

**ADDIS ABABA UNIVERSITY**  
**COLLEGE OF HEALTH SCIENCES**  
**DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE**



**ASSESSING TRIAGE IMPLEMENTATION AND FACTORS AFFECTING  
IT AMONG PATIENTS VISITED TIKUR ANBESSA SPECIALIZED  
HOSPITAL ADULT EMERGENCY DEPARTMENT, ADDIS ABEBA,  
ETHIOPIA.**

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## Approval sheet

By my signature below, I declare and affirm that this research is my own work. I have followed all ethical principles of scholarship in the preparation of this research starting from proposal; all scholarly matter that is included in the study has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this study entitle on: **“Assessing triage implementation and factors affecting it among patients visited Tikur Anbessa Specialized Hospital Adult Emergency Department, Addis Ababa, Ethiopia”**.

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## **Acronym and abbreviation**

ACS-COT: - American College of Surgeon Committee On Trauma

AOR: - Adjusted Odd Ratio

AVPU: - Alert, response to Voice, response to Pain, Unresponsive

CI: - Confidence Interval

COR: - Crude Odd Ratio

ED: - Emergency Department

EMS: - Emergency Medical System

ESI: - Emergency Severity Index

FMOH: - Federal Ministry Of Health

ICU: - Intensive Care Unit

SALT: - Sort, Assess, Life Saving Intervention, Treatment and Transport

SATS: - South African Triaging Score

START: - Simple Triage And Rapid Transport

TASH: - Tikur Anbessa Specialized Hospital

TEWS: - Triage of Early Warning Score

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## **Abstract**

**Introduction:** - Triage is sorting of patients according to their clinical need and the availability of resource. It is important for resource limited setting in which the volume of patients visiting to hospital is unpredicted. Even though the triage tool is important to sort the right patient to the right place at the right time, some patients seen not triaged and evaluated properly as observed and evidenced from many literature. So, this study identifies whether the tool is properly filled, the parameters correctly measured and recorded, patients are well categorized and evaluated at given time frame and the factors affecting its implementation.

**Objectives:** - To assess triage implementation and factors affecting it among patients visited Tikur Anbessa Specialized Hospital Adult Emergency Department, Jan.2016 to Jan.2018. Addis Ababa, Ethiopia.

**Methodology:** - Institutional based cross sectional study was conducted at Tikur Anbessa Specialized Hospital Adult Emergency Department by selecting the patients chart using simple random sampling and reviewing it which was visited and triaged in the past two years. Descriptive statistics was used to compute individual variables, regression for associated variable and Odds ratio at 95% CI to show strength of association.

**Result:** - From the total eligible sample 43.7% were incorrectly triaged. Among them 25.22% (n=29) were over triaged while 74.78% (n=86) were under triage. Correct TEWS score calculation for triage (AOR=3.019, 95% CI {1.139, 8.005, P=0.026), adult age group (AOR=3.018, 95% CI {1.357, 6.712}, P=0.007) and use of clinical discriminator (AOR=8.582, 95% CI {1.873, 17.389} P= 0.000) were the factors significantly associated with triage of patients. The use of clinical discriminator increase over triage proportion by 3.4 fold (AOR=2.400, 95% CI {2.095, 5.515}, P=0.000).

**Conclusion and recommendation:** - Close to half of the patients are not triaged in proper way in adult emergency. Thus, those patients are not getting adequate and efficient care since they are not allocated in their respective area. Periodic monitoring and evaluation, training and awareness creation and allocation of materials is needed to solve the problem.

**Key words:** - Triage, under triage, over triage, implementation.

# **1. Introduction**

## **1.1. Background**

Triage is the process of categorizing emergency department (ED) patients according to their need of care, irrespective of their order of arrival or other factors. It needs an assessment to prioritize patients in need of immediate care, in accordance with clinical severity and time of urgency, compared with patients with non urgent illnesses who can wait longer to be seen or who need referral to a more appropriate health care setting (1).

The term triage was first used to isolate coffee beans; originally the word came from the French language, from the verb “Trier” meaning to sort, sift, and pick over (2). It was applied in the battlefields to abandon injured soldiers and treat them according to their injuries and their ability to return to duty. The initial credit of triaging was earned by the trauma centers in United States of America (USA) as they applied the triage criteria to transfer injured patients to a trauma center in 1986 (3). Following this Australian college of emergency physician issued it and adopt a formal triage protocol in 1993 (4) and in 1999 Canada develops Canadian triage acuity scale (5). In 1996 United Kingdom also introduced their own triage system known as Manchester triaging system (6). USA adopts and design Emergency severity index (ESI) in 2003 (7). South Africa also develop South African triaging system (SATS) in 2006 (8). All these are a five category scale which depends on chief complaint, vital sign and expertise of the triage personnel.

The most common type of triage includes ED triage, inpatient and intensive care unit (ICU) triage and field triage. In pre hospital setting it can be applied as Simple Triage And Rapid Transport (START) and Sort, Assess, Life saving intervention, Treatment And Transport models (SALT) (6,9). It can be mass casualty triage where the number of patient is beyond the capacity, of health institution which considers patients salvageability and multiple casualties’ triage when the number of patients is not beyond the capacity of institution in which Life or limb threatened patient’s gets priority (10,11).

The purpose of triage in ED is to prioritize arriving patients and to identify those who cannot wait to be seen. The triage personnel perform a brief, focused assessment and assign the patient as triage acuity level. The assessment should take no more than two to five minutes (12). In 2010, 123.8 million patients visit to United States ED. From these visits, only 18% of patients were seen within 15 minutes, leaving the majority of patients waiting in the waiting room (13).

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It is important to sort the right patient to the right place at the right time. If it is not applied, error is made as either over or under triage. Under triaged patient has life-threatening injuries but is assigned as non-critical, which may lead to delayed medical interventions and/or discharge from hospital especially in resource limited setting whereas over triaged patient, on the other hand, is triaged as severely injured, thus resulting in rapid evacuation to hospital (14). The American College of Surgeons-Committee On Trauma (ACS-COT) in 2014 declares a goal of <5% under triage and 25–35% over triage in resource abundant setting (15). Both under and over triage errors can create risk for increased morbidity and/or mortality (7,16,17,18).

Triage is a central task in an emergency department and is used as the rating of patients' clinical urgency. It aims to optimize the waiting time of patients according to the severity of their medical condition (19). Rating is important to identify the order in which patients should be given care when their need is high (20). It needs significant decisions making about the use of resources and patients need of care (9).

According to the generic flowchart for the south African triaging system (SATS), triaging nurse took a brief history and documented the main complaint, recorded vital signs, assessed mobility and level of consciousness according to the AVPU scale (A = alert, V = responds to voice, P = responds to pain, U = unresponsive), and calculated a triage early warning score (TEWS). In addition to these they use serial clinical discriminators. Triage involves clinical judgments that have to be made within a short span of time (8,12,13 ).

Rapid and accurate triage of the patient is important for successful ED operations. Triage urgency ratings are useful to describe the overall acuity of an individual. This is possible only when the ED is using a reliable and valid triage system, and when every patient, regardless of mode of arrival or location of triage is assigned a triage level. There is also growing interest in the establishment of standards for triage acuity and other ED data elements in the Ethiopia to support clinical care, ED surveillance, benchmarking, and research activities (15).

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## 1.2. Statement of the problem

Triage involves an assessment to prioritize ED patients in need of immediate care, in accordance with clinical severity and time urgency (5). Although it is important, most patients left to be seen later inappropriately and waste their time and resource and some may be discharged without being seen and lost their life (23).

Evidence also suggested that triaging personnel didn't apply triage protocol properly. In an expert systemic review in Ghana, more than five percent of the patients were judged to have wrongly triaged. Of this nearly 95% were under triaged (24). Triage did not produce all the benefits claimed and formal nurse triage significantly delayed those patients in most urgent need of care, and little difference was found in patient satisfaction. Studies conducted in different provinces of South Africa indicate many patients don't triage in their respective areas (1,24–26).

