependent variables with P-value of ≤0.05 (95% CI). And it shows that patients with age greeter than 40 years ware 91% less likely to have bad outcome than patents with age between 0-15 years. Married patients 97% less likely to have bad outcome than patents who are under age for marriage. Patients who sustained animal injury were 6.8 times more likely to have bad outcome than patients who sustained chest injury by smuggling.

Table 3: Regression table of Chest injured patients in Aksum St. Marry Hospital and referral hospital from May 1, 2015-May 1, 2018.

Variables	Label	Management outcome	COR	P-value	AOR (95% CI)	P-value
Bad				Good		
Sex		Male	27(32.9%)	35(42.7%)	1	
Female		8(9.7%)	12(14.6%)	1.65(0.6-4.3)	0.299	
Age	0-15	7(3.8%)	8(4.4%)	1	0.034	1
16-19	8(4.4%)	31(16.9%)	0.3(0.1-1.1)	0.061	0.000(0.000)	0.999
20-29	26(14.2%)	49(26.8%)	0.6(0.2-1.9)	0.382	2.2(0.3-14.1)	0.425
30-39	2(1.1%)	27(14.8%)	0.08(0.02-0.5)	0.006	1.9(0.5-7.2)	0.33
>40	9(4.9%)	16(8.7%)	0.64(0.2-2.4)	0.506	0.09(0.01-0.78)	**0.028**

23

Marital status	Underage	7(3.8%)	14(7.7%)	1	0.143		1
Single		14(7.7%)	42(23%)	0.67(0.2-1.98)	0.466	0.000(0.000)	0.999
Married		23(12.6%)	61(33.3%)	0.75(0.3-2.1)	0.59	0.03(0.003-0.3)	**0.003**
Divorced		2(1.1%)	11(6%)	0.36(0.06-2.1)	0.26	0.08(0.01-0.5)	**0.009**
Widowed		6(3.3%)	3(1.6%)	4(0.8-20.9)	0.101	0.05(0.003-0.8)	**0.033**
Occupation	Student	12(6.6%)	26(14.2%)	1	0.601		
Employee		15(8.2%)	44(24%)	1.3(0.5-3.5)	0.603		
Farmer		12(6.6%)	20(10.9%)	0.74(0.3-1.8)	0.51		
Merchant		6(3.3%)	14(7.7%)	0.93(0.3-3)	0.902		
Unemployed		7(3.8%)	27(14.8%)	0.56(0.2-1.6)	0.294		
Educational status	Illiterate	7(3.8%)	14(7.7%)	1.1(0.4-3.3)	0.802		
Can read and write		10(5.5%)	30(16.4%)	0.76(0.3-1.9)	0.565		
Primary school		5(2.7%)	8(4.4%)	1.4(0.4-5)	0.573		
Secondary school		6(3.3%)	21(11.5%)	0.66(0.2-1.9	0.44		
Preparatory school		7(3.8%)	19(10.4%)	0.85(0.3-2.4)	0.751		
Higher education		17(9.3%)	39(21.3%)	1	0.883		

