

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE

DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE

TRIAGE KNOWLEDGE AND PERCEIVED SKILLS AMONG NURSES WORKING IN ADULT EMERGENCY DEPARTMENTS OF SELECTED PUBLIC HOSPITALS IN ADDIS ABABA, ETHIOPIA, 2023.

BY: BETE MENGIST (MSc CANDIDATE)

A THESIS TO BE SUBMITTED TO ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE FOR PARTIAL FULFILLMENT OF A MASTER'S DEGREE IN EMERGENCY MEDICINE AND CRITICAL CARE NURSING.

JUNE, 2023

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ADDIS ABABA, ETHIOPIA

Approval by the board of examination

This thesis by Bete Mengist is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of master in emergency medicine and critical care nursing.

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Advisors' Approval Sheet

This is to certify that the thesis entitled "Triage Knowledge and perceived Skills among Nurses Working in Adult Emergency Departments of Selected Public Hospitals in Addis Ababa, Ethiopia, 2023'' is submitted in partial completion of the MSc with specialization in "Emergency Medicine and Critical Care nursing" to the Graduate Program of the College of Health Sciences of Addis Ababa University and was done by Bete Mengist, ID No: GSR/9784/13 under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the Department.

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2. Name Signature Date

Declaration

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

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Date: _____

Acknowledgment

First of all, I would like to praise the almighty God who gave me the courage and power to conduct this thesis. In addition, I would to thank Addis Ababa University College of health science, department of emergency medicine and critical care for giving me this opportunity to do this research based up on my title submission.

Next, I would like also to forward my deepest appreciation and thanks to my advisors Andualem W. (MSc in EMCCN, Lecturer) and Sofia K. (Emergency physician, Assistant professor) for their constructive advice, support, valuable comments and suggestions for the development of this thesis.

Finally, my heartfelt thanks go to Addis Ababa university, Tikur Anbessa campus librarians for giving me support to search literatures and use valuable reference materials.

Last but not least, I would also like to thank to my family especially my husband for his patience, great support and motivation during my write up of this research.

Acronyms and abbreviations

ACLS – Advanced Cardiac Life Support

AOR – Adjusted Odds Ratio

BLS – Basic Life Support

BTLS – Basic Trauma Life Support

EC – Emergency Center

ED – Emergency Department

ICU – Intensive Care Unit

NGO – Non-Governmental Organization

PI – Principal Investigator

SATS–South African Triage Scale

SD – Standard Deviation

SPSS – Statistical package for social sciences

TEWS – Triage Early Warning Score

TOC – Triage Officer Course

TSQ – Triage Skill Questionnaire

VIF – Variance Inflation Factor

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Abstract

Background: Triage is an essential function in emergency department. Knowledge of nurses working at triage has been cited as an influential factor in triage decision-making. As there are increased numbers of clients with life threatening traumatic injuries and medical patients in the emergency department in Ethiopia, triage knowledge and skill are an essential competency required for the nurses working in emergency department. Since there is limited study with in Addis Ababa hospitals regarding the knowledge and skills of triage among nurses working in the emergency departments, it is necessary to assess emergency nurses' triage knowledge and skills including its related factors.

Objective: To assess knowledge and perceived skills of nurses towards triage and associated factors among nurses working in adult emergency department of three selected public hospitals in Addis Ababa, Ethiopia, 2023.

Methods: A cross-sectional study design was used. Three hospitals were selected from the total of 13 public hospitals purposely. A census sampling technique was used to obtain a required sample size. A standardized pretested self-administered questionnaire by open data kit (ODK) version 2022.1.2 was used. The questions were coded and the skip logic was properly prepared on the Kobo Toolbox server before data collection. Finally, it was exported to SPSS version 27 for final analysis. Bivariate analysis at a P-value of 0.25 and multivariable analysis at a P-value of 0.05 was applied. Results was presented using tables, figures and texts.

Results: A total of 179participants were included in this study. The proportion of poor triage knowledge and perceived poor triage skill of nurses were 58.1% and 50.3%, respectively. Educational level and triage experience of nurses were significant predictors of triage knowledge, while training experience and availability of triage equipment's were significant predictors of perceived triage skill.

Conclusion and recommendation: The triage knowledge and skill were found to be at low level. As nurse's knowledge about triage is a key tool in triage decision making, there is the need to improve on nurse's knowledge level and skills in triaging at the ED.

Key words: Triage, Triage knowledge, Triage skill, Emergency nurse, Addis Ababa, Ethiopia.