In some studies carried out in Ethiopia, in nearly one-fifth of patients visiting in ED, vital signs were not measured and recorded. None of the triage forms were filled out completely. A final TEWS score is not calculated in a quarter (24.4%) of ED visits and discriminating factors were not used in above half (53%) of the cases and from these 24.4% of them use the factors for assigning the patient to a higher level. This indicates that most patients are admitted to ED without being properly triaged and evaluated (28). But head injury (21.5 %) and sepsis (18.8 %) were the most common causes of admission in ED, followed by respiratory failure (15.1 %) (29). More than one third of infectious and 81% of non-infectious cases are cardio-respiratory and systemic illness (30), which needs strict vital sign measurements and follow up.

Without triage ED wastes an average of 61 US dollars (1647 ETB) per patient. If they were triaged incorrectly ED stay increases the total ED expenditure by 15.3% – 17.3% (31). Many deaths in hospital occur within 24 hours of admission. Some of these deaths can be prevented if critically ill patients are quickly identified on their arrival and treatment is started without delay (16). It reduces the waiting time and increases patients' satisfaction (24). Inappropriate use and/or misuse of ED service is one of the leading problems resulting in ED crowding (23) and triage decreases ED crowding by 55.4% (31).

Assessment by the triage officers involves a combination of the chief complaint of the patient, general appearance at times, recording of vital signs (TEWS score) and a series of clinical discriminators (23). The triage health professional should completely fill the triage tool, because

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all the information in the sheet is important for patient allocation in their respective area. But in most hospital this practice is low (28,32–35).

The triage personnel usually documents what the monitor measures but it may not display the correct measurement due to several factors. Significant history and investigation is not taken as evidenced from many literatures. These results in miss- triaging, improper patient allocation, wastage of resource to the patient and the hospital, increase patient waiting time and dissatisfaction, increase workload in one specific area and even losing of the patients life. This poses a big problem in resource limited country like our country Ethiopia.

As far as my knowledge a little is done on the implementation of triage and its determinants in Ethiopia. Thus, the purpose of this study is to assess the implementation of triage protocol and identify its determinant factors on patients visiting Tikur Anbessa Specialized Hospital Adult Emergency Department, Addis Ababa, Ethiopia.

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### **1.3. Significance of the study**

All patients arriving for emergency care should be assessed and classified to prioritize those who have the most urgent and life threatening medical problems and are in need of immediate care. This classification process is termed as triage and it is usually performed by an ED nurse. The aim of triage is to share out the workload of the ED for better utilization of resources.

Even though it is important for the client, health workers and for institutions, there is a problem on the efficient application of triaging. This can be either due to resource limitation, lack of skill, lack of attitude or knowledge deficit, mal functionality of the material, shortage of manpower or other factors. So, this study identifies whether the triage tool is completely filled, appropriately measured and documented, TEWS score truly calculated and patients are evaluated, distributed and treated in respected areas and factors which affect its implementation.

Primarily it is important for the client since it identifies and helps to solve the problem on triaging. This result will help for TASH, federal ministry of health (FMOH), Addis Ababa Health office and other stake holders to give training for triage health professionals, for triage tool amendment, manpower and material allocation and to make any correction action. It will also be used as one input for Addis Ababa University, college of health science, department of emergency medicine and critical care and emergency medical system (EMS). Lastly this study will be used as a base line data for further researchers.

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## **2. Literature review**

Triage is the process of sorting the right patient to the right place at the right time. It is mostly applied in emergency department and at the field in when there is disaster. It can be mass casualty triage where the number of patient is beyond the capacity, manpower and available resource of health institution. It considers the greatest goods for the greatest number of the patient who gets priority and usually applied when there is disaster. The other one is multiple casualties' triage which is mostly applied in emergency department. The number of patients is not beyond the capacity of institution. Life or limb threatened patient's gets priority.

Even if it plays a pivotal role in the management of patient many hospitals do not apply properly. Patients are limited in getting the benefit of it and provoked to several life endangering condition and unwanted wastage time and material. Here are some literatures conducted in different places which show the triaging pattern and factors which affect it.

### **2.1.1. Patients waiting time and time of visit**

The study done in Botswana showed that the median waiting time was 15, 51, 23 and 3 min for routine, urgent, very urgent and emergency case from triage until seen by a doctor or a consulting nurse respectively. (36). The average time to get treatment was 59 min (95% CI 51; 67) according to the study done in Durban South Africa. Nearly half (48%) patients were seen within the recommended time and 17.3% of patients seen during the day or after hours could be emergencies or urgencies. About 40.5% of patient was seen during working hours and the rest in the part time and night. One red code was seen immediately after triage and one red code was seen more than 60 minutes after triage. Half (49.4%) of patients were seen within one hour (27).

The study in Somali land shows 80% of the patients attended the ED beyond 24 hours after developing symptoms. There is a dalliance in receiving care after presentation at the ED with 21% green cases, 25% yellow, 33% orange and 72% in red cases and patients flow peaks between 9 am and 11 am, and again to a lesser extent between 4 pm and 6 pm (37). In the study conducted in TASH on burden in emergency centers for providing care, the majority of patients presented to the ED on weekdays (67.9 %) and half (50.8 %) patients during daytime (38).

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### **2.1.2. Patients chief complaint and pertinent history**

In the study done at Hitit University, Çorum Education and Research Hospital ED, Turkey , upper respiratory system disease was the leading complaint (49.1%) for ED visit, followed by gastrointestinal system disorders (5.9%), myalgia (5.1%), headache (3.8%), and lumbalgia (2.8%) (39).

The most common chief complaint was abdominal pain 14.3%, followed by chest pain 13.6% according to the study done rural South Africa and about forty percent (40%) of the patients included were presenting for the treatment of an injury(32). However the study in Nap Kenbe Hospital, Haiti, shows the most frequent reasons for ED visit were trauma-related due to road traffic accidents (40%), work, sport, and domestic accidents (31%), gunshot wounds 13%, wounds from knives 7%, and non traumatic surgical causes 7% (22).

Quality improvement study in Mekelle shows the most common chief complaints were abdominal pain (17.8%), fever (11.1%), chest pain (8.9%), headache (8.9%), and diarrhea/vomiting (8.9%) (28).

A study in TASH on burden on emergency centre to provide care for critically ill patients identifies the most Common causes of ED visit were 21.5 %, 18.8 % and 15.1 % were, head injury, sepsis and respiratory failure respectively. Cancer, rheumatic heart disease, tuberculosis and HIV/AIDS were common co morbidities. More than 70 % of patients came with referral. Approximately 21.5 % of patients arrived by ambulance (29). However nearly half (47%) of the patient visited adult ED were self referral according to the study in Yekatit 12 hospital. About two third (71.6%) of the cases were fully conscious and 14.9% with altered level of consciousness. From all 45.7% had history of chronic illness (30).

### **2.1.3. Completeness of triage sheet, Patients vital sign and TEWS score**

The mean TEWS score was 1.50 (95% CI: 1-2) and most patients were coded as green according to the study in South African Durban hospital. Most parameters were correctly recorded and some are not recorded at all. The TEWS and final TEWS were incorrectly or not recorded in 18.4% and 24% of cases respectively(27).

The study in Mekelle Ayder referral hospital confirms that none of the triage forms were filled out completely. Heart rate was the most consistently recorded vital sign with a 97.8% completion

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rate, followed by systolic blood pressure 93.3%, temperature 86.7%, exposure to trauma 84.4%, mobility 82.2%, respiratory rate 82.2%, and level of consciousness 82.2%. The final summed TEWS was not recorded in 24.4% cases. Discriminating factors (injury mechanism, presentation, pain level) were recorded in 46.7% cases, and in 28% of those cases, the discriminators were used to assign a higher triage level than would have been indicated by TEWS alone (28).

#### **2.1.4. Patient allocation (category)**

Study in South Africa rural hospital indicates the patient distribution was 32.2% to red and orange, 30.0% to yellow and 37.8% to green (40) but in the study at Durban south Africa total of 49 charts were not color coded (27). The patient distribution in Ghana hospital was 7.1% to Red, 29.4% to Orange, 61% to Yellow and 0.3% to Green (24). Patient distribution in Nap Kenbe Hospital, Haiti was 8% in the red category, 40% in the orange category, 47% in the yellow category, and 4% in the green category (41). The patient allocation in Red and orange was 6% and 17% respectively, which need emergent and urgent care according to the study in Somali land (39).