Residence	Urban	33(18%)	80(43.7%)	1			
Rural		19(10.4%)	51(27.9%)	0.9(0.5-1.76)	0.764		
Mechanism of injury	RTA	15(8.2%)	39(21.3%)	1.2(0.4-3.6)	0.724	1.9(0.5-7.3)	0.336
Fighting		15(8.2%)	42(23%)	1.1(0.4-3.4)	0.825	1.5(0.4-5.4)	0.567
Animal injury		9(4.9%)	9(4.9%)	3.2(0.86-11.6)	0.083	6.8(1.2-37.2)	**0.027**
Fall down accident		1(0.5%)	8(4.4%)	0.4(0.04-3.8)	0.424	0.3(0.02-3.8)	0.35
Machinery		1(0.5%)	5(2.7%)	0.63(0.06-6.5)	0.701	0.78(0.06-10)	0.846
Violence		5(2.7%)	9(4.9%)	1.8(0.4-7.3)	0.438	2.2(0.4-12.2)	0.36
Smuggling		6(3.3%)	19(10.4%)	1	0.410	1	0.234
Associated injury	Head injury	10(5.5%)	15(8.2%)	1.9(0.8-4.6)	0.172	1.4(0.4-4.3)	0.604
Abdominal injury		7(3.8%)	11(6%)	1.8(0.6-5)	0.271	1.8(0.5-6.2)	0.375
Fracture		4(2.2%)	18(9.8%)	0.62(0.2-2)	0.424	0.49(0.1-1.8)	0.239
None		31(16.9%)	87(45.5%)	1	0.270	1	
Type of chest trauma	Blunt	20(10.9%)	66(36.1%)	1		1	
Penetrating		32(17.5%)	65(33.5%)	1.6(0.8-3.1)	0.147	0.88(0.4,2.1)	0.77
LOS	6hrs-1day	7(3.8%)	37(20.2%)	1	0.113	1	0.198
2-7days		25(13.7%)	55(30.1%)	2.4(0.9-6.1)	0.066	2.6(0.8-8.6)	0.108
>1 week		20(10.9%)	39(21.3%)	2.7(1-7.2)	0.044	1.4(0.4-4.9)	0.589

CHAPTER SIX: DISCUSSION

6.1 Socio-Demographic Characteristics of chest injured patients

In this study a total 82 chest injuries cases presented in the study period and it shows a male predominance of 84.1% and it is consistent with other studies ((2), (11), (19), (14), (17)). The most affected patients wear patients whose age is between 30-39 years 34.1% and it is consistent with all the studies reviewed((10), (22), (21), (20), (17), (14), (2)). Explanations for these observations include the young and males are more mobile and engaging in high risk activities more than females and old.

6.2 Causes and mechanism of chest injury

In this study fighting is the leading cause of chest injury which accounts 41.1% next to this RTA 25.6%, smuggling 1.2%, animal injury 15.9%, violence 1.2%, falling down accident 15.9% and machinery accident 1.2%. which is different from most studies in those study RTA is the leading cause ((15), (17), (20), (21), (22)).

In this study 34.1% chest injured victims came to hospital less than 6 hrs. 52.4% came within 6 to 12 hrs. 9.8% came within 12 to 24 hrs.and 3.7% came after 24 hrs. Which is less than from Sudan and Ethiopian study (22) (11). This could be due to low ambulance service. In this study 72% of the patients arrive to the hospital by ambulance, which is nearly equivalent to WHO study (23).

In this study blunt type of chest injury is prevalent 68.3% than penetrating type of chest injury 29.3%, which is the same as previous Ethiopian studies (11) (10) but different from Sudan (22), Malaysia(20), Pakistan(24) and Iran studies (12) where blunt is more prevalent. The high incidence of blunt chest injury in this study is explained by the fact that those patients who had penetrating injury were happened due to fighting which associated with inappropriate sharp material handling in this environment.

In this study 62.2% patients injured on the anterior right side of their chest, 15.9% on the posterior right side, 8.7% on the posterior left side, 6.1% on anterior left side and 14.6% of the patients injured on multiple sights. Which is similar with Indian study (17)

In this study 35.5% of the patients had associated injury to the other sights and the most common associated injury is head injury which is lower than all other studies and in those study fracture is

the most common((20), (22), (11)). The reason for this is in those study blunt type of chest injury and the mechanism is RTA but in our case fighting is the leading cause.

In this study 40.4% patients presented with a chief complaint of bleeding which is different from study in India which shows chest pain and dyspnea were the most common symptoms at presentation (17) and In Ethiopia the main presenting clinical features was chest pain (10). Hemopneumothorax is the leading diagnosis with was made on .58.5% of the patients. And 79.3% of the patients managed only by inserting chest tube which is less than from all other studies. This is due to increased incidence of soft tissue injury of the chest wall which is managed accordingly.