1. Introduction

1.1. Background

Twenty-four hours a day Emergency department typically offers quick lifesaving therapy for a many kinds of emergency conditions. serving for. The fluctuating numbers of patients that visit the ED have a variety of diseases, many of which lack a clear diagnosis, urgency, or severity. Priority should be given to treating patients who are experiencing life-threatening situations such cardiac arrest, airway blockage, and shock as soon as possible in order to keep their lives. However, by transferring resources intended for patients who require emergency care to others who may have less urgent requirements, the overcrowding of clients coming to EDs might affect the quality of care (1). Many agree that triage is a crucial step in the ED's efficient system for minimizing wait times and ensuring that each patient receiving care there is given the right care (2).

Triage, a phrase used to define the categorizing of patients for treatment priority in Emergency Centers (ECs), is the cornerstone of organizational care in ECs(3). Three requirements must be met for the term "triage" to be used;1); the existence of resource shortage,2) The scarcity may range from modest to dire;3) The presence of a triage officer who evaluates patients' medical needs typically based on a quick physical examination and evaluation results(3). There are many different types of triages, including ED, inpatient (ICU, pediatric, surgery, and outpatient), incidence (accidents, fire, air crashes, etc.), military (battlefield), disaster (mass casualty incidents, bomb last), and telephonic (over the phone, referral services) triage(4).

Emergency nurses conduct ED triage, a sort of triage, on a daily basis. It is a structured procedure of initial assessment of all patients that present to the department with the aim of identifying the most serious patients who need immediate care(2). A small but crucial aspect of ED care is triage. Regardless of the patient's way of arrival, this is the first stage of ED patient treatment. The triggers also make independent judgments about patients who have insufficient information at the site of care. These choices affect the entire ED visit, which is frequently conducted independently and under limited time(5).

Nursing triage has its own system for classifying patients and allocating them to the appropriate area at the appropriate time. It includes two successive stages. In order for health care providers to allocate clients to the various medical facilities, data collection is the first step. The next step is the start of nursing treatment at emergency room in order to avoid early death as well as reduce subsequent consequences (6).

Triage is classified in to three color coded tagging method like, red triage tag ("immediate" or T1 or priority 1): patients whose lives are in immediate danger and who need immediate treatment; yellow triage tag ("delayed" or T2 or priority 2): patients whose lives are not in immediate danger but who will need urgent, not immediate, medical care; patients who have minor injuries and will ultimately need treatment are marked with a green triage tag ("minimal" or "T3"); those who are marked with a black triage tag ("expectant" or "no priority") are either already dead or have severe enough injuries that they cannot be saved with the limited resources at hand(7).

These triage decisions are linked with three types of outcomes: “correct” or “expected” triage, “over-triage” and “under-triage”. Because the patient is reviewed by a doctor in a timely manner, correct triage by a nurse is linked with a better health outcome. Over-triaging and under-triaging refer to the triage nurse assigning a higher or lower acuity triage category than necessary, respectively(6).

The best triage, which is made by nurses, is the most crucial tool for achieving the desired health outcome. because the doctors can treat their patient effectively because they can reach their patient at the appropriate time. On the other hand, nurses might pay a lot of focus for a client who truly requires small they may give lower focus to a client who requires more focus (6). When a patient arrives at the emergency room for emergency care, the triage nurse is the first person they will see. The experience of the ER nurses who triage have a major factor in process for making choices (2)(8).

In the majority of tertiary hospitals around the world, triage nurses' education and experience have been acknowledged as significant determinants in triage decision-making(2).The triage nurse provides a quick, focused assessment and awards the patient a triage acuity level, which is a proxy indicator of how long the patient can wait without risking harm before receiving treatment and a medical examination(9). Clients who are admitted to the ED with serious medical or surgical illnesses will suffer if the triage nurse assigns the wrong people to the triage room.

Overcrowding in EDs has increased over the past few years in both developed and developing countries due to an increase in patient arrivals, partly as a result of self-referrals(10). In their emergency departments, many hospitals in low-income nations lack a standardized triage procedure(11). Compared to rich nations, emergency treatment, particularly triage, is frequently one of the weakest links in low-income countries' health systems; yet, when properly managed, it may be both life-saving and cost-effective(12). Patients are typically seen by clinicians on a "first-come, first-served" basis. Patients are frequently seen in the wards or the outpatient clinic when they arrive because there is frequently no ED(13).

This method does not allow for the quick management of urgent and important problems. Currently, the majority of hospitals have EDs that are constantly congested. By diverting resources meant for emergency cases to people with possibly less urgent needs, the large number of patients using the ED could have an effect on the standard of care(1). There is general agreement that triage is a crucial method in the emergency department (ED) that shortens wait times and guarantees that all patients receiving care there are treated appropriately(2).