The study in Mekelle Ayder referral hospital shows 11.1% of the patients were triaged to Red, 15.6% were triaged to Orange, 33.3% to Yellow, and 33.3% to Green (28). However the study in TASH ED reports majority of patients were triaged as level 'orange' (48.6 %) while a minority (n = 22; 12 %) were triaged as 'yellow' or 'green' (29).

#### **2.1.5. The prevalence of over and under triage**

The study in Durban South Africa shows that, over triage proportion was 66.7% and under triage was 14% (27) and similar study in South Africa rural hospital shows the prevalence of under-triaged is 19.5% and that of over-triage is 12.6%. they also stats, the prevalence of over triage and under triage for medical case is 72% and 53.8% respectively, for non traumatic surgical case 2% and 42.3% and for traumatic case 4% and 3.8% respectively (26). The other study on the accuracy of nurses performance for triage process in a tertiary hospital emergency department in Gauteng Province, South Africa says, triage category allocations were incorrect in almost one-third (31.2%) of the cases and from these 44.4% of patients were promoted and 55.6% demoted (25).

Implementation of SATS at Ghana teaching hospital shows, 19% were incorrectly triaged. After expert review, 52 (5.7%) patients were judged to have been wrongly triaged by the triage nurse; 49 under-triaged and 3 over-triaged. In this study from 49 under triaged patients, 28 (53.8%)

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orange cases triaged as yellow, 14 (26.9%) red cases as orange, 6 (11.5%) red cases as yellow and one orange case was determined to be green (24). The research in Mekelle, Ayder referral hospital states about 31% of the cases were under-triaged and 21.9% cases over-triaged. Medical cases were more over triaged (28).

#### **2.1.6. Factors that affect triage pattern**

According to the result of study done in south Africa Guttenberg province, there was no statistically significant difference between trauma and non-trauma patients with regard to overall correct triages performed (Fisher's exact test  $p=0.23$ ); however, non-trauma patients were more likely to be incorrectly demoted (Fisher's exact test  $p=0.0439$ ), with an odds ratio of 1.697 (95% CI 1.025 - 2.753) and trauma patients were more likely to be incorrectly promoted (25).

The study on the accuracy of nurse's performance of the triage process in a tertiary hospital emergency department in Gauteng Province, South Africa, patients in the green category were most commonly promoted (29.4%) and patients who should have been in orange were most commonly demoted (35.0%). Trauma patients were more likely to be incorrectly promoted and non-trauma patients to be incorrectly demoted. Mistakes were mainly due to discriminator errors (57.8%), followed by numerical miscalculations (21.5%). The leading omitted discriminators were 'abdominal pain', 'chest pain' and 'shortness of breath'. But, the study in rural hospitals in South Africa indicates that those medical cases and non-traumatic surgical case are more likely to be over triaged (25,26). Over triage (40%) and under triage (9%) remained under the pre-set thresholds (50% and 10% respectively) according to the study in Somali land (37). Implementation of SATS at Ghana teaching hospital shows many of those who had been incorrectly triaged were due to missing information (24)

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### Conceptual frameworks

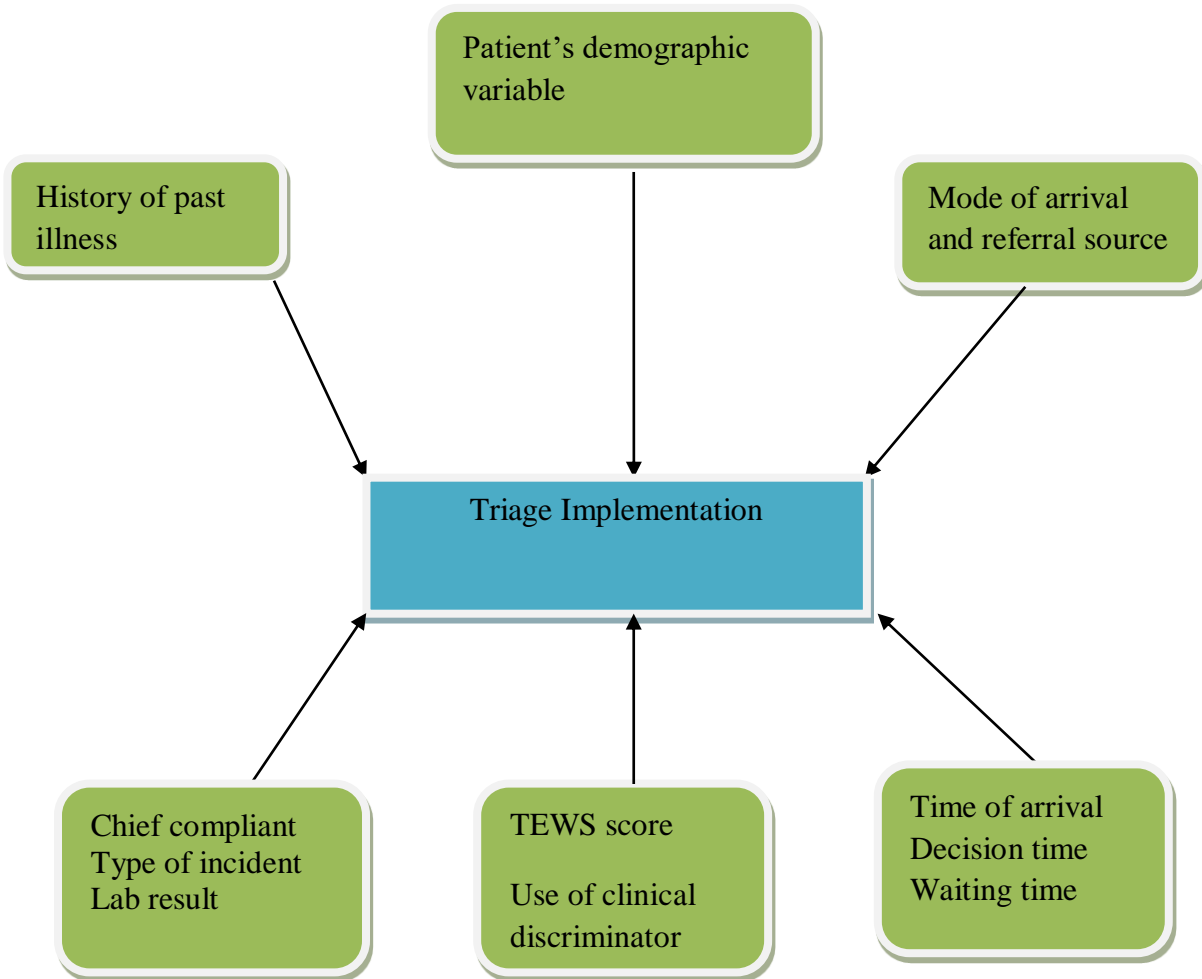


Figure 1: Conceptual framework which shows the factors that affect triage implementation developed from literature.

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### **3. Objectives**

#### **3.1. General objectives**

- To assess triage implementation and factors affecting it among patients visited Tikur Anbessa Specialized Hospital adult emergency department, Jan.2016 to Jan.2018, Addis Ababa, Ethiopia.

#### **3.2. Specific objectives**

- To assess triage implementation of patients visited TASH adult ED.
- To identify factors which affect implementation of triage on patients visited TASH adult ED.

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## **4. Methods and materials**

### **4.1. Study setting**

The study was conducted at Tikur Anbessa Specialized Hospital adult Emergency Department, a governmental tertiary academic teaching hospital working integrated with the Addis Ababa University College of health science. The hospital is found at center of Addis Ababa, Lideta sub city which was established in 1964. The ED was launched in 2008 which has triage room, front, ultrasound room resuscitation room, orange and yellow green zone. And recently they open intermediate ward. Without including intermediate ward the ED has 34 beds and 7 coaches and has a total of 150 staffs. Over 18000 patients visit the ED annually. On average, 50 traumatized and/or critically ill patients are seen in the ED per day, and many require emergent or resuscitative care. Tikur Anbessa Specialized Hospital has high patient flow as compared to other hospitals

### **4.2. Study period**

The data was collected from March to April 2019 by reviewing the selected patients chart in those patients visited and triaged from Jan.2016 to Jan.2018 at TASH adult ED.

### **4.3. Study design**

Institution based cross sectional study was done at Tikur Anbessa Specialized Hospital, adult emergency department.

### **4.4. Population**

#### **4.4.1. Source population**

All patients visited TASH adult emergency department.

