

ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCE
SCHOOL OF ALLIED HEALTH SCIENCE
DEPARTMENT OF NURSING AND MIDWIFERY

ASSESSMENT OF KNOWLEDGE AND SKILLS OF TRIAGING AND ASSOCIATED FACTORS AMONG NURSES WORKING IN EMERGENCY DEPARTMENT OF GOVERNMENTAL HOSPITAL IN ADDIS ABABA, ETHIOPIA, 2016.

BY: AYELE TILAHUN (BSC)

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE SCHOOL OF ALLIED HEALTH SCIENCES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN ADULT HEALTH NURSING IN THE DEPARTEMENT OF NURSING AND MIDWIFERY

JUNE, 2016
ADDIS ABABA, ETHIOPIA

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APPROVAL BY THE BOARD OF EXAMINERS

THIS THESIS BY AYELE TILAHUN IS ACCEPTED BY THE BOARD OF EXAMINERS
AS SATISFYING THESIS REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE
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Abstract

Background: Triage is an essential function in emergency department. As there are increased numbers of clients with life threatening traumatic injuries and non-traumatic cases in the emergency department in Ethiopia, triage skill and knowledge is an essential competency required for the nurses working in emergency department. Triage nurses' knowledge has been cited as an influential factor in triage decision-making, however there have been no study in Addis Ababa hospitals undertaken to assess the knowledge and skills of triage among nurses working in the emergency departments. This study therefore aimed at assessing knowledge and skills of triage among nurses working in the emergency departments in Addis Ababa government hospitals.

Objective: To assess the level of triaging skills and knowledge possessed by emergency nurse and associated factors at government hospitals in Addis Ababa from October 2015 to June 2016.

Methods: An institutional based cross-sectional study design was used for this study. Sample size was calculated by using sample correction formula and sample size of 197 Emergency nurses was obtained. The study participants were recruited using simple random sampling, lottery methods. The data was collected using standardized instrument. The collected data was coded and entered to window based statistical package for social sciences (SPSS) version 22.0. Person correlation and multivariable linear regression was used to analysis the factors.

Results: Response rates of 95.4% were obtained from the study. More than half of the participants (51.9%) were female and Orthodox religion follower accounts for 45% of respondents. Nearly half of the respondents (54.5%) had low triage knowledge scores, with the mean score being 20.71 (SD = 5.06). Greater than half of the subjects (52.9%) perceived their overall triage skill to be at a moderate level 141.3 (SD = 20.87). strong, positive relationships were found to exist between triage skill and triage knowledge ($r = .68, p < .01$) while moderate positive relationship exist between triage skill and the three other factors. There is significant relation between triage knowledge and triage skill ($B=0.069, CI= (3.853, 15.724), P=0.001$).

Conclusion and Recommendation; This finding suggests there is high inadequacy of training and low knowledge among nurses working in emergency department. Hence they need continuing education and training in order to improve their triage skill and triage knowledge.

Key words: triage skill, triage knowledge, work experience, training experience, triage experience, emergency nurse

List of acronyms and abbreviations

AAU-----	Addis Ababa University
AA-----	Addis Ababa
CHS-----	Collage of health science
DDS-----	Demographic Data sheet
DHF-----	Dengue Hemorrhagic Fever
DKA-----	Diabetic keto acidosis
ED-----	Emergency department
IV-----	Inter venous
NGO-----	non-governmental hospital
NPO-----	None per os
OPD-----	out patient department
SPSS-----	Statistical Package for Social Science
TKQ-----	Triage knowledge questionnaire
SD-----	Standard deviation
FMOH -----	Federal ministry of health

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1. INTRODUCTION

1.1 Background of study

Emergency department (ED) generally provides immediate care 24 hours every day. The unpredictable numbers of patients coming to ED suffer from various conditions with unknown severity, urgency, and definite diagnosis. The patients who are suffering from life threatening conditions, such as cardiac arrest, airway obstruction, and shock should be prioritized to provide them an early immediate care to save their lives. However, the over crowdedness of patients visiting to ED can have an impact on the quality of care by diversifying the resources intended for patients, which are in need of emergency care to the individuals who have potentially less urgent needs (1). There is consensus that triage is an essential procedure in emergency departments, and is an effective system for reducing waiting times and ensuring that all patients visiting an emergency department receive appropriate treatment (2). The use of the term triage requires three conditions to be met: 1) at least a modest scarcity of health care resource exists. The degree of scarcity can vary considerably, from modest, as in a hospital emergency department where not every patient who presents for care can be served immediately, to dire, as after a catastrophic disaster in which hundreds or thousands of people may experience severe injuries in a short time; 2) a health care worker (often called a triage officer) assesses each patient's medical needs, usually based on a brief examination. The outcome and grading of the patient is frequently the result of physiological and assessment finding; 3) the triage officer uses an established system or plan, usually based on an algorithm or a set of criteria, to determine a specific or treatment priority for each patient (3).

Triage is putting the patient in the right place at the right time to receive the right level of care ... the allocation of appropriate resources to meet the patient's medical needs'. Triage aims to ensure that patients are treated in the order of their clinical urgency and that their treatment is appropriately timely. It also allows for allocation of the patient to the most appropriate assessment and treatment area, and contributes information that helps to describe the departmental case mix (4). Triage knowledge among nurses is one of the key elements of supervision in emergency department, if it is not carried out at standard level; the outcomes of clinical care of patients and efficiency of emergency departments get compromised (5). There are

two stages to the nurse triage process: first, the triage assessment which leads to allocation of a triage category and the subsequent processing of the patient; and secondly, the initiation of nursing interventions to facilitate emergency care with a possible reduction in the patient's discomfort(6). The world medical association has recommended that clinicians categorize disaster victims with a system that has been adopted worldwide in some form and which involves the following triage criteria: a) those who can be saved but whose lives are in immediate danger, requiring treatment immediately or within a few hours(red triage tag: 'immediate'; priority 1); b) those whose lives are not in immediate danger but who need urgent but not immediate medical care(yellow triage tag: 'delayed 'priority 2);c) those requiring only minor treatment(green triage tag: 'minimal'; priority 3); d) those who are psychologically traumatized and might need reassurance or sedation if acutely disturbed(no specific triage tag); e) those whose condition exceeds the available therapeutic resources, who have severe injuries such as irradiation or burns to such an extent and degree that they cannot be saved in the specific circumstances of time and place, or complex surgical cases that oblige the physician to make a choice between them and other patients(black triage tag: 'expectant'; no priority) (7).These triage decisions are linked with three types of outcome: "correct" or "expected" triage, "over-triage" and "under-triage". Correct triage by a nurse is associated with a positive health outcome because the patient is evaluated by a doctor within a suitable timeframe. Over-triage and under-triage indicate that triage nurse allocated a triage category of a higher or lower acuity than required respectively (6)

1.2. Statement of the problem

The triage nurse in emergency department is the first person that a patient encounters when presenting for emergency care to the department. Triage nurses' knowledge and experience have been as influential factors in triage decision-making (2, 8). One study conducted in United States of America across emergency departments to examine the educational preparation of triage nurses, found that 43.3% of the emergency departments were run by nurses who had no educational preparation on triage (9). In developing countries initial triage and treatment of patients in the emergency departments constitute one of the weakest links in the health system. A study conducted in Malawi revealed delay in care provision among children presented to emergency department which resulted into avoidable death and disability (10)

Study conducted in Tanzania across reveals that more than half (52%) of the nurses involved in the study failed to allocate proper patient's triage category. Fifty eight percent (58%) of the respondents had no knowledge on waiting time limits for patients' triaged categories (15, 20). Study conducted in Indonesia showed that more than half of their study subjects (58%) had low triage knowledge scores and another study conducted at the place shows that, most of the subjects (65.40%) perceived their overall triage skill to be at a moderate level, and they felt the same towards each of the sub-dimensions of triage skill (11, 12). About 44% of the nurse working in emergency departments in Australia reported not receiving any unit-based orientation program on triaging, although most of them (89%) reported it to be essential (13)

The high burden of non-communicable diseases and injury because of urbanization and way-of-life changes of the AA residents is exacerbated by multiple factors, including the lack of a coordinated emergency medical system, the lack of designated well-developed emergency centre (EC), the lack of human and material resources to care for injury or acutely ill patients, the lack of medical training on principles of triage and emergency management, and the lack of sustainable funding for emergency services. Ethiopia does not have the facilities, equipment and human resource with the essential skills to support a coordinated emergency medical care system and as such lacks the basic infrastructure for delivering emergency care (14, 15). No national or regional guidelines exist for triage, patient delivery decisions or pre-hospital treatment plans (16). Therefore, those who could benefit most from early intervention are often forced to

wait, while those who do not require immediate care might be seen first. The lack of a proper triage system and the lack of a designated EC make it difficult to provide dedicated emergency care with appropriate triage protocols, rapid diagnosis and timely treatment. In most hospitals in AA, each major department (e.g., surgical, medical and Pediatric) provides OPD emergency-unit or receiving area coverage and manages the intake of acutely ill patients. The emergency units of even the best-equipped and best-staffed public hospitals lack the human and material resources to care for a person in distress: efforts to support airway function, provide sedative and pain medications, or rapidly diagnose patients are often impeded. As emergency departments are struggling to cope with overcrowding there is a critical need for valid, reliable triage acuity (17). Since there is no study in Addis Ababa hospitals undertaken to assess the knowledge and skills of triage among nurses working in the emergency departments and their concern is with patient safety issues and providing highest quality of care, it is necessary to examine emergency nurses' triage knowledge and skills including its related factors. Therefore this study was aimed at assessing knowledge and skills of triage among nurses working in emergency departments in Addis Ababa hospitals.