In-depth Triage knowledge and skill, which are among the primary components of supervision in emergency departments, are necessary to maintain the effectiveness of ED triage emergency nurses. If Triage is not performed at a standard level, the clinical outcomes of patient care and the efficiency of emergency departments are jeopardized(14). One of the developing nations with few resources and infrastructure is Ethiopia. Despite this, more patients are seeking emergency care for a variety of reasons, which leads to a congested ED. The key to resolving this is to use ED triage. However, ED triage has only been practiced recently, and primarily by nurses. Therefore,

it's crucial to assess nurses' knowledge and skills together with the associated factors to enhance the triaging system and lessen ED congestion.

1.2. Statement of the problem

In emergency care, triage is the procedure of gathering relevant patient data and starting a decision-making process that sorts and ranks the requirements of patients requesting treatment. The ability of a registered nurse to perform the duties of a triage nurse may not be sufficiently assured by a certain quantity of training and experience in emergency care. Registered nurses should complete a triage-specific educational program as well as other pertinent courses and certifications in order to perform triage with a high degree of accuracy and competence(15).

When a patient arrives at the emergency room for emergency care, the triage nurse is the first person they will see. The knowledge and expertise of triage nurses have influenced decisions in the triage process(2)(8). According to a research that looked at emergency rooms, nurses who had no formal training in triage managed about 43.3% of emergency departments in the United States of America(16). And in Australia, 44% of emergency room nurses did not offer a unit-based orientation training on triaging, despite the fact that the majority of them (89%) considered it to be essential(17). The early triage and treatment of patients in emergency departments is one of the weakest links in the health systems of underdeveloped nations(18).

According to a survey carried out across Tanzania, more than half (52%) of the nurses included in the study missed to assign patients to the appropriate triage category. The respondents, 58%, were unaware of the waiting times for the various patient triage categories(8). Similarly, more than half of the study subjects in an Indonesian study (58%) had low triage knowledge scores, and the majority (65.4 percent) thought that the total triage skill was low (19).

The lack of a designated well-developed emergency center (EC), the lack of human and material resources to care for injured or acutely ill patients, the lack of medical training on principles of triage and emergency management, and the lack of sustenance all contribute to the high burden of non-communicable diseases and injuries that result from urbanization and way-of-life changes among Addis Ababa residents(20). As a result, people who would benefit from early intervention the most are frequently made to wait, and others who do not need immediate treatment may be treated first.

It is vital to evaluate emergency nurses' triage knowledge and skills, as well as related issues, because there is limited study with in Addis Ababa hospitals for nurses in the emergency rooms. Therefore, the purpose of this study was to evaluate the triage knowledge and skills of nurses in the three adult emergency rooms at public hospitals in Addis Abeba.

1.3. Significance of the study

The purpose of this study was to assess nurses triage knowledge and abilities in adult emergency rooms of selected public health facilities in Addis Ababa. In addition, it helps to identify associated factors, which affect knowledge and skill of triaging. Evaluating the knowledge and skills of nurses gives insight on learning needs of nursing curriculum, needs of on job training and workshops. In addition, identification of associated factor helps to address the problem by recommending to the respective body.

Furthermore, the finding may serve as a base line data for policy makers and researchers. As to the researcher knowledge there is limited study done in emergency departments of public hospital in Addis Ababa to assess the nurses' expertise and knowledge towards triaging. Therefore, this study may serve as a base line data. Overall, the finding of this study will be helpful to improve quality of emergency department through improving triage system.

2. Literature review

A small but crucial aspect of ED care is triage. It is the first stage of emergency department care, whether a patient arrives by ambulance or other means. Additionally, it is the point of treatment where the triggers independently decide on patients about whom they know little. These choices, which are frequently hastily and independently made, have an impact on the overall ED visit(21).

2.1. Knowledge of nurses towards ED triage

In the emergency room, patient outcomes are thought to be significantly influenced by the accurateness of the triage decision. There are two types of triage decisions: primary and secondary. The initial triage judgments involved the triage assessment, category assignment, and appropriate treatment site(8,22,23).

According to a study done across emergency departments in the United States of America to assess the educational preparation of triage nurses, 43.3 percent of the emergency departments were managed by nurses who had no formal training in triage(16).

A study conducted in Pakistan's Lahore city on the knowledge of triage among nurses working in emergency rooms revealed that 1 out of 100 participants had excellent knowledge, 3 respondents had good knowledge, 27% had average knowledge, and 69% had a lot of knowledge. This study showed that Pakistani nurses' knowledge of triage is deficient(24).

Over half of the participants (58%) in another study conducted by Fathoni in Indonesia had poor triage knowledge levels. This study found that the respondents needed triage-related continuing education and training courses to enhance their knowledge and skill in order to increase patient safety(19). Another study, carried out at three hospitals affiliated with Mazandaran University of Medical Sciences in Sari, Iran, revealed that just 20.1% of study participants had good knowledge of triage. According to this study, emergency nurses need in-depth clinical knowledge and expertise to offer treatment to patients of all ages and to handle scenarios like patient crowding and the use of advanced technologies(23).