#### **4.4.2. Study population**

All adult patients visited to TASH adult ED from Jan.2016 to Jan.2018.

#### **4.4.3. Sample population**

Selected patient visited and triaged in TASH adult ED.

#### **4.4.4. Study unit**

Each selected Patients chart from TASH adult ED registry.

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## 4.5. Eligibility criteria

### 4.5.1. Inclusion criteria

All adult patients visited and triaged in TASH adult emergency department from Jan.2016 to Jan.2018.

### 4.5.2. Exclusion criteria

Patient from which their cards were not available in card room at the time.

## 4.6. Sample size determination

A single population proportion formula was used to calculate the sample size by considering the following assumption:- p (proportion in the previous study in similar topic) as prevalence of under triage in Mekelle Ayder referral hospital 31%, 95% confidence interval (CI) with level of precision  $z_{@/2} = 1.96$ , p value 0.05, margin of error 0.05.

$$n = \frac{(z_{@/2})^2 pq}{d^2}$$

**d<sup>2</sup>**

$$n = \frac{(1.96)^2(0.31)(0.69)}{(0.05)^2}$$

$$n = \underline{\underline{329}}$$

Where: - n= sample size,  $Z_{@/2}$ = level of precision, p=proportion in similar study (estimated variability), q = 1-p, d= margin of error.

## 4.7. Sampling technique

Simple random sampling technique was used to select the patient's card which was recorded in emergency triage from Jan.2016 to Jan.2018. Patient chart in which, the third digit is greater than or equal to eight was selected using computerized simple random sampling.

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## **4.8. Variables**

### **4.8.1. Dependent variable**

Triage implementation

### **4.8.2. Independent variables**

Demographic variables, patients' complaint, time of ED visit, mode of arrival, referral, type of illness, TEWS score and use of clinical discriminator.

## **4.9. Operational definition**

**Triage:** - is the basic structure in which all incoming patients are categorized into groups using a standard urgency rating scale or structure.

**Over triage:** - Assigning non-critical casualties to immediate care or to the higher area of care.

**Under triage:** - Inappropriate assignment of critically ill patients with life threatening problems to a delayed category or to the lower level of care.

## **4.10. Data collection tools and technique:**

The sources of data for this study were patients chart in those patients triaged and visited in TASH adult ED. The data from the chart was collected using structured checklist. Trained health professionals were used to collect it. Data collectors were supervised during the data collection periods.

## **4.11. Data quality assurance**

The checklist was checked for its completeness and coherence and pretested on 5% of the sample at AaBET hospital with a reliability of 0.78 using Cronbach's Alpha test. Training was given for data collectors and supervised during data collection. On each day of data collection, the collected data was checked. Data cleaning was done using Epi data manager after entry and during analysis.

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#### **4.12. Data analysis and presentation**

Data was entered and cleaned using Epi-data version 4.2.0.0 statistical software and transferred to SPSS version 23. Statistical software for further analysis. Frequency, mean, median, mode and standard deviation were used to summarize descriptive statistics of the data and tables and graphs used for data presentation. Bivariate logistic regression analysis was used to check variables association with dependent variable individually. Variables found to have association with the dependent variable (p-value up to 0.2) were entered in to multiple logistic regression models for further analysis and variables having P- value of less than 0.05 were considered as significantly associated with the dependent variable. The degree of association between dependent and independent variables were expressed by using odds ratio with 95% confidence interval.

#### **4.13. Ethical consideration**

Permission letter to carry out the study was obtained from the Institutional Review Board of Addis Ababa University College of health science, school of medicine, department of emergency medicine and critical care and submitted to Tikur Anbessa specialized hospital administrative office. To ensure confidentiality, names and any other personal identifiers is not used during data collection and analysis. The data collectors were notified to keep patient confidential.

## 5. Results

### 5.1. Socio-demographic variable

Around 36000 patients had visited TASH adult ED in the last two years, and from them 329 patient's charts were randomly selected from registration book. From the selected chart 1.52% (n=5) charts do not contain triage sheet in it and taken as non-response rate (loss can be considered as non-response rate).

Table 1 below shows, demographic profile of patients. Their sex distribution is nearly similar (49.4% male and 50.6% female) with mean age of 42.26 year (mean  $\pm$  17.794 years) which ranges from 15 to 92 years and median age of 40 years old. Most of the patients (68.9%, n=223) were in adult age group (25-64 year). The largest percentage (65.1%) comes from Addis Ababa.

In the study period patients came to ED with average duration of illness of 8 days and 8 hours ( $\pm$  15.87 days) which ranges from minutes to years, median and mode of 2 and 1 day respectively but, in 35.2% of patients their duration of illness was not recorded. The average waiting time at triage for patients visiting adult ED during the study period was 10 minutes (mean  $\pm$ 17.35 minutes), median of 8 minutes and mode of 10 minute which was ranges from zero time (immediate) to 2 hours but the initial time of arrival and decision time were not recorded in 16.8% (n=53) charts.

Table 1 :- Socio-demographic variables of patients visited TASH adult ED, Jan.2016 to Jan.2018.

Variables		Frequency	Percent
Age	Youth (15-24)	58	17.9
	Adult (25-64)	223	68.8
	Elderly ( $\geq$ 65)	43	13.3
Sex	Male	160	49.4
	Female	164	50.6
Address	Addis Ababa	211	65.1
	Oromia	44	13.6
	Amhara	27	8.3
	Tigrie	5	1.5
	SNNAP	29	9.0
	Others	8	2.5

## 5.2. Triage History

Patients with non-traumatic problem accounts 67% (n=217), followed by surgical (7.1%, n=23) and obstetrics and gynecologic problem (3.1%, n=10). More than one fifth (22.8%, n=74) of patients compliant were not documented. Respiratory problems were the leading cause ED visit (16.4%, n=41), followed by abdominal pain (13.2%, n=33), chest pain (11.2%, n=28), diarrhea and/or vomiting (10.8%, n=27), fever (7.2%, n=18) and headache (6.0%, n=15). Falling accident (3.6%, n=9) and labour pain (3.2%, n=8) were the leading surgical and obstetrics compliant respectively.

More than half of the patient arrived with taxi (51.5%, n=167) followed walking (14.8%, n=48) and ambulance (7.4%, n=24) but in 14.8% (n=48) their mode of arrival were not recorded. More than half (53.7%, n=174) of the patient came to adult ED without referral source.

During the study period 44.1% (n=143) patients had history of chronic illness. From these chronic heart related problems are the most common chronic illness (37.8%, n=54) followed by malignancy (20.3%, n=29), DM (14, n=20) and HTN (13.3%, n=19 but it was not recorded in 29.3% (n=95) of patients. History of allergy were either not asked or documented in 39.5% (n=128) patients and from the recorded count 5.2% (n=17) had allergic history to acetaminophen and other unknown medications.

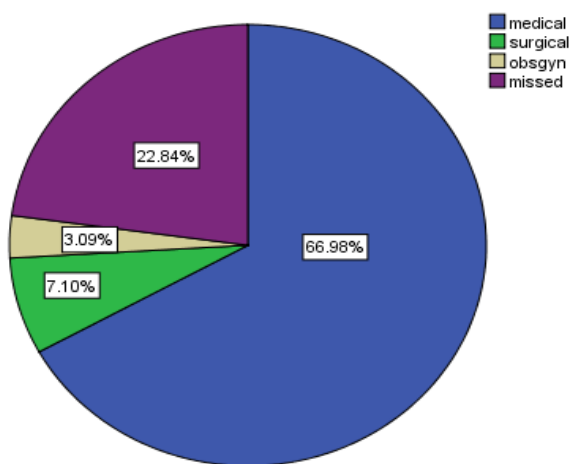


Figure 2 :- Patient's chief complaint on arrival to TASH adult ED, Jan.2016 to Jan.2018.

Table 2 :- Subjective findings on patients visited TASH adult ED, Jan.2016 to Jan.2018.