6.3 Management **outcome**

 In this study among 183 managed cases of Chest injury, 72% had good outcome having been discharged without complication, whereas 24.7% improved with complication. Which is lower than from most studies((11), (10), (12), (17)). And 3.3% patients wear dead due to chest injury which is much lesser than a study done in South Africa and Egypt and Ethiopia((8), (9), (10)), but slightly increased from Sudan study (11). The reason for low mortality rate in the present study is that most of the patients were not severely injured except when there was a major associated extra-thoracic injury. In this study 43.7% stayed for 2 to 7 days, which is greater than a study done in Sudan (11) and Ethiopia (10) (12) it is explained by increased incidence of extra thoracic injuries. In this study Anemia is the prevalent post injury complications 14.8%, 3.3% wound infection, 2.7% pneumonia, 1.6% malfunction tube and 1.1% had sepsis and this result is greater in anemia, wound infection and pneumonia but less than in malfunction tube and sepsis from Sudan and Ethiopia studies (10), (11) this could be due to increased incidence of penetrating type of injury.

6.4 Limitations of the study

 ☐ This study was conducted in a six consecutive months so this could make it seasonal.

 ☐ Low availability of major thoracic surgical services in the hospital.

CHAPTER SEVEN:

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

In conclusion, fighting founded to be the major etiological factor for chest injuries with a higher rate of penetrating chest injuries and the commonly affected victims are young adult males in their productive and reproductive age group. There was delay in hospital arrival, less ambulance service and majority of the patients came directly from the seen rather than visiting near by health institutions. Urgent preventive measures targeting at reducing the occurrence of inter personal violence, quarrel, RTA, animal injury, and occupational injuries is necessary to reduce the incidence of chest injuries in this region. The majority of the chest traumas are successfully managed by tube Thoracotomy and supportive measures as well. The associated extra thoracic injuries constitute a major prognostic factor in among patients with chest injuries. It is likely that better organization of health systems and improved management of surgical emergencies from the place of accident will increase the rate of severe trauma that can be managed properly, and so decrease overall mortality.

7.2 Recommendations

Based on the finding the following recommendation can be forwarded 1. Paying special attention for young adults as a group at risk for chest injuries and related deaths is recommended. 2. Improvement in general security. 3. Availability of a well-equipped set up for proper management of such injuries should also be given due emphasis. 4. Increasing public awareness on manifestations of the disease and improving the knowledge of mid and low level health professionals on detection and management as well as importance of early referral to higher center with appropriate prereferral management. 5. Governments and NGOs should pay more attention to trauma with respect to prevention. 6. The hospital should be well organized for early and prompt management of patients in case of emergency like blood transfusion and thoracotomy.

There should be:

a) Training and retraining of health personnel involved in trauma management.

b) Provision of EMS on our major roads at every 20-30km distance.

c) Computerization of health information system and employment of more skilled hands.

d) Enforcement of road safety measures and educating road users adequately on these safety measures.

e) Provide appropriate health and safety training for workers, beginning with the first day of their employment and strength strict supervision of workplace and working conditions.

f) Appropriate animal handling. When enforced, these recommendations would reduce the incidence of chest trauma and improve on the outcome of management.

7. Reference

1. Kenneth D, Kochanek,M.A., et al. Deaths: final data for 2014. WHO press. 2016 June 30; 65(4).

2. World Health Organization. Injuries and violence: the facts 2014. WHO press. 2014.

3. D W. Trauma to chest. 1995; 3.

4. Ha ags ma J A, et al. Inj Prev 2015. BMJ Publishing Group. 2015 Dec; 1(16).

5. Norman s. Williams CjkBaPRo. Bailey and love short textbook of surgery UK: Arnold publications; 2008.

6. McQueen KA HCMM. The Global trauma burden and anesthesia needs in low and middle income countries. 2014; 78(6).

7. Ekpe EE EC. Determinants of mortality in chest trauma patients. 2014; 20.

8. N B Moodley & et all.. An audit of trauma-related mortality in a provincial capital in South Africa. 2014; 52(4).

9. Mahran DG FOQMBA. Hospitalized injuries and deaths in a trauma unit in upper Egypt. 2013; 3(4).

10. Adem AA RIRME. Chest injuries in Tikur Anbessa Hospital, Addis Ababa, Ethiopia: 3-year experience. 2009; 6(1).

11. Asfaw M AM. A prospective analysis of thoracic injuries in Harar, Hiwot Fana hospital. 2005 Oct; 43(4).

12. Hossein Hemmati, et all. Evaluation of Chest and Abdominal Injuries in Trauma Patients Hospitalized in the Surgery Ward of Poursina Teaching Hospital. 2013; 1(4).