1.3 Rational of the study

This study helps to assess knowledge and skills on triage among nurses working in emergency department of governmental hospitals in Addis Ababa. The finding of this research is expected to show learning needs to the nursing programs and to recommend hospital administration and appropriate government bodies to improve intervention and to provide evidence based triage training for nurses working in emergency departments of public hospitals in Addis Ababa. As to researcher knowledge there is no study in Addis Ababa hospitals undertaken to assess the knowledge and skills of nurses working in the emergency departments on triaging and therefore this study help as baseline for further investigation. Over all it helps to provide quality of care for patients coming to the emergency departments of those hospitals.

2. LITRETURE REVIEW

2.1 Triage knowledge

Accuracy of triage decision is considered to be a major factor that determines patients 'outcomes in the emergency department. Triage decisions can be classified as primary and secondary triage decisions. Primary triage decisions related to the triage assessment, allocation of triage category, and suitable location for treatment (18). Study conducted in Tanzania across selected hospital in Dar es salaam hospitals reveals that more than half (52%) of the nurses involved in the study failed to allocate proper patient's triage category. Fifty eight percent (58%) of the respondents had no knowledge on waiting time limits for patients' triaged categories. Approximately 67 % of the respondents had knowledge on what triage is all about. This implies that about half of the nurses working in the emergency department of the hospitals in Dar es Salaam region triage patients attending emergency medical services with knowledge deficit on triaging (8). Another Study conducted in three hospitals of Mazandaran University of Medical Sciences, Sari, Iran; shows only (20.1%) study participant had Triage knowledge (19).

Emergency nurses require in depth knowledge and clinical expertise to provide a care across the lifespan and to manage situations such as patient overcrowding and the use of complex technology (15). A Study done in emergency departments to identify the organization of and knowledge about triage work found varieties in several areas including education, personnel performing triage, facilities available and scales used(20). A study in Australia found that 75% of emergency nurses agree that the basic component of triage as rapid assessment, first aid, and prioritization of medical urgency (21).

Study in Pakistan Lahore city which include 100 participant shows that 1 out of 100 participants was having excellent knowledge as the participant correctly responded more than 80% questions, 3 participants were having good knowledge as they correctly responded more than 70% of the questions, 27% were having average knowledge as they correctly responded 50 – 70% of the questions and a large number of participants 69% were having poor knowledge as they correctly responded less than 50% of the questions in the self administered questionnaires. The researcher concluded that on the basis of the results obtained, the knowledge of triage among nurses is inadequate in Pakistan (22). Another study conducted by Fathoni in Indonesia

showed that more than half of their study subjects (58%) had low triage knowledge scores. Based on the referenced criterion, the percentages were interpreted as follows: $< 60\%$ = low level of triage skill, $60 - 80\%$ = moderate level of triage skill, and $> 80\%$ = high level of triage skill. They concluded that the participants required continuing education and training courses related to triage to improve their knowledge and skill in order to increase patient safety (11)

2.2 Triage skill

The skill required by the triaging staff includes clinical experience, good judgment, and sense of humor, stress-tolerance, knowledge of available resources, problem solving ability and sense of anticipation. Identifying and triaging patient accurately and efficiently was a challenging task. Particularly, many health care institutions are increasingly overcrowded and this leads to longer waiting time of patient and increase treatment delay. As a result it leads to miss- categorization of patient (23). A study that was done to determine current issues in triage found about 78% of the respondents indicating that triage should only be performed by a registered nurse while 22% believed enrolled nurses or registered nurses could perform the role. Majority of the respondents (77%) believed that the triage role should be compulsory and that all emergency nurses should be competent to perform the role (13). To maintain the effectiveness of ED triage, emergency nurses require triage skill, which is centered on the decision-making ability to prioritize patients into the most correct urgency-of-care categories within a limited space of time (1).

The study conducted in east Java, Indonesia to determine Relationships between Triage Knowledge, Training, Working Experiences and Triage Skills among Emergency Nurses revealed that the mean score of triage skill and its sub-dimensions were at a moderate level. In addition, all skills related to advance nursing skill were not high such as insertion of oropharyngeal or nasopharyngeal airway, assessment of internal and external bleeding, stop bleeding, manual ventilation, and bag-valve-mask ventilations. These skills were mainly performed by physician rather than nurses and most of prepared ED nurses completed the degree at diploma level. In addition, existing training courses did not include either advanced skill or drills for actual practice at hospital (12). Another study at the same place in east java, Indonesia to determine triage skill and related factors among emergency nurses shows that, most of the subjects (65.40%) perceived their overall triage skill to be at a moderate level, and they felt the

same towards each of the sub-dimensions of triage skill. the mean score for overall triage skill was 75.12 (sd = 11.23), which was considered moderate (1).

2.3 Associated factors

Study conducted in east java, Indonesia which already mentioned above reflect that working experience was correlated with triage skills ($r = .27$, $p = .001$) particularly for those who continued working at ED more than five years, and those experienced emergency nurses had more abilities in triage skill than novice nurses. Training experience had also a positive relationship with triage skill which reflects that the more trainings or drills attended, the higher skill nurses develop (12). About 44% of the nurse working in emergency departments in Australia reported not receiving any unit-based orientation program on triaging, although most of them (89%) reported it to be essential(13)

Another study conduct at the same place by the same author to the above showed that the mean scores for triage skill and work experience were at a moderate level (mean = 75.12, SD = 11.23, and mean = 59.48, SD = 33.81, respectively). There were significant positive correlations between triage skill and the three other factors: triage knowledge ($r = .38$, $p < .01$), training experience ($r = .37$, $p < .01$), and work experience ($r = .27$, $p < .01$). These findings indicated that there were low correlations in the relationships between the triage knowledge, training experience, work experience, and triage skill perceived by the emergency nurses(11).

Nurses needs triage training and competency to run the emergency units effectively. Triage training is the vital weapon of nurses to defeat the patient's problems in emergencies. According to the responses analysis from study conducted in Lahore city, Pakistan; majority of the study participants perceived themselves as inadequately prepared for triage. It was found that 78% participants were strongly agreed to include triage training for nurses. Twenty two percent (23%) nurses agreed according to use the Likert scale and no one disagree or strongly disagree for the training of triage for nurses (22). study conducted in east Java ,Indonesia indicate that, during the three years prior to the study, all subjects had attended the Basic Life Support (BLS) training course, 59.39% had attended the Basic Trauma Life Support (BTLS) training course, 30.83% had attended the Advanced Life Support (ACLS) training course, and 29.32% had attended the Triage Officer Course (TOC). The mean training index score for training experience was 4.47

(SD = 3.19), which was considered to be low. During the past three years, all subjects had attended several short training courses(11).

Another study in Indonesia reveals that, the three most attended courses were the Basic Life Support (BLS) training course (100%), the Basic Trauma Life Support (BTLS) training course (59.39%), the Advanced Life Support (ACLS) training course (30.83%). In addition, some were trained about TOC (Triage Officer Course), ambulance protocol, the Advanced Trauma Life Support (ATLS), ECG resuscitation, Trauma Nursing Care (TNC), but less number of nurses was trained in Emergency Care, first aid in emergency, and disaster management. By training index calculation, 66.2% of subjects had training experience at a low level (1 - 5), 28.6% had training experience at a moderate level (6 - 10), and only 5.2% had training experience at a high level (> 10). More than half of subjects (51.90%) had experienced in working at ED more than five years, but most of them (82.30%) had working experience in triage room less than five years. Currently, there were only 16.20% have been working in triage room (12).

2.4 Conceptual framework

The conceptual framework of this study was derived from the synthesis and the integration of literature review in the area of emergency nursing. Triage skill in the ED was the performance of emergency nurse using decision-making capability to prioritize patients into the right categories within a limited space of time (24, 25). The triage skill includes rapid assessment, patient categorization, and patient allocation (25). The triage knowledge was examined in terms of the factual knowledge and the procedural knowledge, which are essential as the basic knowledge for the emergency nurses to perform the triage effectively (24). Factual knowledge is knowledge about a fact or set of facts condition without wide understanding such as anatomy, physiology, pathophysiology, and common illness of the patients visiting to ED. Procedural knowledge is a kind of knowing related to how to perform actions in many activities such as nursing techniques using in primary triage. The training experiences can improve the nurse's triage skill for identifying the patient's scale of urgency, diagnosing the patient, and providing emergency nursing intervention in ED (26). To be skillful in triage, the emergency nurses are required to participate in the training program regarding triage and the related topics, and should be refreshed every one to three years. The working experience refers to the duration of working as the emergency nurses. Figure 1 presents the conceptual framework of this study. The factors related to triage skill and triage knowledge are training experience, and working experience. Triage knowledge and triaging skill also affect each other.