Variables		Frequency	Percent	
	Chief complaints			
Medical compliant (67%, n=217)	Chest pain	28	11.2	
	Fever	18	7.2	
	Headache	15	6.0	
	Diarrhea/vomiting	27	10.8	
	Sudden collapse	10	4.0	
	Respiratory problem	41	16.4	
	Convulsion	4	1.6	
	Poisoning	2	0.8	
	Abdominal pain	33	13.2	
	Other medical compliant	58	23.2	
	Missed/eligible compliant	15	6.0	
Surgical compliant (7.1%, n=23)	RTA	3	1.2	
	Falling accident	9	3.6	
	Homicide	1	0.4	
	Fighting	6	2.4	
	Stab	2	0.8	
Obstetrics and gynecologic compliant(3.1%, n=10) Mode of arrival	Vaginal bleeding	2	0.8	
	Labour pain	8	3.2	
	Ambulance	24	7.4	
	Heavy track	5	1.5	
	Private car	20	6.2	
	Police car	6	1.9	
	Taxi	167	51.5	
	Walking	47	14.5	
	Carried	3	.9	
	Others	4	1.2	
	Missed/eligible	48	14.8	
	Referral source	Self-referral	174	53.7
		With referral	123	38.0
		Missed/eligible	27	8.3
Does pre-hospital care given?	Yes	128	39.5	
	No	87	26.9	
	Missed/eligible	109	33.6	
Chronic illness	Yes	143	44.1	
	DM	20	14.0	
	HTN	19	13.3	
	CHD	54	37.8	
	Malignancy	29	20.3	
	Others	21	14.7	
	No	86	26.5	
History of allergy	Missed	95	29.3	
	No	179	55.2	
	Yes	17	5.2	
	Missed/eligible	128	39.5	

### 5.3. TEWS registrations

Systolic blood pressure (SBP), heart rate (HR) and arterial O<sub>2</sub> saturation (SPO<sub>2</sub>) were recorded in 97.5% (n=316), 96.3% (n=312) and 95.7% (n=310) respectively, whereas temperature and respiratory rate (RR) were recorded only in 39.5% (n=128) and 52.8% (n=171) respectively. Even if blood glucose is one of the vital sign in ED patients it was done only in 9.6% (n=31) cases and also it was not measured in 55% (n=11) patients with DM. TEWS didn't calculated for 60.5% (n=198).

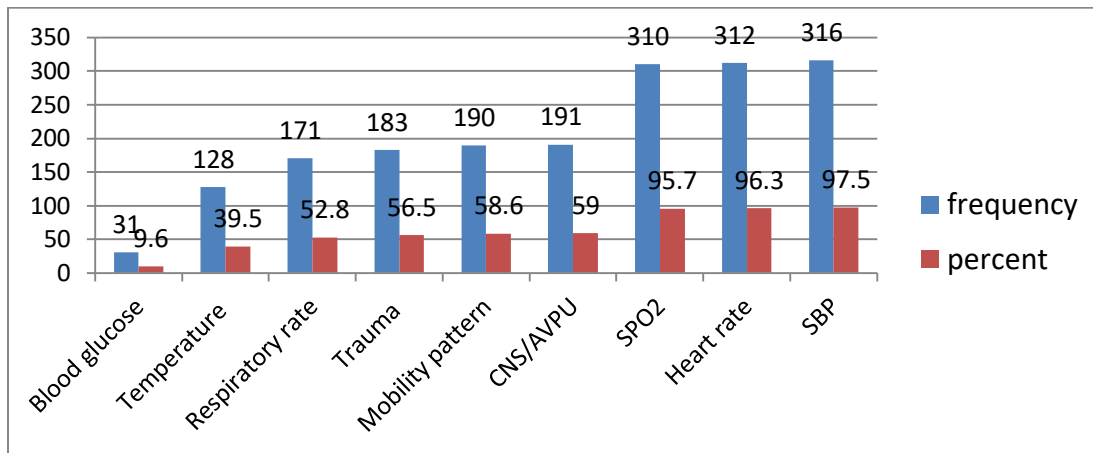


Figure 3:- Recorded vital sign on patient visited TASH adult ED, Jan.2016 to Jan.2018.

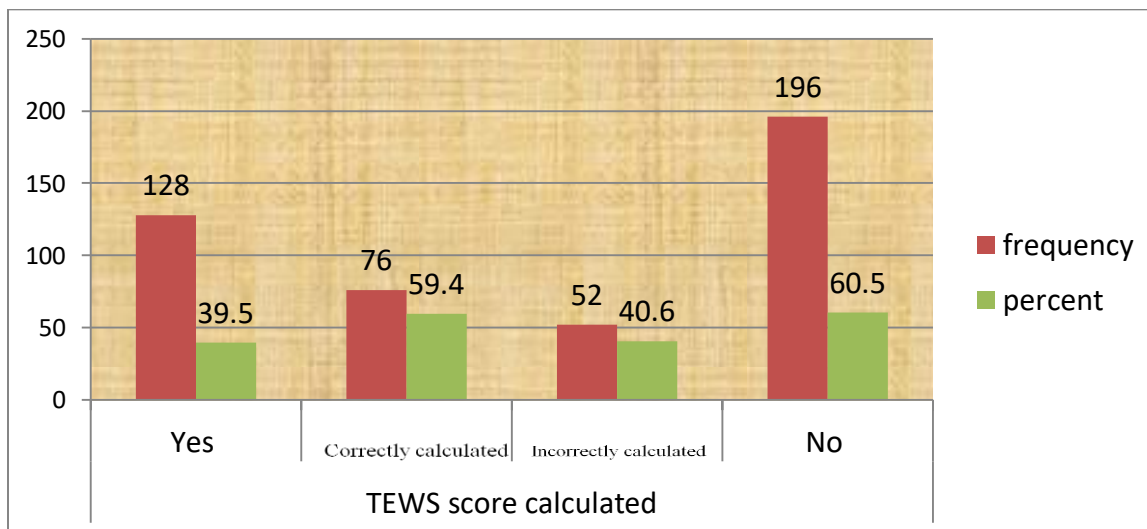


Figure 4:- TEWS score of patients visited TASH adult ED, Jan.2016 to Jan.2018.

#### 5.4. Patient's category

During the study period, more than half of the study participants' were categorized as yellow and green (31.2% [n=100] as yellow and 22.2% [n=72] as green), 20.1% (n=65) as orange and 8% (n=26) were categorized as red. About 16.4% (n=53) of patients were not triaged at all and 2.5% (n=8) were recorded as death on arrival and excluded for analysis related to triage.

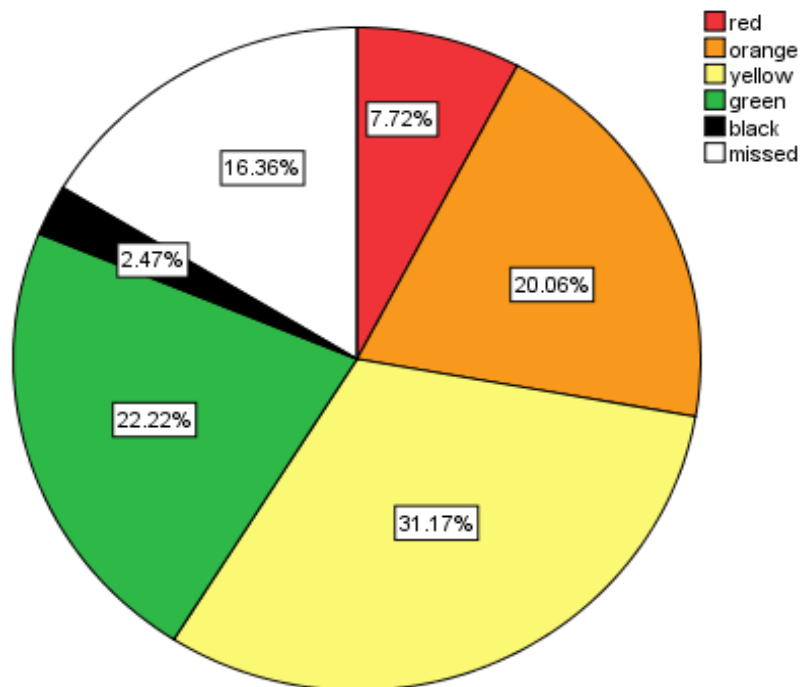


Figure 5:- Category of patients at triage in TASH adult ED, Jan.2016 to Jan.2018.