The early triage and treatment of patients in emergency departments is one of the weakest aspects of the health systems of underdeveloped nations(18). According to a study conducted in Tanzania across a number of hospitals in Dar es Salaam, 58% of participants were unaware of the waiting times for patients in various triaged categories. About 67% of those asked were aware of what triage is all about(8). According to this, around 50% of the nurses who work in the emergency rooms of the hospitals in the Dar es Salaam region triage patients who are receiving emergency medical care without having enough knowledge of the process.

According to another study conducted in the hospitals of Tamale Metropolis, Ghana, the majority of nurses (61.5%) who worked in emergency departments were able to define triage correctly. The majority of study participants, 46 (70.8%), had very good understanding of the triage colors as specified by the South African Triage Scale; they were able to link the patient's condition or state to the triage colors after evaluation. 36 (55.4%) of the nurses had sufficient knowledge by connecting TEWS with the maximum patient wait time at the ED, as determined by SATS, while also taking triage waiting time and TEWS into account.

In the three hospitals used for the study in the Tamale Metropolis, the nurses' average level of triage knowledge was 62.6%. According to SATS, nurses' general knowledge of triage was based on their ability to "define triage correctly," "identify triage colors and their significance," and "relate TEWS and the waiting time" at the ED(25). In addition, another study conducted in in Hawassa to evaluate nurses' triage knowledge and ability found that 51.5 percent were with poor knowledge (26).

2.2. Nurses' perception towards ED triage skill

Emergency nurses need triage skills, which is focused on the decision-making ability to prioritize patients into the most appropriate urgency-of-care categories within a constrained amount of time, to sustain the effectiveness of ED triage. Quick evaluation, client classification, and client placement are all incorporated into this skill. ED nurses need triage experience and skill to fulfill this task (8). The majority (65.4 percent) thought that the total triage ability was poor and the average triage skill score was 75.12 according to a study conducted in east Java Province, Indonesia (19).

A research caried out in Addis Ababa to evaluate emergency nurses' triage skill and related characteristics found that more than half (52.9 percent) were with a low triage ability (27). And another study of a similar nature, conducted in Hawassa Specialized Hospital, found that nurses total performance in the triage was at high level (26).

2.3. Factors affecting knowledge of nurses towards triage

Another interventional study conducted at Shiraz University of medical sciences in Iran examined the effects of triage education on knowledge, practice, and the qualitative index of emergency department materials. The results showed that knowledge and practice levels in triage were greater after the training than they were prior to it. The workers' pre-training knowledge was poor but it improved following training, and none of them demonstrated inadequate knowledge. The majority of participants performed moderately and well before and after training, and none of them demonstrated poor performance after training(28).

Another study that evaluated the viewpoints and knowledge of nurses working in emergency departments in Tamale Metropolis, Ghana indicated an association between the nurses' knowledge of triage and their prior experience working in the ED. The nurses' skills of triage increased as their time working in the ED grew. The majority of nurses (96%) had positive opinions of their own knowledge of or understanding of triage in the ED, but they nevertheless underlined the need for workshops and in-service training on the subject to improve nurses' knowledge. Participants in this study did, however, continue to stress the need for enough triage information to be included in nursing curriculum(25).

Another study of a similar nature, conducted in Hawassa, found that the study participants' working years, educational status, and triage expertise in were significantly related to their triage knowledge(26).

2.4. Factors affecting perceived skill of nurses towards triage

According to a study conducted in the east Java Province, Indonesia, there are significant positive relationships among triage knowledge, presence of training, and work expertise as well as triage skill (19).

Another study carried out in Addis Ababa to evaluate emergency nurses' triage skill and related characteristics revealed that training expertise, triage knowledge, and educational status all significantly correlated with triaging skill. Triage skill was positively correlated with triage knowledge (27).

Another research of a similar nature, conducted in Hawassa, Ethiopia, found that the study participants' working expertise and triage expertise were strongly linked with skill regarding triage (26).