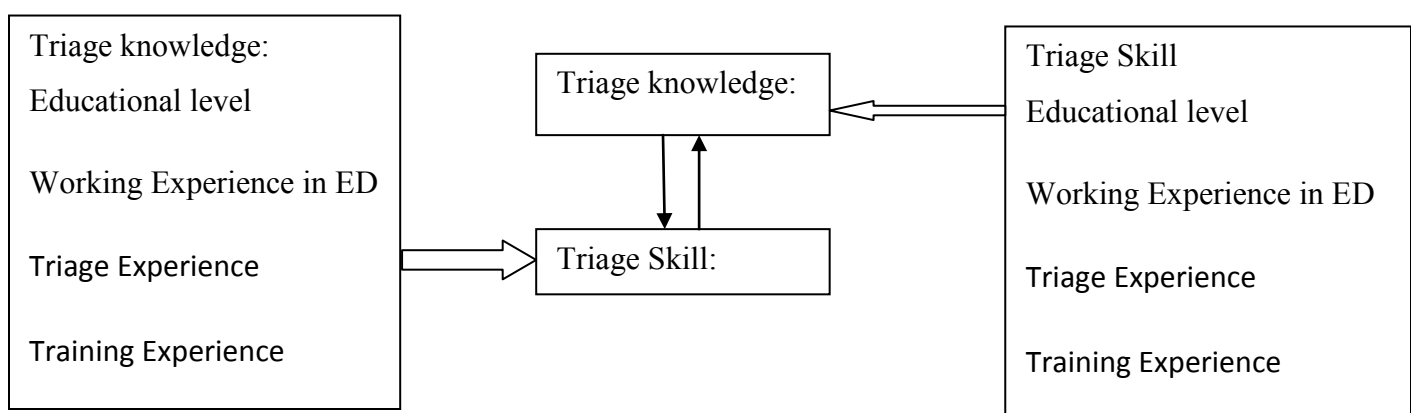


Figure 1; Conceptual Framework of the Study (1)

3. OBJECTIVE OF THE STUDY

3.1 General Objective

To assess the level of knowledge and skills of triaging possessed by emergency nurse and associated factors at government hospitals in Addis Ababa from October 2015 to may 2016.

3.2 Specific Objectives

1. To assess the level of triage skill possessed by emergency nurses.
2. To assess the level of triage knowledge possessed by emergency nurses.
3. To identify factors that affect triaging knowledge.
4. To identify factors that affect triaging skill.

4. METHOD AND MATERIAL

4.1. Study area

The study was conducted in Addis Ababa the capital city of Ethiopia and the capital city of Africa. Addis Ababa is the largest city in Ethiopia, with a population of 3,475,952 according to the 2007 population census with annual growth rate of 2.7 %. Its area is estimated to be 530 Km² with altitudes ranging from 2200 to 3000 m above sea level, average temperature of 22.8°C and average rainfall of 1,180.4 mm. Addis Ababa has 41 hospitals (13 public and 28 NGO and private), 29 health centers, 122 health stations, 37 health posts and 382 modern private clinics(27). Out of 12 public hospitals Amanuel specialized psychiatric hospital and Mahatma Ghandi memorial hospital provide specific service that is psychiatric case and Obstetrics and gynecology cases respectively. The rest ten hospitals will provide general emergency service in their emergency department.

4.2. Study period

The study was conducted from October 2015 to may 2016.

4.3. Study design

Institutional based cross sectional study was conducted

4.4. Populations

4.4.1. Source population

All nurses works in emergency department of public hospitals in Addis Ababa.

4.4.2. Study population

Those nurse who were selected randomly at the time of data collection in emergency department.

4.5. Inclusion & Exclusion Criteria

4.5.1. Inclusion criteria:

- ✓ The study include all nurses who were employed and working in the adult emergency departments of hospital.

- ✓ Nurses who were available at time of data collection and willing to participate in the study.

4.5.2. Exclusion criteria:

- ✓ Other health professional(non-nurse)
- ✓ Students
- ✓ Nurses who give free service.

4.6. Sampling technique and sample size

4.6.1 Sample Size Calculation

A single population proportion formula was used to estimate the sample size of triaging knowledge and skills amongst nurses working in emergency department and the following assumptions was made: proportion of triaging knowledge and skills of nurses working in emergency department 50% ($p = 0.5$), level of significance to be 5% ($\alpha = 0.05$), 95 % confidence level ($Z_{\alpha/2} = 1.96$) and absolute precision or margin of error to be 5% ($d = 0.05$).

$$n = \frac{(Z_{\alpha/2})^2 P (1-P)}{d^2}$$

Where, n = sample size

p = proportion of triaging knowledge and skills amongst emergency nurses (50%)

Z = standard normal distribution curve value for the 95% confidence interval

(1.96)

d = the margin of error or accepted error

$$n = \frac{(1.96)^2 * 0.5(1-0.5)}{(0.05)^2}$$

n = 384 nurses working in emergency department.

The source populations of the study area were 333 emergency nurses.

Since total study population were less than 10,000, sample size correction formula was made to get the actual sample size (N=333)

$$nf = n / (1 + n/N)$$

Where, nf = Final sample size

n = first calculated sample size

N = Source population

n final = $384 / (1 + 384 / 333) = 179$ nurses working in emergency department

Adding a 10% allowance for a non-response rate, the total sample size was $18 + 179 = 197$

4.6.2. Sampling procedure

There were 13 public/governmental hospitals in Addis Ababa. All hospitals included expect Mahatma Ghandi memorial hospital and St.Amanuel specialized psychiatric hospital which provides specific service of gynecologic and psychiatric cases respectively. List of public hospital that was included in the study with number of emergency nurses working in emergency department. Armed force hospital excluded due to ethical issue.

<u>Name of hospital</u>	<u>Number of emergency</u>
Black lion Specialized Hospital	(66)
St.Paul's Specialized Hospital	(139)
Yekatit 12 Hospital	(16)
Zewditu Memorial Hospital	(18)
Menilik II Hospital	(18)
St. Peters Hospital	(10)
Alert Hospital	(22)
Tirunesh Bejing Hospital	(16)
Ras Desta Hospital	(18)
<u>Federal Police Referral Hospital</u>	<u>(10)</u>
Total	333 Emergency nurses

The number of study participant for each Hospital were proportionally allocated and those who had been part of the final sample size were selected using Simple random sampling, lottery method from those found in emergency department during data collection seasons.

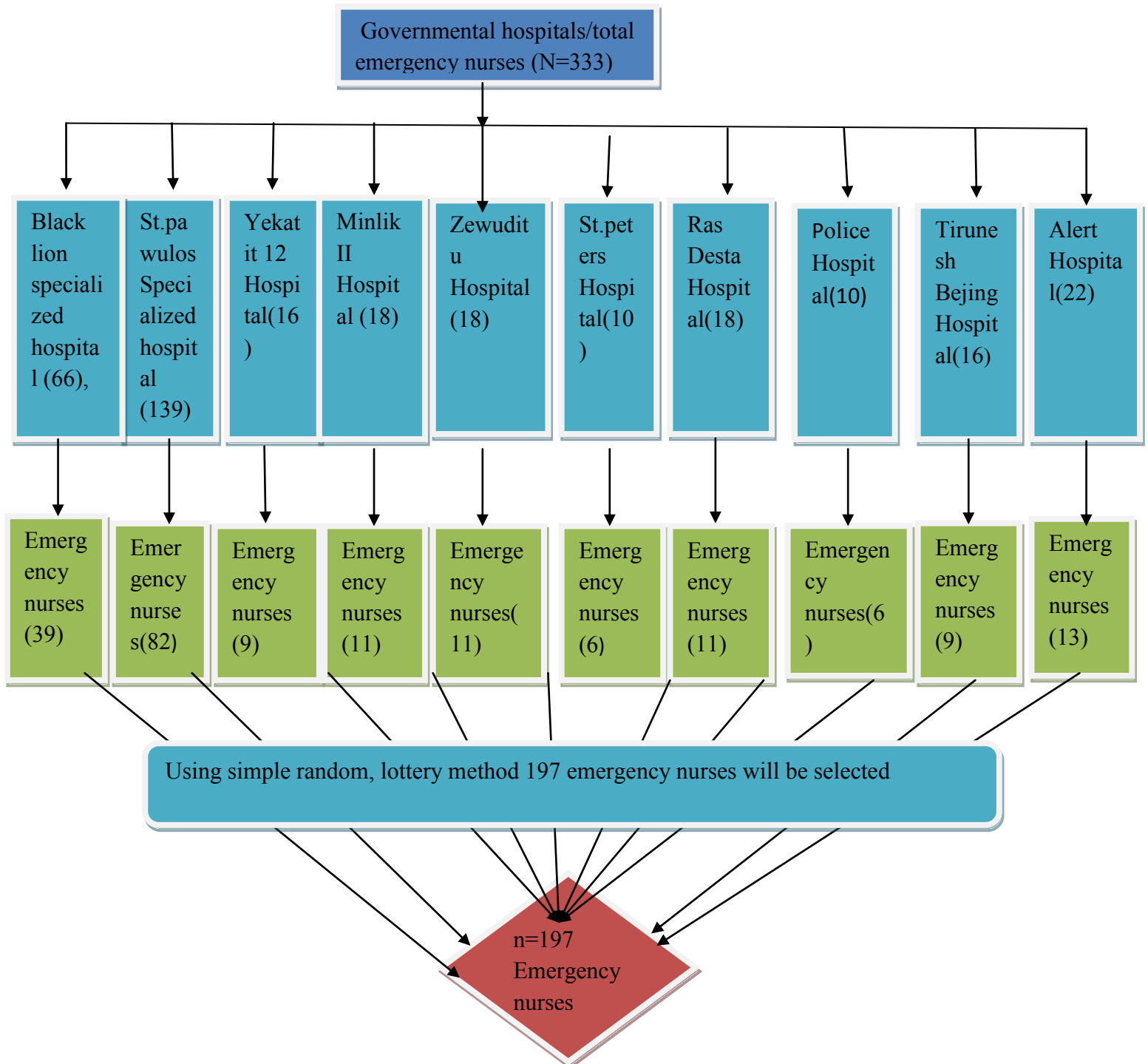


Figure 2; Schematic representation of sampling procedures

4.7 Variables

Dependent variable

- Knowledge
- Skills

Independent variable

- Age
- Sex
- Religion
- Marital status
- Ethnicity
- Educational level
- Work experience
- Triage experience
- Training experience

4.8 Operational definition of terms

Triage skills; referred to the level of nurses' ability in making decision accurately and timely.