In order to identify the correct triage, clinical discriminator, TEWS score, history of the patient and investigations were seen. In the study period 43.7% (n=115) of patients were not triaged correctly. Among incorrectly triaged patient 25.22% (n=29) of them were over triaged while 74.78% (n=86) were under triage. Clinical discriminators were not used for 34.6% (n=112) of patients visited adult ED and in more than half (56.7%) of the cases it was used to over triage the patient. The use of clinical discriminators was 3.27 times more likely to over triage the patient.

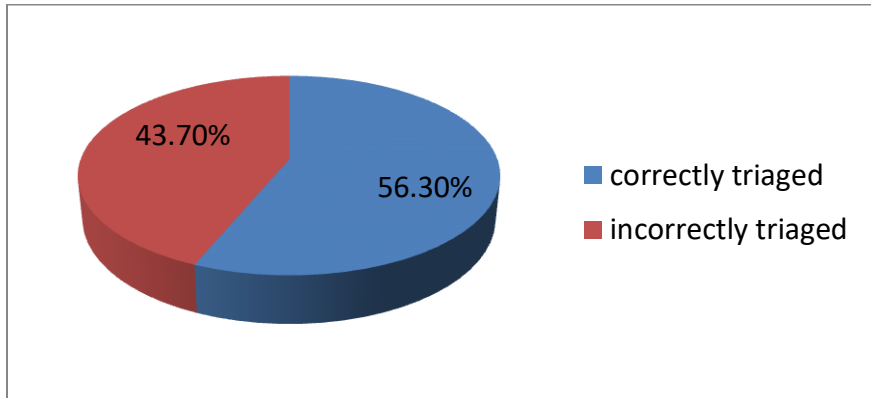


Figure 6:- Patients triage at TASH adult ED, Jan.2016 to Jan.2018.

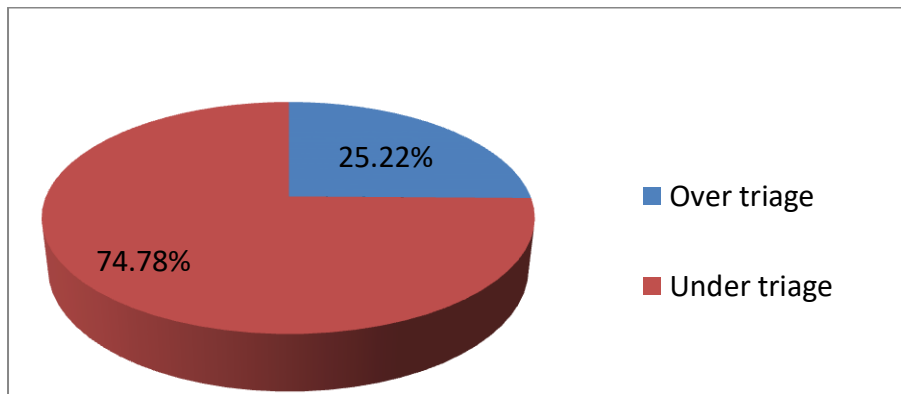


Figure 7:- Improper patient triage at TASH adult ED, Jan.2016 to Jan.2018.

As shown in table 5 below, 43.7 % n=115 [Sixteen percent (n=4) of red cases (all were over triaged), 44.6% (n=29) of orange cases with 58.6% (n=17) over triage, 48% (n=48) of yellow cases with 83.3% (n=40) under triage and 47.2% (n=34 under triage) of green cases] patients were incorrectly triaged. A patient who's TEWS not calculated were 1.8 times more likely to be over triaged.

There is no statistical difference in triaging of patient between surgical and medical compliant patient (fisher's exact test P=0.306) however, those with medical compliant were 1.43 times more likely correctly triaged than surgical. In approximately three fourth (66.0%, n=208) of the patients, the area where they were seen was not recorded and 19.7% (n=62) patients sent to emergency diagnostic room.

Table 3:- Patient category and triage distribution of patients at TASH adult ED, Jan.2016 to Jan.2018.

Variables		Frequency	Percent
Patient category	Red	25	7.7
	Correct	21	84.6
	Incorrect	4	15.4
	Orange	65	20.1
	Correct	36	55.4
	Incorrect	29	44.6
	Yellow	101	31.2
	Correct	53	52.0
	Incorrect	48	48.0
	Green	72	22.2
Correct	38	52.8	
Incorrect	34	47.2	
Black	8	2.5	
Missed/eligible	53	16.4	
Use of clinical discriminator	Yes	212	65.4
	No	112	34.6
Patient transfer to	Resuscitation room	14	4.4
	Procedure room	28	8.9
	Diagnostic room	62	19.7
	Regular OPD	1	.3
	Nearby HI	2	.6
	Missed/eligible	208	66.0

Only 21.9% (n=71) patients had got emergency management at triage in the study period. The odd of getting treatment in adult ED was 3.25 in red categories followed by 2.18 in yellow categories and 1.7 orange categories. The odd of getting treatment in patients with traumatic compliant were 2.28 than medical cases. Oxygen therapy and intra venous fluid administration were the most prominent intervention in adult ED.

Investigation was done in 63.3% (n=205) patient during the study period. Patients in yellow category had a more likelihood to have investigation at adult ED with odds of 10.29 followed by orange category with odds of 9.2, green with odds of 9 and red with odds of 8. The odd of patient with medical compliant to have investigation in ED is 1.45 surgical and 5.81 in relation to patients with surgical and obstetrics compliant respectively

To determine the documentation, ownership, accurate use and functionality of ED triage system this study reviews the completeness of triage sheet, surprisingly only 11.1% (n=36) of triage sheet was filled completely and re-triage was done only in 4.3% (n=14).

Table 4:- Intervention at triage and completeness of triage sheet for patients visited TASH adult ED, Jan.2016 to Jan.2018.

Items		Frequency	Valid Percent
Does treatment given at triage?	Yes	71	22.5
	O2	40	56.3
	Iv fluid	25	35.2
	Others	6	8.5
	No	46	14.6
Does investigation done at triage?	Missed	198	62.9
	Yes	205	65.1
	v/s	192	93.7
	Laboratory	13	6.3
Does Triage sheet filled Completely?	No	19	6.0
	Missed	91	28.9
Does re-triage done?	Yes	36	11.4
	No	279	88.6
Does re-triage done?	Yes	14	4.4
	No	301	95.6

## 5.5. Factors associated with triaging of patient.

Bivariate analysis revealed that age of patient, mode of arrival, referral source, TEWS score calculation and miscalculation, patients category and use of clinical discriminator were associated with triaging of patient but, in multivariate analysis correct TEWS calculation (AOR=3.019, 95% CI {1.139,8.005}, P=0.026), adult age group (AOR=3.018, 95% CI {1.357, 6.712}, P=0.007) and use of clinical discriminator (AOR=8.582, 95% CI {1.873, 17.389}P=0.000) for triage were significantly associated with triage of patients.

Table 5:- Factors affecting patients triage at TASH adult ED, Jan.2016 to Jan.2018.

Variables		P-value	COR ( 95% C.I)	AOR(95% CI)
Age	Adult (25-64)	.134	3.246 (.879, 5.898)	3.018(1.357, 6.712)*
	Elderly (>=65)	.038	1.846 (.827, 4.119)	2.916 (.982, 8.659)
	Youth (15-24)	.124	.568	
Mode of arrival	Heavy track	.945	.933 (.131, 6.657)	1
	Private car	.581	1.400 (.424, 4.623)	1
	Police car	.710	.700 (.107, 2.406)	1
	Taxi	.982	2.317 (.456, 3.327)	1
	Walking	.681	2261664779.992(000)	1
	Carried	.999	4.200(.379, 46.495)	1
	Others	.242	1.800 (.668, 4.853)	1
	Ambulance	.714		
Referral source	With referral	.985	.378 (.026, 1.584)	1
	Missed/eligible	.166	.680 (.086, 4.080)	1
	Self			
Does TEWS calculated?	Yes	.118	1.279 (.913, 2.247)	1
	No	.035	.684	
Does TEWS calculated correctly?	Yes	.000	3.866(1.843, 8.374)	3.019 (1.139, 8.005)*
	No	.001	2.750 (1.536, 4.925)	3.044 (.729, 12.713)
Patients category	Orange	.016	7.673 (1.305, 13.705)	1.631(.403, 6.595)
	Yellow	.009	8.088 (1.464, 14.266)	.990(.227, 4.323)
	Green	.016	7.350 (1.309, 13.477)	13.169 (.718, 24.454)
	Black	.003	36.750 (3.497, 58.250)	.421(.087, 2.040)
	Red			
Does clinical discriminator used?	Yes	.000	9.005 (4.143, 15.315)	8.582(1.873, 17.389) *
	No	.000	.247 (0.018, 2,243)	

\*Factors significantly associated with patient's triage

Using bivariate analysis address, mode of arrival, chronic illness, patients triage category and use of clinical discriminator for triage showed association with improper patient's triage but, in multivariate analysis use of clinical discriminator (AOR=3.400, 95% CI {2.096, 5.515}, P=0.000) for triage were the only factor significantly associated with improper patient triage.