2.5. Conceptual frame work

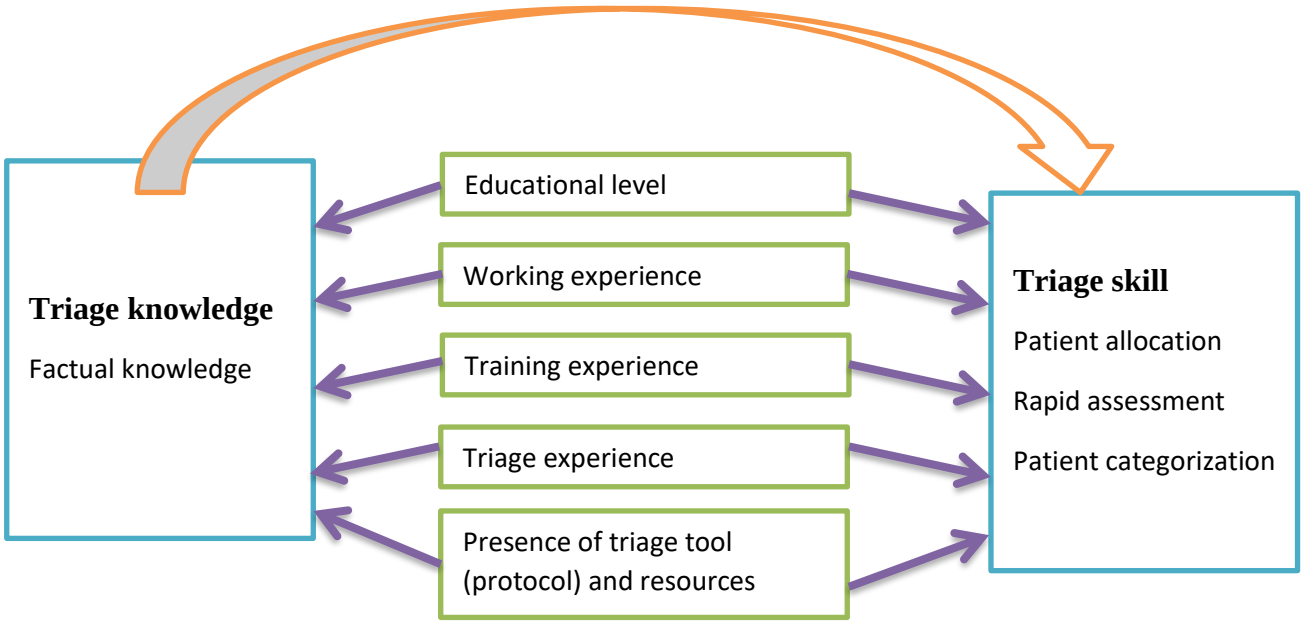


Figure 1: Knowledge, perceived skill and related characteristics of nurses regarding triage in the emergency units conceptual frame work.

(8,19,26,27,29)

3. Objectives

3.1. General objective:

- To evaluate the nurses' knowledge, perceived skills as well as related characteristics towards triage in the adult emergency centers of three selected public hospitals in the city of Addis Abeba, Ethiopia, 2023.

3.2. Specific objectives:

- To assess nurses' knowledge towards triage in the adult emergency centers of three chosen governmental hospitals in the city of Addis Ababa, Ethiopia, 2023.
- To asses nurses' perceived skill towards triage in the adult emergency centers of three chosen governmental hospitals in the city of Addis Abeba, Ethiopia, 2023.
- To identify factors associated with nurses' knowledge towards triage in the adult emergency centers of three chosen governmental hospitals in the city of Addis Abeba, Ethiopia, 2023.
- To identify factors associated with nurses' perceived skill towards triage in the adult emergency centers of three chosen governmental hospitals in the city of Addis Abeba, Ethiopia, 2023.

4. Methodology

4.1. Study area:

This study was conducted in the adult emergency departments of chosen governmental hospitals in the city of Addis Abeba, Ethiopia. Ethiopia's main city, Addis Ababa, have a population estimated to be of 5,228 million in 2022 (30). Addis Ababa has 41 hospitals (13 public and 28 NGO and private) as well as 98 health centers. From the 13 governmental hospitals, Tikur Anbessa hospital, AaBET trauma center and Alert specialized hospitals were specific area of the study. The hospitals were purposely selected, because these are major trauma centers, with high patient flow referred from different corners of the country and other Addis Ababa hospitals for specialty care. These hospitals are tertiary level hospitals with organized emergency department and staff.

Tikur Anbessa specialized hospital has established in the year 1973 and situated at the heart of the capital city on Churchill Avenue. It serves as Ethiopia's biggest teaching hospital and offers higher-level referral care along with 24/7 emergency care as well as AaBET trauma center is a branch of St. Paulo's hospital which is organized a year back around Gojam Brenda. It provides emergency service for 24 hours and staffed with senior surgeon medical doctors, BSC nurses.

Whereas Alert specialized hospital is a medical facility on the edge of Addis Ababa, specializing in Hansen's disease, also known as "leprosy". It was originally the All-Africa Leprosy Rehabilitation and Training Center (hence the acronym), but the official name is now expanded to include tuberculosis: All Africa Leprosy, Tuberculosis and Rehabilitation Training Centre. There is currently a 240-bed teaching hospital, which includes dermatology, ophthalmology, and surgery departments, also an orthopedic workshop, and a rehabilitation program.

ALERT is the continuation and expansion of the leprosy hospital originally built by Dr. Thomas Lambie in 1922, which was later named the Princess ZänäbäWärq Hospital. A memorandum to found ALERT was signed at Dec. 11, 1965 by representatives of the Ministry of Health, Addis Ababa University. Currently it has doing expansion program to trauma center and working for 24hours.