13. J. Wayne Meredith JJH. Thoracic Trauma:When and How to Intervene. 2007; 87.

14. European Union Health office. Health Statistics; Atlas on mortality in the European Union: Mortality by age. Luxemburg:; 2003. Report No.: Chapter 5 – part1.

15. Veysi T. Veysi, Vassilios S. Nikolaou, et all. Magnitude of chest trauma, associated injuries and mortality: a level I trauma centre experience. .

16. Chun Sung Byun, et al.. Epidemiology of Trauma Patients and Mortality. January 2015; 56(1).

17. Sharma PP, et al. Blunt trauma chest: our experience at rural tertiary care centre. 2016 Feb; 3(1).

18. World Health Organization. Noncommunicable Diseases (NCD) Country Profiles. 2014.

19. Bergen G CLWMFL. Injury in the United States: 2007 Chartbook. March 2008.

20. Mehboob Alam Pasha MFMMZG. A 10-year retrospective review of chest trauma in Hospital Universiti Sains Malaysia. Aug. 2015; 14(8 Ver. IV).

21. Cury F, Baitello AL, Echeverria RF, Espada PC, Pereira de Godoy JM. Rates of thoracic trauma and mortality due to accidents in Brazil. 2009; 4.

22. Abdelrazag Y Saeed AAH&OMI. P attern and Management Outcome of Chest Injuries in Omdurman Teaching Hospital Sudan. 2015; 15(1 Version 1.0).

23. World Health Organization. Global status report on road safety. 2015.

24. Muhammad Laiq uz Zaman Khan et al.. CHEST TRAUMA MANAGEMENT:Good outcomes possible in a general surgical unit. 2009; 25(2).

25. Lambrecht R TN. Penetrating chest injuries. 1989; 27(4).

26. Patterson A, Cooper D, Deslauriers J, Lerut AEMR, Luketich JD, Rice TW. Pearson's thoracic and esophageal surgery Philadelphia: Churchill Livingstone; 2008.

10. ANNEX1. CHECK LIST

10.1 PARTICIPANT INFORMATION SHEET AND INFORMED CONSENT FORM

My   Name is Abdiselam Ahmed HirsiI am working as an investigator for the study being conducted in this hospital for partial fulfillment of Master's degree at Mekelle University, College of Health Sciences. I kindly request you to lend me your attention to explain you about the study and being selected as the study participant. In line with my masters of IESO I am interested conducting research on **Management outcome and prognostic factors of chest injury in three years retrospective analysis at Aksum St.marry and referral hospital, Northern zone of Tigray regional state.** The aim of this study to address the management and prognostic factor of the problem, this help to give emphases on the problem, early diagnosis ,treatment and minimizing mortality and morbidity of the patients due to chest injury . Your hospital is selected purposively. The sample will be selected patient card and operation registration books from May 1 2015 to May 1 2018. Data collection will be under taken using data extracted format for the next one month with four data collectors. Confidentiality issue will be maintained, Identification of the patient will not be recorded: the information will not be applied for other purpose except this study. All obtained patient's card will be returned to the record office by the end of a month.

Finally, analyzing and compiling the findings of this study a copy of this thesis will be provided for your institution. Having understood the given information about this study, you can put your signature of confirmation below.

   Signature of hospital manager   ----------------------------

Principal investigator: –Abdiselam Ahmed Hirsi (postgraduate student on masters in Integrated emergency surgical officer Mekelle university college of health science.