Table 6:- Factors affecting improper triage at TASH adult ED, Jan.2016 to Jan.2018.

Variables		P-value	COR (95% CI)	AOR (95% CI)
Address	Addis Ababa	.169	2.785 (.648, 11.970)	
	Oromia	.381	2.000 (.425, 9.418)	1
	Amhara	.150	3.333 (.647, 17.181)	1
	Tigrie	.512	.417(.030, 5.708)	1
	SNNAP	.296	2.361(.472, 11.822)	1
	Others	.484	.600	
	Mode of arrival	Ambulance	.131	.464 (.171, 1.258)
Heavy track		.498	2.194 (.227, 21.227)	1
Private car		.721	.823 (.281, 2.404)	1
Police car		.375	2.742 (.296, 25.424)	1
Taxi		.660	861(.441, 1.679)	1
Walking		.476	740 (.324, 1.693)	1
Carried		.942	.1.097(.093, 12.996)	1
Others		.154	183(.018, 1.896)	1
Missed		.047	.1.824	
Chronic illness		HTN	.111	.511 (.224, 1.166)
	CHD	.092	.529 (.252, 1.110)	1
	Malignancy	.615	.813 (.362, 1.823)	1
	Others	.121	.525 (.233, 1.185)	1
	Missed/eligible	.278	.590 (.228, 1.531)	1
	DM	.004	2.400	
Patient category	Orange	.854	1.091 (.431, 2.760)	1
	Yellow	.054	2.400 (.986, 5.843)	1
	Green	.065	2.393 (.947, 6.045)	1
	Back	.767	1.273 (.258, 6.273)	1
	Missed/eligible	.031	2.943 (1.101, 7.870)	1
	Red	.549	.786	
Use of clinical discriminator	Yes	.000	3.266 (2.021, 5.276)	3.400 (2.096, 5.515) *
	No	.657	.936	

\* Factors significantly associated with improper patient's triage

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## 6. Discussion

This study aims to assess implementations of triage protocol at adult emergency department and identifying determinant factors which obscures the practice of triage since there is some misunderstanding and ignorance of triaging system in at anywhere in Ethiopia. The finding of this study gives clues on hospital based ED triage in other hospitals and other stakeholders to implement and undergo some corrections on triaging systems.

From the selected charts, only n= 5 (1.52%) were not contain triage sheet and it is completely filled only in 11.1% of patients. It is a little better than the finding in Mekelle Ayder referral hospital which was none of the triage forms were filled out completely (28). The triage form should be attached at the top of the patients chart but in this study it was hidden and difficult to get in to it. This indicates that the staffs may not consider it as an important part of medical records and they were not using it to meet the desired goal. This study shows there is poor medical record handling and documentation which hinders quality of care within hospitals.

Triage personnel were not completely fill the triage form and missing some important parameters and also few were not fill all elements. They miss either the history part, don't measure and/or document objective findings, not calculated and miss-calculating TEWS score, triaging the patient in improper area and missing place where the patient to be treated. Almost similar result were seen in Ayder referral hospital four years back and Durban South Africa (27,28). This is due to either the triage personnel don't consider it for the patient outcome or senior were not supervising and giving feedback to them.

In this finding patients came to ED with average duration of illness of one week (8days and 8hours). This shows there is a dalliance in receiving care and most of patients were not get emergency illness and/or incident. The average waiting time for patients ED during the study period was 10 minutes which was ranges from zero time (immediate) to 2 hours. It much less as compared to the study done in Durban South Africa which is 59 min. Here we can say that, on average patients were distributed quickly at triage room even if some patients wait for hours.

Most of the patients came to ED with a non-traumatic compliant (67%) like respiratory problems, abdominal pain, chest pain, and diarrhea and vomiting, which is much more than surgical compliant (7.1%). Comparative result is reported in turkey (39), south African rural

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hospitals (32) and Mekelle Ayder referral hospital (32) but in the study done at Nape kembe, Haiti hospital traumatic problem were the leading cause of ED visit (39). This may be because the presence of other trauma center in Addis and decrease flow of traumatic case to TASH. More than half of the patient came to ED with taxi and by walking. The reason may be accessibility issue and the patients were not in acute illness, or recording error by triage personnel. About 41.1% patients had history of chronic illness like heart related problem, DM, HTN and malignancies which needs recurrent ED visit and increasing the proportion of medical compliant as compared to surgical.

Temperature and respiratory rate (RR) were recorded only in 39.5% and 52.8% respectively. Triage early warning score (TEWS) were not calculated in 60.5% of patients and of calculated, 40.6% were incorrectly calculated. As compared to a related study done in Ayder referral hospital the documentation is much less in TASH. This may be due to increased workload and dependency of triage personnel on monitors and mal-functionality of it, negligence and lack of senior supervision.

Clinical discriminators are important to allocate the patients. Despite the use of their TEWS score, it is used to place the patient immediately into a higher triage category based on the severity of their illness. Not recording a valid discriminator or using invalid discriminator will therefore result in incorrect patient category. Discriminator were not used for 34.6% patients and mostly used to over triage the patient (by 3.27 fold). A consistent result was reported in urban district hospitals of Durban south African (27) and some decrement from the finding in Ayder referral hospital four years back (TEWS increase over triage by 46.7%) (28). From this we can consider that the triage personnel are not familiar with the triage protocol and when and/or how to use clinical discriminator.

More than half of patients were categorized in yellow and green categorized while about 28% in red and orange category. From the total sample size about 43.7% were categorized incorrectly which is much higher than the finding in Ghana (5.7%) (42). It may be due to misuse of clinical discriminator, very superficial history and incorrect physical finding. This poses much higher problems to the hospitals and may affect quality of cares, increase ED overcrowdings and waiting time, increase morbidity and mortality in ED, increase workloads and leading to staff burnout. Patients with non-traumatic compliant were 1.43 times more likely to be triaged

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correctly, the reverse is seen in south Africa where non traumatic complaints were 1.666 times more likely to be triaged incorrectly (26). This may be due to study site preference, since this study was done in a hospital with a low traumatic patient flow.

Triaging patients incorrectly, whether over or under triaging can have unfavorable effects. Over triage increases the number of patients who need to be seen urgently and puts further strain on an already under-resourced and under-staffed system, which may also lead to correctly triaged and more critical patients not receiving treatment within the recommended time. Under triaged patients potentially have even more serious consequences.

In this study 43.7% were incorrectly triaged. Among them 74.78% (32.7% from the total sample) were under triage which is higher than related study in Ayder referral hospital (30.7%) (28) and Cape Town South Africa (9%) (34), much higher than study conducted in South Africa 4.4% (26), Somali land, (9%) (37). It is also higher than the expected range of under triage declared by ACS-COT which is <5%. This difference may be due to variation in understanding of clinical discriminator, very superficial history, incorrect physical finding, poor understanding of triage form and the working environment. This indicates the understanding and implementation of triage is still not in good progress and needs frequent follow up and updating their entire knowledge and skill.

Among incorrectly triaged patients 25.22% (11% from the eligible sample) were over triaged which is much less than the result in Cape Town South Africa (49%) (34) and the expected over triage declared by ACS-COT (25-35%) and also in Somaliland Burao hospital (40%) (37) and but higher than that of reported in Ayder referral hospital (21.9%) (28) and Ghana (1%) (42), and South Africa rural district hospital (4.3%) (26). The difference may be variation in understanding of triage in different countries and difference in triage protocols. Even if the expected range of over triage is high it is difficult to apply in resource constrained settings because it has almost similar effects like under triage.