The possible range of the total score of triage skill was 37-185. The total score was converted to percentage. Using the criterion referenced, the score was interpreted as $< 60\%$ = *low level of triage skill*, $60-80\%$ = *moderate level of triage skill*, and $> 80\%$ = *high level of triage skill* (1).

Triage knowledge; It was measured by the Triage Knowledge Questionnaire. The possible ranges of total score of triage knowledge were 0-35. The total score was converted to percentage. Using the criterion referenced similar to the triage skill, the total score less than 60% *low level of knowledge*, $60-80\%$ *moderate level of knowledge* and more than 80% *high level of knowledge*(1)

Training experience; referred to the numbers of time and the types of previous training in triage and related topics in the past three years. It was measured by using training index; with the formula: number of training x number of times. The higher score will reflect the higher training experience (1).

Working experience; referred to the numbers of months in working as emergency nurses. Working experience was calculated using months of working as emergency nurses. The longer months of working experience reflects the higher experience (1).

Triage Experience; referred to the numbers of months nurses work in triage room.

Emergency nurses; referred to nurses working in emergency department

Public or governmental hospital; in this study the word public and governmental used interchangeably both to refer those hospitals owned by the government.

4.9 Data collection Tools

Data collection tools was adopted with some modification and the tools were used repeatedly (1, 11, 12). These measurements tools include three parts: 1) Demographic Data Sheet (DDS), 2) Triage Knowledge Questionnaire (TKQ). 3) Triage Skill Questionnaire (TSQ).

The Demographic Data Sheet (DDS) included age, gender, educational level, training experience related to triage, and working experience.

Triage Skill Questionnaire (TSQ) to measure nurses' ability in making decision accurately and timely in the following areas of triage: rapid assessment, patient categorization, and patient allocation. It has 37 items to be filled by study participant. Subjects were evaluated for each item using the following 1-5 rating scale: 1 = need improvement, 2 = poor, 3 = fair, 4 = good, and 5 = very good. The possible ranges of the total score of triage skill were 37-185. The total score were converted to percentage. Using the criterion referenced, the score were interpreted as: < 60% = low level of triage skill, 60-80% = moderate level of triage skill, and > 80% = high level of triage skill.

Triage Knowledge Questionnaire (TKQ) used to measure triage knowledge of emergency nurses consisted of 35 multiple choice questions (MCQ). Each question has four choices. The correct answer of each item was scored as 1 and incorrect answer scored as 0. The higher scores indicated that the better knowledge. The possible range of total score of triage knowledge is 0-35. The total score were converted to percentage. Using the criterion referenced similar to the triage skill, the total score less than 60% = low level of knowledge, 60-80 % = moderate level of knowledge and more than 80% = high level of knowledge.

4.10 Data collection procedure

Data was collected using standardized self administered questionnaire. The investigator had been responsible for the overall management of the project; the development of the final questionnaire; identifying, training and assignment of data collectors and supervisors. The Data collectors were four trained BSc who had been assigned and supervised by principal investigator. The purpose of the training was to ensure that all the data collectors had the same information about the study instrument and follow the same survey administration procedures. The training was dealt with the purpose of the study, confidentiality and how to approach the study participants.

4.10 Data quality assurance

To assure quality of the data the following measures had been undertaken; Two weeks prior to the actual data collection, questionnaire were pre tested on 5%(10) of the estimated sample at Bishoftu general hospital which was out of sampled population for its clarity, understandability, and completeness. The tools were in English language because this was the media of communication for the study participants during their basic nursing course training. Data collectors and supervisors had been trained for two days on the study instrument and data collection procedure. During the actual data collection process, supervisors had cross checked the data collectors on the field randomly every day for questionnaires consistency and completeness. Filled questionnaires were checked daily.

4.11 Data processing and analysis

The collected data was entered using EpiData version 3.1 and then analyzed by using computer program running (SPSS) version 22.0. The data were cleaned for inconsistencies and missing values and amendment had been considered as needed. Simple frequencies were used to see the overall distribution of the study subject with the variables under study. A Pearson correlation was used to determine the association between different factors and the outcome variable. Those variables which had significant association with skills and knowledge of triaging among nurses had been entered to multivariate linear regression analysis. Finally, results were presented in texts, graphs and tables.

4.12 Ethical consideration

Ethical clearance and approval was obtained from the Ethical Committee of department of nursing and midwifery, college of health science, Addis-Ababa University. Official letters were obtained from department of nursing and midwifery to health bureaus of Addis Ababa city and to selected hospitals. After explaining about the purpose, the possible benefit of the study and oral permission were obtained from each respondent before administering questionnaire to participants. The confidentiality has been maintained in each level of the response in this study.

The study was explained fully (i.e, the aim of the study; significance of the study) to each participant before joining the study and if the participants agree to participate then informed consent had been given to sign. For the purpose of confidentiality, the names of the participants were not required. The study participants had been informed of their rights to refuse to join, answer any question or withdraw at any particular point during data collection process without being offended.

4.13 Dissemination of the result

The findings of the study will be presented to Addis Ababa University, School of allied health science, department of Nursing and Midwifery as partial fulfillment of master's degree in Adult Health Nursing.

It will be also communicated to Federal ministry of health and all hospitals that's was included in the study.

The findings will also be presented in different seminars, meetings and workshops as well as further effort will be made to publish the findings on national and international peer reviewed journal. Hard and soft copies will be made available in the library of AAU, for graduate students as well as for other researchers and readers

5. RESULTS

5.1 Demographic characteristics of the respondents

One hundred eighty nine out of 197 respondents completed and returned the questionnaires thus a response rate of 95.4% were obtained. Five respondents did not return the questionnaire while three respondents didn't fill the questionnaire properly. More than half of the participants (51.9%) were females, and they were between 18 to 51years (mean = 28.02, SD = 5.29). Nearly two third (63.8%) of the respondents were unmarried.

Table 1: Socio demographic characteristics of nurses working ED in Addis Ababa government hospitals, Ethiopia, 2016 (n=189)

Characteristic	Category	Frequency	Percentage (%)
Sex	Male	91	48.1
	Female	98	51.9
Age	<20	3	1.6
	21-30	147	77.7
	31-40	31	16.4
	>40	8	4.3
Marital status	Married	69	36.5
	Unmarried	120	63.5

From one hundred eight nine respondents 74.1% of them were BSc,degree holder in nursing, 15.8%had diploma in nursing while the 10.1% had masters in flied of nursing.

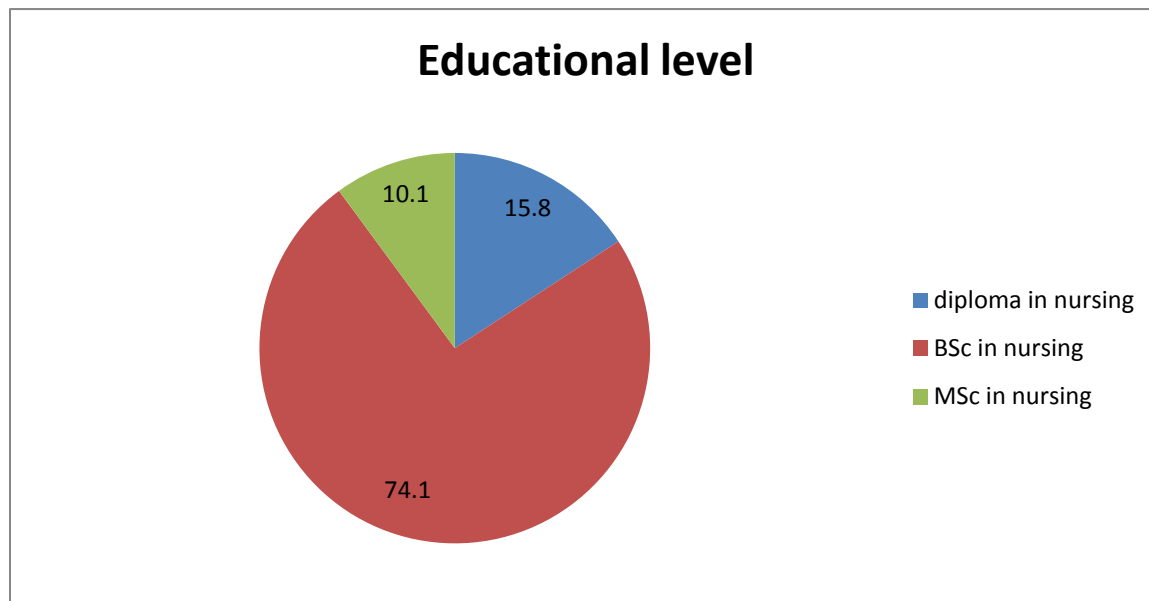


Figure 3; Educational level of nurses working in ED in Addis Ababa governmental hospitals, 2016(n=189)

About 49.2% of the respondents had working experience of less than one year while only 2.1% of them had working experience in emergency department greater than five year. Majority of them (38.1%) had a work experience between one to three years in emergency department. At the time of data collection only 19.6% of them are working in triage room with a minimum of 1 month and maximum of 48 months work experience in triage room. The mean score for work duration in triage room was 12.18 months (SD = 10.68). Around 49.2% of the respondents had at least attend one training in the past three years. Around 33% of subjects had attended infection prevention training, 25.4% had attended the Triage Officer Course, 21.2% had attended the Basic Trauma Life Support (BTLS) training course, 14.3% had attended trauma in nursing care. The mean training index score for training experience was 5.13 (SD = 8.48).