4.2. Study period:

This research was carried out between March 15 and April 15, 2023.

4.3. Study design:

Facility based cross-sectional survey was carried out to assess nurses' knowledge, skill and related aspects towards triage at adult emergency centers of three selected governmental hospitals in the city of Addis Abeba, Ethiopia during the specified study period.

4.4. Population:

4.4.1. Source population:

All nurses employed in the adult ED of the three chosen governmental hospitals in the city of Addis Abeba, Ethiopia, which are, TASH, AaBET trauma center as well as Alert specialized hospitals during the study period.

4.4.2. Study population:

Nurses who were employed in the adult emergency rooms of the three chosen governmental hospitals in the city of Addis Abeba, Ethiopia and who fulfilled the selection criteria.

4.5. Eligibility criteria:

4.5.1. Inclusion criteria:

- ✓ All nurses who were employed and work in the adult emergency centers of those three selected public hospitals of Addis Ababa.

4.5.2. Exclusion criteria:

- ✓ Those nurses who did not finish their trial period (45 days).

4.6. Sample size determination and sampling procedure:

4.6.1. Sample size determination:

To determine the sample size, one population proportion formula was employed. Based on a prior study, it was found that 51.5% of the participants were with poor triage knowledge (26) 95% confidence level ($\frac{\mathbf{Z\alpha}}{\mathbf{2}} = \mathbf{1.96}$), desired degree of precision of 5% (d = 0.05).

Based on the above information, the total initial sample size was calculated by:

Using the formula; $\mathbf{n} = \frac{(z\alpha/2)^2 \times P(1-P)}{(d)^2}$, $\frac{(1.96)^2 \times 0.515(1-0.515)}{(0.05)^2}$

Where:

- n= initial sample size required
- 1.96 (Z value at = 0.05) is the critical value for a normal distribution at the 95% confidence interval.
- Zα/2= 1.96, at 95% C.I and (α= 0.05).
- P= proportion
- d= marginal error (0.05).

n = 384

The source population was 182 nurses.

Since total reference population was below 10,000, sample size correction formula was determined (N=182).

nf= n/ (1+n/N) = n × N/ n + N

Where:

nf = Sample size at the end

n = Initial estimated sample size

N = Reference population

nf = 384× 182 / 384 + 182=123 nurses

Adding a 10 percent contingency for non-response rate, the final was 12.3+ 123=135

But, since the number of source population was small, all nurses from those emergency departments of selected public hospitals was taken as study participants (182).

4.6.2. Sampling technique and procedure

To select the specific study area purposive sampling was used. I.e., from a total of 13 public hospitals three hospitals were purposely selected, because these are major trauma centers, with high patient flow referred from different corners of the country and other Addis Ababa hospitals for specialty care. These hospitals are tertiary level hospitals with organized emergency department and staff. A census sampling technique was used to obtain 182 study participants.

4.7. Instruments and data collection

4.7.1. Data collection procedure

Data was collected using standardized self-administered questionnaire. Three BSc nurses' data collectors and one MSc nurse supervisor were recruited, and they were given training on basic data collection skills and orientation on ODK application for two days. The data collectors were assigned and supervised by the supervisor. A census sampling technique was used to obtain the study participants. Finally, nurses who met the selection criteria were asked to answer the questions.

4.7.2. Data collection tool

Self-administered tool that was adapted from a similar study done previously was used to collect data (8)(26).The data collection tool includes socio-demographic data, triage evaluations of knowledge questions and triage skill evaluation questions and Checklist to assess availability of equipment, which assists nursing triage. There were 17 questions in the socio-demographic and triage knowledge evaluation questionnaire.

The 37-item Triage Skill Questions has 3 aspects: quick assessment, patient classification, and patient distribution. A scale ranging from 1 to 5 was given to respondents, with 1 needs improvement, 2 being poor, 3 being fair, 4 being good, and 5 being very good. The overall scores possibly ranged from 37 to 185. In addition, the Checklist to assess availability of equipment, which assists nursing triage, contained 13 questions. The ODK version 2022.1.2 software was used to collect the data, along with the Kobo Toolbox humanitarian response server to store the collected data.

4.8. Data quality assurance

To ensure the quality of data, the data collectors and supervisor was trained for 2 days on the basics of data collection skills and orientation on ODK application. The data collectors as well as supervisor had two days of training on the basics of data collection techniques as well as an orientation on ODK application, to ensure the quality of data.

The questionnaire was designed on the Kobo Toolbox server carefully to allow optional and mandatory questions by skip logic, to minimize missing data. The tools were in English language because this was the media of communication for the study participants during their basic nursing course training.