 Contact address at mobile phone -**0915744953**

                              Signature of principal investigator ----------------------------

ANNEX2

Mekelle University, institute of health, medical faculty, postgraduate study program department of integrated emergency surgery

Book log code_____

Date of checking_____

Remark: 1. Complete 2. Incomplete

Checklist

Checklist -administered questionnaire for the assessment of *Magnitude and management outcome of chest injuries in Aksum St merryHospital, and Referral Hospital in Tigray regional state, Ethiopia.*

Date: -------------------------------

No	Question	Response	Code	Remark
PART I .SOCIO DEMOGRAPHIC CHARACTERISTICS				
101	Card no			
102	Sex	1. Male 2. Female		
103	Age	1. 12-15 years 2. 16-19 years 3. 20-29 years 4. 30-39 years 5. >40 years		
104	Marital status	1. Underage 2. Single 3. Married 4. Divorced 5. Widowed		
105	Occupation	1. Student 2. Employee 3. Farmer 4. Merchant 5. Unemployed		

106	Educational level	1. Illiterate		
		2. Preschool		
		3. Can read and Write		
		4. Primary school		
		5. Secondary school		
		6. Preparatory school		
		7. College or TTI		
		8. Higher education		
107	Address	1. Rural		
		2. Urban		
Part II. Type and mechanism of injury				
201	Time of injury	1. In the morning		
		2. In the afternoon		
		3. In the evening		
		4. After midnight		
202	How does the injury occur?	1. Road traffic accident		
		2. Fighting		
		3. Animal injuries		
		4. Fall down accident		
		5. Machinery		
		6. Violence		
		7. Smuggling		
203	The place of injury occur	1. Home		
		2. Street		
		3. Transport		
		4. Work area		
		5. Farm area		
		6. Construction site		
204	Duration from accident(in hrs)	1. < 6 hrs		
		2. 6-12 hrs		
		3. 12-24 hrs		
		4. > 24 hrs		
205	From where does the patient come to the emergency department?	1. From the scene		
		2. From hospital		
		3. From health center		
		4. From private clinics		

		5. Unknown		
206	Before arriving to ED any treatment was given?	1. Yes 2. No 3. Unknown		
207	If yes to Q 207 Which type of treatment was given?	1. Chest tube insertion 2. First aid 3. IV fluid Resuscitation 4. Medications		
208	Means of transportation to the hospital	1. Ambulance 2. Other vehicles 3. Carried 4. By foot		
210	Types of chest trauma	1. Blunt 2. Penetrating		
211	Place of chest injury	1. Anterior Right side of chest 2. Anterior Left side of chest 3. Posterior Right side of chest 4. Posterior Left side of chest 5. Multiple sites		
212	Associated injuries?	1. Head injury 2. Abdominal injury 3. Fracture 4. None		
213	Presenting symptoms	1. Difficulty of breathing 2. Bleeding 3. Loss of consciousness 4. Chest Pain 5. Others(specify)_____		
214	Investigations done (can have more than one option):	1. Chest x-ray + Hemoglobin 2. Hemoglobin only 3. CXR only 4. No investigation done		
215	No of Rib fracture	1. < 3 ribs 2. > 3 ribs		

		3. None		
216	Hgb result	1. < 7 g/dl 2. 8-12 g/dl 3. > 12 g/dl 4. Not done		
217	Type of chest injury the patient suffered	1. Pneumothorax 2. Hemothorax 3. Hemopneumothorax 4. Sacking wound 5. Filial chest 6. Cardiac temponade 7. Lung Contusion 8. Cardiac injury 9. Vascular injury 10. Chest wall STI 11. Rib # only 12. Others (specify)		
218	What is done for the patient?	1. Chest tube insertion only 2. Thoracotomy + chest tube 3. Pericardio synthesis 4. Fracture Mgt + chest tube 5. Fracture Mgt + medications 6. Medications only 7. Exploratory laparotomy + CT 8. Exploratory laparotomy only 9. Wound care		
Part III. Outcome				
301	Length of Hospital Stay (in days)	1. 6hr-1day 2. 2-7 days 3. >1 week		
302	Post treatment condition	1. Improved without complication 2. Developed complication 3. Dead		

		4. Referral		
		5. Medical advice		
303	What was the post treatment Complications?	1. Malfunction Tube 2. Sepsis 3. Diaphragmatic injury 4. Wound infection 5. Pneumonia 6. Anemia 7. Pain 8. None 9. Death		
304	Management outcome	0. Good 1. Bad		