Table 2; Distribution of training experience, work experience among nurses working in ED in Addis Ababa, 2016

Variable	Category	Frequency	percentage	Mean	SD
Training experience	Basic Cardiac Life Support(BCLS)	33	17.5		
	Basic Trauma Life Support (BTLS)	40	21.1		
	Triage Course	48	25.4		
	Trauma in Nursing Care	27	14.3		
	Emergency Care	23	12.1		
	Disaster Management	12	6.3		
	Infection prevention	63	33.3		
	Other	4	2		
Work experience in ED(N=189) In months	<12	93	49.2	21.30	15.91
	12-36	72	38.1		
	36-60	20	10.6		
	>60	4	2.1		
Triage experience(N=130) In months	<12	91	48.1	12.18	10.68
	12-36	37	19.6		
	36-60	2	1.1		
	>60	0	0.00		

SD=standard deviation

More than half of the respondents (54.5%) had low triage knowledge scores, with the mean score being 20.71 (SD = 5.06). Greater than half of the subjects (52.9%) perceived their overall triage skill to be at a moderate level. The mean score for overall triage skill was 141.3 (SD = 20.87), which was considered moderate.

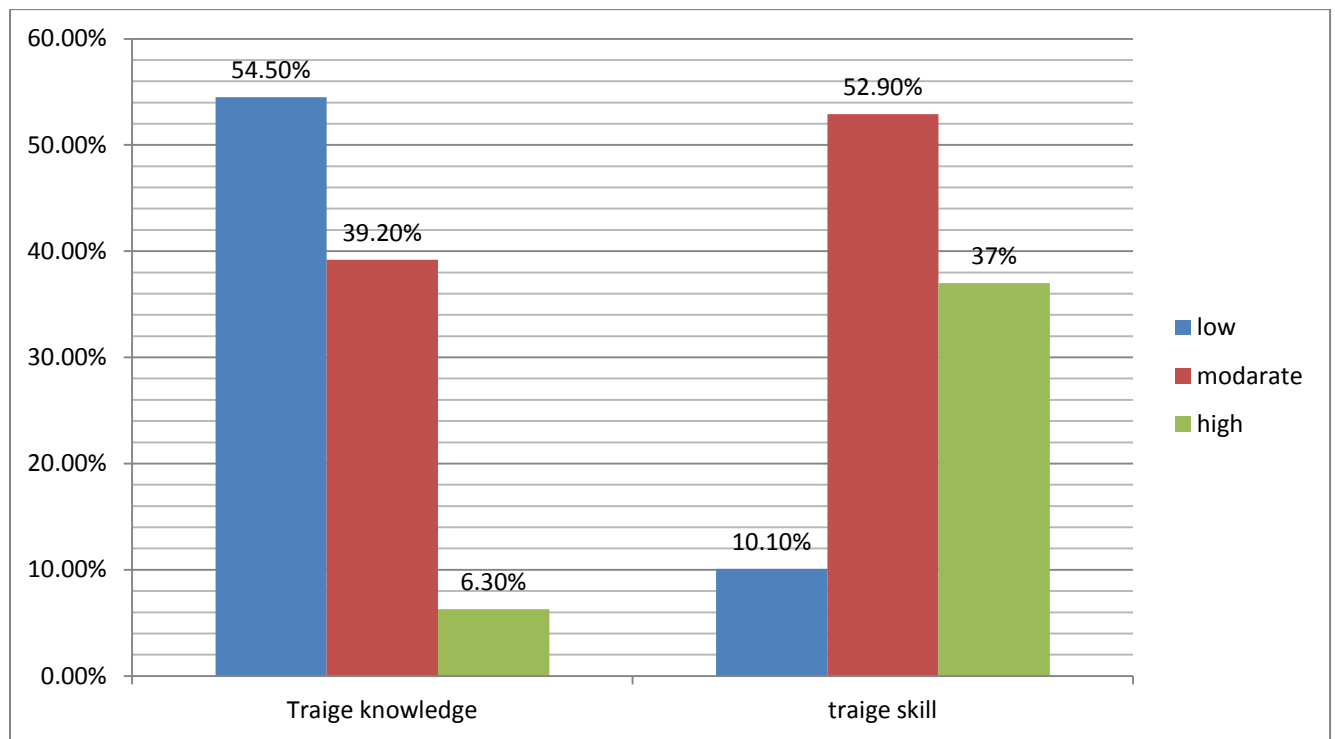


Figure 4; Distributions of level of triaging knowledge and triaging skill among nurses working in ED in Addis Ababa government hospitals, 2016(n=189)

5.2 Associated Factor analysis of triage skill and triage knowledge using Pearson correlation

Strong, positive relationships were found to exist between triage skill and triage knowledge ($r = .68, p < .01$) while moderate positive relationship exist between triage skill and the three other factors: training experience ($r = .56, p < .01$), work experience in Emergency department ($r = .52, p < .01$), and triage experience ($r = .49, p < .01$). The triage knowledge had strong positive relationship with training experience ($r = .68, p < .01$) and moderate positive relationship with triage experience ($r = .44, p < .01$), work experience in Emergency department ($r = .56, p < .01$) and triage skill ($r = .57, p < .01$).

Table 3; Associated Factor of triage skill and triage knowledge among nurses working in emergency department of Addis Ababa hospitals, Ethiopia 2016.

variables	Test	Correlation				
		Triage skill	Triage knowledge	Training experience	Work experience in ED	Triage experience
Triage skill	Pearson correlation	-	.680**	.560**	.522**	.488**
	Sig.(2-tailed)		.000	.000	.000	.000
	N		189	189	189	130
Triage knowledge	Pearson correlation	.567**	-	.680**	.559**	.440**
	Sig.(2-tailed)	.000		.000	.000	.000
	N	189		189	189	189

**. Correlation is significant at the 0.01 level (2-tailed).

5.3 Associated Factor analysis of triage skill using multivariable linear regressions

Bivariate linear regression was conducted to assess those variables which had influence over triaging skill of nurses working in emergency department. From bivariate linear regression analysis factors like triaging knowledge, training experience, work experience in emergency department, triage experience and educational level had been seen significant at p-value <5%. To control confounding factor those variable which had been significant at bivariate linear regression was entered together to multivariable linear regression. From those variable only training experience, triaging knowledge and educational level had been significant to influence triage skill at p-value less than 5%. Triage knowledge is positively associated to ($B = 1.094$, $CI = (0.412, 1.777)$, $p = 0.002$) to triaging skill. This association tells us in every unit increase in triage knowledge there is around 1.094 unit increases in triaging skill. There is also significant association between education and triage skill. Diploma holder emergency nurse has around 19.961 times lower triaging skill when compared to degree (Bsc) holder emergency nurses ($B = -19.961$, $CI = (-30.208, -9.715)$, $p = 0.000$). Training experience had significant association to triage skill ($B = 0.551$, $CI = 0.160, 0.941$), $p = 0.006$).

Table 4; Multivariable linear regression model showing associated factors of triage skill, Addis Ababa, 2016.

Variables entered into model	Unstandardized Coefficients	P-value	95.0% Confidence Interval for B	
	B		Lower Bound	Upper Bound
1 (Constant)	114.011	.000	100.164	127.858
Work experience in ED	.130	.350	-.144	.403
Work experience in triage room	.075	.703	-.313	.463
Training experience	.551	.006	.160	.941
Triage knowledge Education level Bsc*(reference)	1.094	.002	.412	1.777
Msc	3.986	.396	-5.278	13.251
Diplom	-19.961	.000	-30.208	-9.715

Dependent variable=triage skill

*Variables which are candidate for multiple linear regression (<0.05) were included in the model. Note: $r^2 = 0.541$

5.4 Associated Factor analysis of triage knowledge using multivariable linear regressions

In similarly way to triage skill bivairate linear regression was done to determine those factor which have significant influence over triage knowledge. Those factors which had been found to affect triage skill were also found to have relation with triage knowledge through bivariate linear regression analysis. Triage skill, work experience in ED, triage experience, training experience and educational level were all entered together for multivariable linear regression. The output of

multivariable linear regression shows there is significant relation between triage knowledge and four factor: triage skill($B=0.069, CI=(0.026, 0.112), p=0.001$), Training experience($b=0.112, CI=(0.013, 0.211), P=0.027$) and work experience in emergency department($b=0.090, CI=(0.023, 0.158), P=0.009$). Education level also shows significant association with triage knowledge. Degree (Bsc) holders of emergency nurse were found about 4.351 times had greater triaging knowledge when compared to diploma holder nurses working in emergency department.