Before the actual data collection period, the questionnaire was checked for clarity, comprehensiveness, and internal consistency reliability test of Cronbach alpha ($\alpha = 0.944$) on 5% of the sample in another hospital, which was not be included in the study. Finally, possible modifications were made to the questions. The supervisor was evaluated and validated the obtained data for completeness and consistency during data collection, and data collectors were immediately notified if the survey forms were incomplete or incorrectly filled in. The ODK version 2022.1.2 software was used to collect the data, along with the Kobo Toolbox humanitarian response server to store the collected data.

4.9. Study variables

4.9.1. Dependent variables/ outcome variables

- ❖ Nurses' triage knowledge
- ❖ Nurses' perceived triage skill

4.9.2. Independent variables

- Socio demographic factors (Age, sex, educational level)
- Presence of triage tool (protocol) and resources
- Work experience
- Triage experience
- Training experience

4.10. Statistical analysis

ODK version 2022.1.2 software was used to collect the data along with the Kobo Toolbox server to store the collected data and it was exported to SPSS version 27 for final analysis. Before data export, it was checked for completeness and frequency was run to rule out any missing value. Then data was coded and revalued on SPSS and frequency distributions was run and further cleansing and missing values and errors were checked. The sample was described using descriptive statistics, and numerical data was reported as mean, standard deviation, proportion, or percent. The relationship or statistical association between dependent and selected independent factors were investigated using binary logistic regression.

The factors having P-value below 0.25 in the bivariate regression was involved in the multivariable analysis to examine the combined impact of various factors associated with the triage knowledge and skill of nurses; after filtering for multi-co-linearity by variance inflation factor (VIF), those with less than 10 and testing the model of fitness by Hosmer and Lemeshow models. The results were summarized by AOR and 95% confidence interval, which represents the degree of each category's effect on the outcome in comparison to the reference category. P-value (0.05) was used as the significance level. Tables, texts, and figures were used to report the findings.

4.11. Operational definitions

Triage knowledge: knowledge refers to the level of factual and procedural knowledge required for nurses working in the emergency centers to perform quick assessment, patient classification, and patient distribution. It was determined by triage knowledge tool (13questions) the probable ranges for the overall triage knowledge score were 0-13.

When the participants scored less than the mean of 7.02 (54%) of total knowledge questions as poor knowledge, while these scored greater than or equal to the mean of 7.02 (54%) of total knowledge questions as good knowledge(29).

Triage skill: It was determined by the Triage skill questionnaire (TSQ) which includes 37 questions, each question has 5 choices. The probable ranges for the overall score were 1 to 185. When the participants' score less than the mean of 149 (80.5%) of total skill questions as poor perceived skill, while these scored greater than or equal to the mean of 149 (80.5%) of total skill questions as good perceived skill(29).

Training experience: is referred to the numbers of time and the types of previous training in triage and related topics in the past three years(29).

Work experience in ED: is referred to the numbers of months in which the nurses work in the ED. The longer months of working experience reflects the higher experience(29).

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

4.12. Ethical consideration

Ethical clearance was obtained from the departmental research and ethical review committee of the department of emergency medicine and critical care, facility of medicine, Addis Ababa University. An official letter of permission from the department was submitted to the selected hospitals in order to conduct the research. After informing respondents about the study's objective, data was collected by obtaining written verbal informed consent from each participant. Participants had the right to refuse or stop participation at any moment. Throughout the study period, information was recorded anonymously as well as confidentiality was ensured. All of the gathered data was kept confidential, and only members of the research team had access to it. All paper and computer records of the study were kept in a secure place under lock and any report did not include their name or any other personal information.

5. Results

5.1. Socio - demographic characteristics of participants

Out of the total 182 respondents in the adult emergency rooms of selected governmen hospitals, 179 participated in this study making a response rate of 98%. About two third of the nurses (73.7%) were aged 30 years and below, with a mean of age 28.5 (± 3.7). One hundred one (56.4%) of the nurses were females, and majority of them (79.3%) had BSc in nursing, while only a few respondents (7.3%) of them had diploma in nursing. Only 68 (38%) of the nurses had 3 years and below triage working experience, and majority (70.9%) of them have been attended either training or workshop during the past 3 years **(Tab 1).**

Table 1: Socio-economic factors of participants at the three selected public hospitals found in Addis Ababa, Ethiopia, 2023 (n = 179).