Triage is one of patient management areas but in this finding only 21.9% of patients had got bedside treatment at emergency triage and most of patients who got treatment were in red category and those who came with traumatic complaints. This may be due to high patient flow, low resource availability and may also be due to understanding of the severity of illness and role of triage.

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Bedside investigations are believed to complement the TEWS to identify high-risk patients and applied as an appropriate discriminator to triage the patient in higher level. These are probably not understood by the triage nurses. Pregnancy test to identify obstetrics emergency, urine dipstick and bedside blood glucose measurement to identify diabetics' emergency are necessary to identify patients with high risk. Let's see one scenario, a woman with lower abdominal pain due to uterine rupture may be triaged to yellow instead of orange or red but pregnancy test can resolve it and can prevent preventable death. But in this study investigations were not done and/or missed in 34.9% and mostly done to yellow and orange category patients than the other category. This may be because lack of recognition for green category and direct transfer of red patient to resuscitations room and not having enough time for investigation at triage. Result consistent with this was seen in Durban South Africa (43). This may be inadequate understanding of triage personnel on the role of triage and benefit of investigations.

Patients in adult age group (25-64) were 3.018 times more likely triaged correctly than youth (AOR=3.018, 95% CI 1.357, 6.712 and P=0.007). This may be due to high proportion of adult age in this study and cooperativeness of them for triage personnel.

In this study, those patients for which their TEWS calculated correctly were 3 times more likely to be properly triaged than incorrectly calculated (AOR=3.019, 95% CI 1.139, 8.005, P=0.026). This is because, TEWS score is the main component to triage protocol to categorize the patient, thus miscalculation and/or fail to calculate it leads to assign the patient in irrespective triage area.

The use of clinical discriminators were result in incorrect triage of patients by 8.6 folds (AOR=8.582, 95% CI {1.873, 17.389} P= 0.000) and it increase the over triage rate by 3.4 folds (AOR= 3.400, 95% CI 2.096, 5.515). The same is true in the study done in Durban South Africa and Gutenberg province of south Africa , in which the use of clinical discriminator results in improper triage of the patient and mostly to over triage the patient (25, 43). This may be because the triage personnel are not confident by their decision based on clinical manifestations of patients, biased by the patient's response to their illness or they may not familiar with category of clinical discriminator and lack of training and frequent supervision.

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## **7. Limitations**

- ✓ The study design is a cross sectional which has a limitation to establish a causal association as how and when the associations are established.
- ✓ The use of secondary data results in missing of important information's which can be collected in prospective observational study and it may decrease the quality of the study.

The missed data limits some aspect of analysis.

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## **8. Conclusion**

Implementation of emergency based triage in TASH adult ED is not satisfactory according to this study result. Some vital information and parameters were not recorded even if they are important for patient care. TEWS were miscalculated/incorrectly calculated and in most of it is not calculated at all. These all leads patient to categorize in inappropriate area. We can also conclude that the staffs were not considering triage as important part for patients care. Triage personnel were poor in documentation. To deal with this, feedback should be taken from the patient and attendant, and focused training to triage personnel should be given. A quality improvement project needs to be implemented and to assure the quality of care manager needs to take responsibility for continuing monitoring and evaluation. Further research is suggested to evaluate the implementation of emergency based triage.

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## **9. Recommendation**

### **To the FMOH and RHB:**

- Since triage plays a pivotal role in quality and efficient care lessons or training for all triage personnel should be offered on a periodic basis.
- There should be frequent supervision triage personnel and assessment of patient satisfaction and feedback should be collected on triage.
- Posters, brochures, flair and guidelines should be available in triage area.
- There are some confusing and some redundant components of triage sheet and it is better to check and made some modifications based on our country situation.

### **To TASH**

- There should be periodic monitoring and evaluation.
- Completeness of triage sheet should be checked frequently.
- There should be electronic communication between the triage personnel and seniors and also the emergency case team in order to increase quality of care which should start in triage.

### **To the researcher**

- Further prospective studies are important to strengthen this finding.

### **To Health care providers:**

- All staff should give attention to triage, ordering of patients profile and documentation.

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## Annex

### Data collection checklist

Code .....

1.	Demographic variable	Age(in year)	_____	Remark
		Sex	a. Male b. Female	
		Address	a. Addis ababa b. Oromia c. Amhara d. Tigrie e. SNNAP f. Others	
2.	Timing related to triage	Duration of illness/accident (in minute) _____ Time of arrival _____ Decision time of triage _____		
3.	Mode of arrival	a. Ambulance b. Heavy track c. Private car d. Police car e. Walking f. Carried g. Others h. Missed/illegible		
4.	Referral	a. Self b. With referral c. Missed/illegible		
5.	Pre-hospital care given	a. Yes b. No c. Missed/illegible		
6.	Chief compliant	a. Medical	1. Chest pain 2. Fever 3. Diarrhea/vomiting 4. Headache 5. Sudden collapse 6. Respiratory problem 7. Convulsion 8. Poisoning 9. Abdominal pain 10. Others	
		b. Surgical	1. RTA 2. Falling accident 3. Homicide 4. Suicide 5. Fighting 6. Gunshot 7. Stab 8. Burn 9. Foreign body aspirate 10. Others	
		c. Obstetrics/ gynecology	1. Vaginal bleeding 2. Labour pain 3. Lower abdominal	

			bleeding 4. Seizure 5. Others	
7.	History of chronic illness	a. Yes (specify) b. No c. Missed/illegible		
8.	History of allergy	a. No b. Yes (specify) c. Missed/illegible		
9.	Blood glucose level	a. Recorded b. Not recorded		
10.	TEWS recorded	HR	a. Yes    b. No	
		RR	a. Yes    b. No	
		SBP	a. Yes    b. No	
		SPO2	a. Yes    b. No	
		Temperature	a. Yes    b. No	
		Mobility pattern	a. Yes    b. No	
		CNS/AVPU	a. Yes    b. No	
	Trauma	a. Yes    b. No		
11.	Total TEWS score	a. Yes	1. Correctly calculated 2. Incorrectly calculated	
		b. No		
12.	Patient category	a. Red	1. Correct 2. Incorrect	
		b. Orange	1. Correct 2. Incorrect	
		c. Yellow	1. Correct 2. Incorrect	
		d. Green	1. Correct 2. Incorrect	
		e. Black	.....	
13.	Does clinical discriminator used	a. Yes b. No		
14.	Triageed correctly	a. Yes		
		b. No	1. Over triaged 2. Under triaged	
15.	Patient triaged to	a. Resuscitation room b. Procedure room c. Waiting room d. Regular OPD e. Nearby health institution f. Missed/illegible		
16.	Treatment given at triage	a. Yes(specify) _____ b. No c. Missed/illegible		
17.	Investigation at triage	a. Yes(specify) _____ b. No c. Missed/illegible		
18.	Does the triage sheet completely filled	a. Yes b. No		
19.	Re-triage done	a. Yes (where) _____	.....	
		b. No		

Discriminating factors

Color Code	RED	ORANGE	YELLOW	GREEN	BLUE
Target time to treat	Immediate treatment or resuscitation	Treat the patient in less than 10 minutes	Treat the patient in less than 60 minutes	Treat within 4 hours	DEAD
TEWS	7 or more	5-6	3-4	0-2	
Mechanism of injury		High energy Transfer			
Presentation		Shortness of breath - acute Coughing blood Chest Pain Hemorrhage - uncontrolled	Hemorrhage - controlled	ALL OTHER PATIENTS	
	Seizure – current	Seizure - postictal			
		Focal neurology - acute Reduced level of consciousness Psychosis / Aggression Threatened limb			
		Dislocation - other joint Fracture - compound	Dislocation - finger or toe Fracture- closed		
	Burn – face Burn- inhalation	Burn over 20% Burn - electrical Burn - circumferential Burn - chemical	Burns - other		
		Poisoning / Overdose	Abdominal pain		
	Hypoglycaemia – glucose<60mg/dl	Diabetic- glucose>200mg/dl Diabetic- ketonuria	Diabetic – glucose >300 mg/dl (no ketonuria)		
		Vomiting - fresh blood	Vomiting - persistent		
	Pregnancy & antepartum hemorrhage	Pregnancy & abdominal trauma or pain	Pregnancy & other trauma		
	Pain level	Severe			Moderate
<b>Senior Healthcare Professional's Discretion</b>					