Table 5; Multivariable linear regression model showing associated factors of triage knowledge Addis Ababa, 2016

Variables entered into model	Unstandardized Coefficients	p-value	95.0% Confidence Interval for B	
	B		Lower Bound	Upper Bound
(Constant)	9.788	.001	3.853	15.724
Triage skill	.069	.002	.026	.112
Training experience	.112	.027	.013	.211
Education level Bsc*(reference)				
Msc	1.521	.197	-.799	3.841
Diploma	-4.351	.001	-6.965	-1.737
Work experience in ED	.090	.009	.023	.158
Work experience in triage room	.078	.112	.175	.019

a .Dependent Variable: triage knowledge,*Variables which are candidate for multiple linear regression (<0.05) were included in the model. Note: $r^2 = 0.528$

6. DISCUSSION

The findings showed that around 74.1% of respondents had bachelors' degrees in nursing. This was different from a study results in Indonesia which found that almost all subjects (94%) had graduated with a diploma in nursing (1). This study result is similar to study conducted in Australia, in that their study subjects had also bachelors' degrees in nursing (24). This difference might be due to education policies that their respective government follow based on their human resource and qualification needed to fulfill their country demand concerning health. Triage is necessary to identify those who need immediate care and those who may deteriorate; to prioritize care for the remaining patients; and to distribute finite resources in the best way and ED triage is usually performed by specially trained nurses (28). However this study showed around 49.2% of the respondents had at least attend one training in the past three years which means more than half of them had no training. Again this is far less than the study conduct in Indonesia which showed all subjects had at least attended one training in the past three year (1, 12, and 11). This shows that almost half of nurses working in emergency department in Addis Ababa hospitals had no training in past three year while nurses working in emergency department in Indonesia had at least on training in the past three year. Furthermore this result is supported by another study conducted in Ethiopia as it conclude by stating Ethiopia has no standardized training or certification of emergency medical technicians. Undergraduate training for physicians, nurses and other health care providers lacks emergency content (15).

In this study nearly half(49.2%) of the respondents had work experience in emergency department between two to three years while only 2.1% of them had work experience greater than five year .This is low when compared to study conduct in Indonesia which showed more than half of the subjects (51.90%) had greater than five years of work experience in emergency department(12,11). This difference might be due to work place rotation is practiced in Addis Ababa hospital which made nurses not to stay in emergency department for a longer period. As it had been seen in this study work experience had strong positive correlation on both triage skill($r = .52, p < .01$) and triage knowledge($r = .56, p < .01$). Through multivariable linear regression work experience in emergency department had significant association ($b=0.090$, $CI= (0.023, 0.158)$, $P=0.009$) with triage knowledge.

In this study greater than half of the subjects (52.9%) perceived their overall triage skill to be at a moderate level. This is not different from study conducted in Indonesia as the findings revealed that the mean score of triage skill and its sub-dimensions were at a moderate level (12). The majority of emergency nurses have performed triage process collaborated with a physician that may help nurses to have a triage skill for precise decisions at some circumstance. In contrast, to a reviewed four studies which found that there was no significant relationship between experience and triage decision making in triage skill(2),this study showed that there is moderate positive relationship($r = .52, p < .01$) between triage skill and work experience at emergency department. Training experience had significant association ($B = 0.551, CI = 0.160, 0.941, p = 0.006$) with triage skill which reflects that the more trainings or drills attended, the higher skill nurses develop. This is Consistency to the study which suggested that the regular training of triage could improve skill of nurses to handle stressful work situation (29).

More than half of the respondents (54.5%) had low triage knowledge scores which is similar to study conducted in Indonesia where the subjects reported a low level of triage knowledge(1,11,12). The reason might be that emergency nurses in this study almost more than half(50.8%) didn't attend training course special to triage knowledge and less work experience in emergency department as those factors had been seen to influence knowledge. Similar to this result the study conducted in Lahore city, Pakistan found that a large number of participants (69%) were having poor knowledge as they corrected less than 50% of the questions in the self administered questionnaires. In addition this study revealed that there was a significant difference in the mean score knowledge based on the level of qualification of nurses (22). In congruent to it this study shows Education level had significant association with triage knowledge. Degree (Bsc) holders of emergency nurse were found about 4.351 times had greater triaging knowledge when compared to diploma holder nurses working in emergency department. This might be Bsc nurse had more training and education for a longer period than diploma nurse who had attended less training and education for shorter period as this could make a difference in knowledge level.

7. STRENGTH AND LIMITATION OF THE STUDY

7.1 Strength of the study

- Used well structured questionnaire from validated survey instruments
- Participation of nurses was also generally satisfactory with 95.4% response rate
- As to researcher knowledge the study could be said the first in assessing Knowledge and skills of triaging and associated factors among nurses working in emergency department in the country

7.2 Limitation of the study

- One limitation of this study was that triage skill was measured using self-reporting. Participatory observation might be a more useful technique, as it would probably decrease any negative effects of self-reporting.
- All emergency departments were overcrowded and this made quite difficult to contact nurses working in emergency department easily.
- As to researcher knowledge the fact that no studies conducted on this topic so far in Ethiopia , no enough literature to discuss with Ethiopian context .

8. CONCLUSIONS AND RECOMMENDATION

8.1 conclusion

The findings provide a some understanding of triage skill and triage knowledge among nurses working in emergency department of Addis Ababa, Ethiopia. The triage skill was found to be at a moderate level while the triage knowledge was at a low level. In addition, there were significantly positive relationships between triage skill and triage knowledge, training experience, working experience, Educational level. There is also significantly positive relationship between triage knowledge and training experience, working experience, Educational level.

8.2 Recommendation

To FMOH and Federal Ministry of Education

- The findings suggest that the emergency nurses are required the proper knowledge and experience to increase their triage skill. The necessity to improve quality of care and patient safety, triage skill of the ED nurses must be offered as continuing nursing education and training related to triage.
- The hospitals in Addis Ababa should avoid rotation of work place among nurse as this made nurse not to stay longer duration and not have good work experience in emergency department.

To professional nurses

- Nurses need to enhance their knowledge and skill of triaging in order to further improve nursing practice in this area.
- Nurses, who had better knowledge and skill, should also teach their respective colleagues who had deficits.

To Researchers

- Further study should be conducted through participatory observation to assess skill as this study limited to assess perceived triage skill.
- Further research should be conducted to test the effectiveness of educational programs and training courses on triage knowledge and triage skill for nurses.

9. REFERENCES

1. Sangchan, M. R. N., Rn, H., Ph, D., Rn, P., & Ph, D. (n.d.). Triage skill and Related Factors among Emergency Nurses in East Java Province , Indonesia, 1–11.
2. Considine, J., Botti, M., & Thomas, S. Do knowledge and experience have specific roles in triage decision-making? *Academic Emergency Medicine*.2007;14, 722-726.
3. Iserson,K.V.,& Moskop.J.C. Triage in medicine, part I: Concept, history, and types. *Annals of emergency medicine* .2007;49(3),275-2813.
4. Australian College of Emergency Medicine. The Australian Triage Scale. 7thed, USA, Mosby Comp, pp;2004;58-60.
5. Kelly A.M., Richardson D.Training for the role of triage in Australasia. *Emerg Med (Fremantle)* 2001; 13: 230-2.
6. Gerdtz, M., and Bucknall, T, Australian triage nurses' decision making and Scope of practice,Australian Journal of Advanced Nursing 2006;18(1), pp.24-33.
7. Kennedy,k.,Aghababian,R.V.,Gans,L.,&phuli,L.C. Triage: techniques and applications in decisionmaking. *Annals of emergency medicine*.1996; 28(2),136-144
8. Aloyce R, Leshabari S, Brysiewicz P. Assessment of knowledge and skills of triage amongst nurses working in the emergency centres in Dar es Salaam, Tanzania. *African J Emerg Med* [Internet]. 2014;4(1):14–8. Available from: <http://dx.doi.org/10.1016/j.afjem.2013.04.009>
9. Purnell, L. A survey of qualifications,special training,and levels of personnel working in emergency department triage, *J Nurs staff develop*.1993;9(5),223-226
10. Gove,S, Tamburlini, G.,Molynuex, E., Whitesell, p.,& Campbell, H. Development and technical basis of simplified guidelines for emergency triage assessment and treatment in developing countries.WHO Integrated Management of childhood illness(IMCI). Referral care project.*Arch of diseases in childhood*.1999;81,473-477.
11. Fathoni, M., Sangchan, H., Songwathana, P,Triage Knowledge and Skills among Emergency Nurses in East Java Province, Indonesia. *Australasian Emergency Nursing Journal*, 2010; 13 (4): P. 153.

12. Fathoni M, Sangchan H, Ph D, Songwathana P, Ph D. Relationships between Triage Knowledge , Training , Working Experiences and Triage Skills among Emergency Nurses in East Java , Indonesia. 2013; 511–25.
13. Burr,G.,&Fry,M.Current triage practice and influences affecting clinical decision-making in emergency departments in NSW,Australia,Accid emerg Nurs,2001;9(4),227-234.
14. Pozner CN, Bayleygne TM, Davis MA, et al,Emergency medical services capacities in the developing world: preliminary evaluation and training in Addis Ababa, Ethiopia. Prehosp Emerg Care;2003;7(3):392–6.
15. Germa, F., Bayleyegn, T., Kebede, T., Ducharme, J., & States, U. Emergency medicine development in Ethiopia : Challenges , progress and possibilities ´ veloppement de la me ´ decine d ´ urgence en Ethiopie: de ´ s et possibilities progre. African Journal of Emergency Medicine, 2013;3(1), 3–9. <http://doi.org/10.1016/j.afjem.2012.08.005>
16. Afework S, Mariam DH, Demeke Bet al.. Assessment of quality of services in private clinics in Addis Ababa, Ethiopia. Ethiop Med J.2003;41(3):267–78
17. Ethiopian Federal Ministry of Health (FMOH). Health facts. Addis Ababa, Ethiopia: The Ministry.Availablefrom:<http://www.ethiopia.gov.et/English/MOH/Information/Pages/Facts-Sheets.aspx> [cited 24.11.2010].
18. williams, G. Sorting out- triage Nursing times,1992;88(30), 30-36.
19. Hamed Aminiahidashti, Seyed Mohammad Hosseininejad, Maryam Mohammadi,Triage skill and related factors among emergency nurses in sari, iran,International journal of analytical,pharmaceceutical and biomedical sciences2014;Volume: 3: Issue-6: ISSN:2278-0246
20. Goransson,k.,Ehrenberg,A., & Ehnfors, M. Triage in the emergency dpartments. National survey. J Clin Nurs, 2005; 14(9), 1074.
21. Burr,G.,& Fry, M,Currssent triage practice and influences affecting clinical decision-making in emergency department in NSW, australia. Accid emerg Nurs(2001),9(4)' 227-234s
22. Ali S, Taverner BCB, Ghani M, Kussor Z, Naz S. knowledge of triage among nurses in emergency units. 2013; 29:240–3.
23. School of information science knowledge based system for pre-medical triage treatment at adama university Asella School of gra20duate studies. (2013), (January).

24. Gerdzt, M. F., & Bucknall, T. K. Triage nurses' clinical decision making. An observational study of urgency assessment. *Journal of Advanced Nursing*, 2001; 35, 550-561.
25. Gilboy, N. Triage. In L. Newberry & L. M. Criddle (Eds.). *Sheehy's Manual of Emergency Care*. 2005 ;(6th ed., pp. 61-80). St.Louis, MO: Mosby.
26. Chung, J. Y. M. (An exploration of accident and emergency nurse experiences of triage decision making in Hong Kong. *Accident and Emergency Nursing*, 2005; 13, 206-213.
27. Lemecha G. Personal Communication. Addis Ababa; 2008.
28. Anderson P, Petrino R, Halpern P, Tintinalli J. Public Health Reviews The globalization of emergency medicine and its importance for public health. 2006;028548(05):835–9.
29. Forsgren, S., Forsman, B., & Carlstrom, E. D. (2009). Working with Manchester triage - Job satisfaction in nursing. *International Emergency Nursing*, 17, 226-232.

ANNEXES

Annex-I Information Sheet

How are you? My name is Ayele Tilahun. I am from Addis Ababa university health Science College, Department of Nursing and Midwifery. I am conducting a study for partial fulfillment of master of Adult health Nursing.

I am here to assess the level of triaging skills and knowledge possessed by emergency nurse and associated factors which help the nurses to deliver quality of care at emergency department. I would very much appreciate your participation in this study. You are selected to participate in this study by simple random sampling, lottery method. The following are some general information about the study.

Objectives of the study: To assess the level of triaging skills and knowledge possessed by emergency nurse and associated factors at public hospitals in Addis Ababa from October to June 2016.

Participants to be included: Participants to be included in this study are nurses working in emergency department recruited by government at governmental hospital in Addis Ababa, Ethiopia.

Confidentiality: All information you give will be kept confidential and won't be accessible to any third party; your name won't be registered on the question sheet so that you will not be identified for any reason.

Benefits of the study: For your participation in the study no payment will be granted or has no any special privilege to you, but participating in the study and giving your genuine information will provide great input to bring change in quality of health service to management of emergency situation in emergency department.

Risks of the study: The procedure does not bear any physical or psychological trauma. Furthermore you will not be forced to respond to information you do not know.

Consent: Your participation in the study will be totally based on your willingness. You have the right not to participate from the beginning, or you may stop participating at any time after starting the participation. You won't be forced to give information that you do not know.

Rights as a participant: If you have any questions about the study please be free to ask and contact me. Your participation in this study is voluntary and you can choose not to answer any

individual question or all of the questions. However, I hope that you will participate in this survey since your views are important.

Annex-II Informed consent

I have read this form or it has been read to me in the language I understand all conditions stated above. Therefore, I am willing to participate in this study.

Signature _____

Name of PI: Ayele Tilahun

Address: Tell 09 12789046

E-mail ayeletilahun2005@gmail.com

Name of witness _____

Signature _____

Date of data collection-----Time started----- Time completed-----

Result of self administered questionnaire:

1. Completed 2. Refused 3. Partially completed

Checked by:

Supervisor Name-----signature-----Date-----

If no, skip to the next participant by writing reasons for his/her refusal

Annex-III Self administered questionnaire

Demographic Data Sheet (DDS)

Instruction

I would like to ask you some information regarding personal data. Please answer by putting marking (x) in the space available as that is appropriate for you and/or filling in the blank.

1. Age years
2. Gender: 1 Male ☐ 2 Female ☐
3. Marital status 1 ☐ married 2 unmarried ☐
4. Educational level;
 - 1 Diploma ☐ 2 BSc ☐
 - 3 MSc ☐ 4 Others specify.....
5. Religion 1 Orthodox ☐ 2 Muslim ☐
 - 3 Protestant ☐ 4 Catholic ☐ 5 others.....
6. Ethnicity 1 Oromo ☐ 2 Amhara ☐
 - 2, Tigre ☐ 4 other (specify).....
4. Working experience by nursing Profession.....years.....months
5. How long have you been working as a nurse in ED?Years... .. months
6. How long have you been working as a nurse in triage room.....years... .. months
7. Do you currently work in triage room? ☐ Yes ☐ no
8. Training and continuing education
 - 8.1 Did you attend any training, course or workshop during the past three years?
☐ Yes ☐ no

No	Training	Number of training	Duration of training course(days)
1	Basic Cardiac Life Support(BCLS)		
2	Basic Trauma Life Support (BTLS)		
3	Triage Course		
4	Trauma in Nursing Care		
5	Emergency Care		
6	Disaster Management		
7	Other..... ..(Please identify it)		

Triage Knowledge Questionnaire (TKQ)

The questionnaire provides 35 questions regarding to knowledge on triage skill. Please check your choice by putting mark (x) in the available options A, B, C, and D.

Triage knowledge

Case 1 for question number 1 – 3

The male patient, 15 years old come to ED due to right leg injury with painful. There is visible deformity of the lower part of right leg, and it appears shorter than another.

1. The nurse would focus the assessment on which of the following first?

- a. The area proximal to the fracture
 - b. The actual fracture site
 - c. Look sign of hypoperfusion/ shock and then assess the area distal to the fracture
 - d. The opposite extremity for baseline comparison
2. Which of the following interventions is most appropriate?
- a. Casts
 - b. Debridement
 - c. Compression bandage
 - d. Analgesia
3. Which of the following complications might occur within 24 hours?
- a. Bleeding
 - b. Shock
 - c. Compartment syndrome
 - d. Infection
4. A patient presents in the emergency department after falling from a roof. A fracture of the femoral neck is suspected. Which of these assessments best support this diagnosis?
- a. The client reports pain in the affected leg
 - b. A large hematoma is visible in the affected extremity
 - c. The affected extremity is shortenend, adducted, and extremely rotated
 - d. The affected extremity is edematous.

Case 2 for question number 5 – 7

The female patient, 19 years old come to ED present with fever for 1 week, headache, nausea, vomiting, petechiae, and semiconscious.

5. Which of the following typical problems would you anticipate?

- a. Malaria c. DHF
- b. Varicella d. Typhoid

6. Which of the following items might occur in this patient?

- a. Hypoglycemia c. Shock
- b. Arrhythmia d. Sepsis

7. The most appropriate initial management by the nurse is:

- a. Administer prescribed antiemetic medicine
- b. Apply oxygen per nasal canular as order
- c. Start IV fluid replacement as order
- d. Administer prescribed antibiotic medicine

Case 3 for question number 8- 9

Mr. R is a 63-year-old retired business executive who comes to the emergency room with complaints of dyspnea, shortness of breath, and chest pain radiating to the left arm.

8. The nurse caring for Mr. R should response which of the following actions FIRST?

- a. Administer prescribed pain medication
- b. Apply oxygen per nasal cannula as ordered
- c. Assess vital signs
- d. Apply electrocardiogram electrodes to the patient's chest

9. Which of the following complications is the most possible in this patient?

- a. Cardiogenic shock
- b. Heart failure
- c. Arrhythmias
- d. Pericarditis

10. Atherosclerosis impedes coronary blood flow by which of the following mechanisms?

- a. Plaques obstruct the vein
- b. Plaques obstruct the artery
- c. Blood clots form outside the vessel wall
- d. Hardened vessels dilate to allow the blood to flow through

Case 4 for question number 11- 12

Mrs. C, 49-year-old female was rushed in the emergency department because of severe and steady right upper quadrant pain that radiates to the scapula lasting for 2 hours. She has vomited frequently and experiencing chills.

11. Based from the data presented, Mrs. C is experiencing which of the following problems?

- a. Acute pyelonephritis
- b. Acute appendicitis
- c. Acute cholecystitis
- d. Perforated peptic ulcer

12. Frequent vomiting puts Mrs. C at risk of which of the following acid-base imbalance?

- a. metabolic acidosis and hyperkalemia
- b. metabolic alkalosis and hyperkalemia
- c. metabolic acidosis and hypokalemia

- d. metabolic alkalosis and hypokalemia

Case 5 for question number 13- 14

The female patient, 28 years old come to ED with dyspnea, short of breathing, and cyanosis. She has history of allergy.

13. Which of the following items is the etiology of the patient's illness?

- a. Alveolar consolidation
- b. Infection of the upper airways
- c. Hyperreactivity inflammation and bronchospasm
- d. Diffuse alveolar damage

14. Which of the following breathing sounds is the most possible in this patient?

- a. Rales b. Crakles
- c. Ronchi d. Wheezing

Case 5 for question number 15-17

The male patient, 42 years old come to ED with coma. He has present illness of jaundice rising, lower extremity edema, and nausea/vomiting for 1 week.

15. Which of the following items is the most related to the current illness?

- a. Smoking
- b. Allergies
- c. Alcohol consumption
- d. Hypertension

16. Which of the following specific areas for jaundice the patient with darkness skin?

- a. Flexor surfaces of the extremities
- b. Sclera
- c. Nailbeds
- d. Skin

17. What is the appropriate treatment to reduce severe vomiting?

- a. NPO
- b. Start give neomycin 2-4 gms/day
- c. Administer antiemetic
- d. Nasogastric decompression

Case 6 for question number 18 – 20

The male patient, 35 years old come to ED present after falling approximately 20 meters from the hill, has severe pain and contusion at left flank. His neighbor transfer him to ED with patient condition unconscious

18. What is the injured organ in abdomen from patient above?

- a. Liver b. Gastric
- c. Kidney d. Pancreas

19. What is the most important complication for patient above?

- a. Neurogenic shock
- b. Hypovolemic shock
- c. Anaphylaxis shock
- d. Sepsis

20. What is the appropriate to administer blood transfusion if the patient had blood loss ?

- a. 500 – 750 ml
- b. 750 – 1000 ml
- c. 1000 – 1500 ml
- d. 1500 – 2000 ml

Case 7 for question number 21-23

The male patient, 52 years old come to ED with dyspnea, anorexia, vomiting, edema, pruritus. The patient semi conscious, urine output 300 ml/24 hours.

21. What the phase that fluid overload in acute renal failure?

- a. Diuretic phase
- b. Oliguric phase
- c. Recovery phase
- d. End stage phase

22. What is emergency nurse should monitor from the patient above?

- a. Anorexia b. Vomiting
- c. Urine output d. Edema

23. The patient above has a serum potassium (K) level of 5.8 mEq/L. Emergency nurse would plan which of the following as priority action?

- a. Allow an extra 5000 ml fluid intake to dilute the electrolyte concentration
- b. Place the patient on a cardiac monitor in critical care area
- c. Check the sodium level
- d. Give oxygen low concentration

Case 8 for question number 24-25

The male patient, 45 years old come to ED with history DM five years ago. The patient has coma and Kussmaul's sign.

24. Which of the following findings would confirm the diagnosis of DKA?

- a. Blood glucose
- b. Urine output
- c. Blood pressure
- d. Level of conscious

25. The most appropriate initial management by the nurse is:

- a. Administer prescribed regular insulin
- b. Apply oxygen per nasal cannula as order
- c. Administer IV fluid as order
- d. Retained foley's catheter

Case 9 for question number 26 - 28

The male patient, 25 years old with motor vehicle accident. The patient's condition are eye opening by pain stimuli, inappropriate word verbal, and has abnormal flexion of both arms. The physical exam presents bleeding and discharge from right ear.

26. Which of the following signs would confirm the diagnosis of base of skull fracture?

- a. Periorbital ecchymosis
- b. Otorrhea
- c. Battle sign
- d. Hemotympanum

27. What is the GCS score of this patient?

- a. 6 b. 7
- c. 8 d. 9

28. What is procedure can reduce intracranial pressure?

- a. Administer steroid drug as order
- b. Bed rest for limiting activity
- c. Clear airway by suction oftenly
- d. Keep the patient's head elevated 30 degrees

Case 10 for question number 29 - 31

The male patient, 30 years old, has car accident. He complaints neck pain, and dyspnea.

29. Which of the following problems would you anticipate?

- a. Thoracic injury b. Cervical spine injury
- c. Subclavical injury d. Head injury

30. The nurse caring should response which of the following actions FIRST?

- a. Administer oral analgesic drug
- b. Place the patient with cervical collar
- c. Give oxygen
- d. Suction

31. Emergency nurse found the absence of breathing sound in the right upper lobe of lung. Which of the following problems would you anticipate?

- a. Flail chest

b. Acute lung injury

c. Pericardial tamponade

d. Pneumothorax

32. Which of the following is true about an oropharyngeal airway?

a. it eliminates the need to position the head of the unconscious patient

b. it eliminates the possibility of an upper airway obstruction

c. it is of no value once a tracheal tube is inserted

d. it may stimulate vomiting or laryngospasm if inserted in the semiconscious patient

33. The patient has no pulse or respirations. After calling for help, the first action the nurse should take is:

a. Start a peripheral IV

b. Initiate closed-chest massage

c. Establish an airway

d. Obtain the crash cart

34. Which of the following is the correct initial drug and dose for treatment of asystole?

a. epinephrine 2mg IV

b. atropine 0.5 mg IV

c. lidocaine 1mg/kg IV

d. epinephrine 1mg IV

35. A patient who has Ventricular Fibrillation has failed to respond to 3 shocks. After started an IV and inserted a tracheal tube, confirming proper placement. Which of the following drugs should this patient receive first?

- a. Amiodarone 300 mg IV push
- b. Lidocaine 1 to 1.5 mg/kg IV push
- c. Procainamide 30 mg/min up to a total dose of 17 mg/kg
- d. Epinephrine 1 mg IV push

Triage Skill Questionnaire (TSQ)

Instruction: Please assess your own ability in triage skills by check list the number on scale 1 to 5 following each statement below. There are five options available: 5 = very good, 4 = good, 3 = fair, 2 = poor, 1 = need, improvement

No	Triage skills	Perceived Triage Skill				
		VG(5)	G(4)	F(3)	P(2)	NI(1)
	Rapid Patient Assessment					
1	Assess patient include vital signs with rapid assessment in 2-5 minutes					
2	Assess or ask chief complaint of the patient rapidly					
3	In unconscious patients, look in the upper airway such as blood, vomit, foreign bodies, oedema, and tongue obstruction as assess airway patency					
4	Decide to open airway and remove foreign body when airway is obstructed according to airway management (A)					
5	Give positioning airway to maintain patency by chin lift					
6	Perform clear airway by correct position with jaw thrust and head tilt					
7	Perform clear airway by correct position by jaw thrust without head tilt if the patient suspect cervical spinal					
8	Perform to insert oropharyngeal or nasopharyngeal airway					

No	Triage skills	Perceived Triage Skill				
		VG(5)	G(4)	F(3)	P(2)	NI(1)
9	Look at the chest about patient chest abnormal movement					
10	Assess rate and depth of respirations to observe (B) breathing rate and pattern rhythm with look and listen					
11	Look at the patient skin to investigate for integrity, wounds, bruising, texture, and color					
12	Listen the noise in the airway such as gurgling, snoring, and wheezing					
13	Listen the silent or noisy breathing					
14	Easily identify a patient in respiratory distress					
15	Administer oxygen therapy					
16	Perform manual ventilation					
17	Perform bag-valve-mask ventilations					
18	Protect cervical spine when patient suspect fracture cervical with cervical collar					
19	Check pulse rate and rhythm according circulation assessment (C)					
20	Assess of the capillary refill					
21	Assess the temperature the patients					
22	Assess the patient with diaphoresis					

No	Triage skills	Perceived Triage Skill				
		VG(5)	G(4)	F(3)	P(2)	NI(1)
23	Perform chest compressions in critical condition of the patient					
24	Collaborative with physician to administer emergency drugs					
25	Assess internal and external bleeding					
26	Perform control blood loss appropriately to stop bleeding the patient					
27	Collaborate resuscitation to provide appropriate intravenous fluid					
	Patient categorization					
28	Categorization the patient according to triage priority					
29	Identify the patient who require immediate care, urgent, and non urgent according to triage categorization					
30	Avoid the condition of the patient with over-triage and under-triage					
31	Initiation nursing intervention during triage categorization					
	Patient allocation					
32	Make a decision to allocate the patient with priority 1 (Resuscitation in ED) in the right place					

No	Triage skills	Perceived Triage Skill				
		VG(5)	G(4)	F(3)	P(2)	NI(1)
33	Make a decision to allocate the patient with priority 2(Critical care in ED) in the right place					
34	make a decision to allocate to the patient with priority 3 in the right place (Ambulatory in ED) correctly					
35	Allocate the patient with nursing intervention safety in ED					
36	Allocate the patient by collaboration with other emergency nurse & medical doctor with hand over effectively					
37	Allocate the patient to get advance treatment in ED in accurately and timely					

Annex IV Declaration

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in this or another university and that all sources of materials used for this thesis have fully acknowledged.

Name: Ayele Tilahun

Signature: _____

Date: _____

This thesis work has been submitted for examination with my approval as a university advisor.

Name: Sr.ALEMNESH MANDESH(BSc, MSc nursing)

Signature: _____

Date: _____