Variables	Category	Frequency	Percent
Age category	≤ 30 years	132	73.7
	> 30 years	47	26.3
Sex	Male	78	43.6
	Female	101	56.4
Educational level	Diploma in nursing	13	7.3
	Bachelors in nursing	142	79.3
	Postgraduate in nursing	24	13.4
Working experience by nursing profession	≤ 3 years	26	14.5
	> 3 years	153	85.5
Working experience in emergency department	≤ 3 years	29	16.2
	> 3 years	150	83.8
Triage working experience	≤ 3 years	68	38
	> 3 years	111	62
Currently working in triage room	Yes	64	35.8
	No	115	64.2
Training experience	Yes	127	70.9
	No	52	29.1

5.2. Availability of equipment or resources which assists nursing triage

By overall, the majority of the respondents (62%) stated that as the equipment's which are essential for triaging activity in triage room were available in the hospitals. Presence of triage assessment form (95.5%), presence of triage sheet (95%), and presence of pulse-oximetry (94.4%) were stated by the nurses as the most available resources in the triage room. On the other hand, presence of triage acuity rating guideline (32.4%), presence of thermometer (31.8%), and presence of pain assessment scale (29.1%) were rated by the participants as the least available equipment's in the triage room during triaging of patients **(Table 2)**.

Table 2: Availability of equipment or resources which assists nursing triage at the three selected public hospitals found in Addis Ababa, Ethiopia, 2023 (n = 179).

Equipment	Category	Frequency	Percent
Thermometer			
	Absent	57	31.8
	Present	122	68.2
Pulse oximetry			
	Absent	10	5.6
	Present	169	94.4
Glucometer with strep			
	Absent	31	17.3
	Present	148	82.7
Triage assessment form			
	Absent	8	4.5
	Present	171	95.5
Pain assessment scale			
	Absent	52	29.1
	Present	127	70.9
Stethoscope			
	Absent	29	16.2
	Present	150	83.8
Bag valve mask (Ambu bag)			
	Absent	24	13.4
	Present	155	86.6
Sphygmomanometer and BP cuff			
	Absent	23	12.8
	Present	156	87.2
Triage acuity rating guidelines			
	Absent	58	32.4
	Present	121	67.6
Oropharyngeal airway			
	Absent	42	23.5
	Present	137	76.5
Neck collar			
	Absent	42	23.5
	Present	137	76.5
Triage assessment tool			
	Absent	31	17.3
	Present	148	82.7
Triage sheet			
	Absent	9	5
	Present	170	95
Overall availability of triage equipment			
	Absent	68	38
	Present	111	62

5.3. Triage Knowledge of Nurses

The total knowledge of the respondents was categorized based on the overall mean and percentage. The proportion of these who scored less than to the overall mean of 7 (54%) were categorized as poor triage knowledge. More than half of the participants (58.1%), with a 95% C.I. (51, 65.3) had poor triage knowledge scores, with the mean score of 7.02 (± 2.025). Majority of the respondents (62%) defined triage correctly **(Figure 2).**

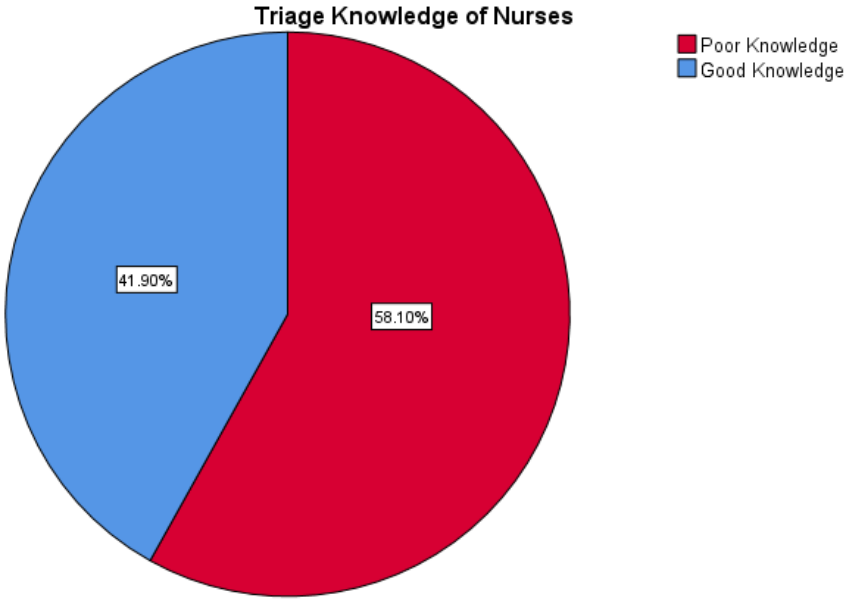


Figure 2: Nurses' Triage knowledge in the emergency centers of selected governmental hospitals in Addis Ababa, Ethiopia, 2023.

5.4. Perceived triage skill of nurses

The total skill of the respondents was categorized based on the overall mean and percentage. The proportion of these who scored less than to the overall mean of149 (80.5%) were categorized as poor perceived skill. Almost half (50.3%), with a 95% CI (43, 57.6) of the participants had poor perceived total triage skill, with mean score of 149 (± 24.285) **(Figure 3).**

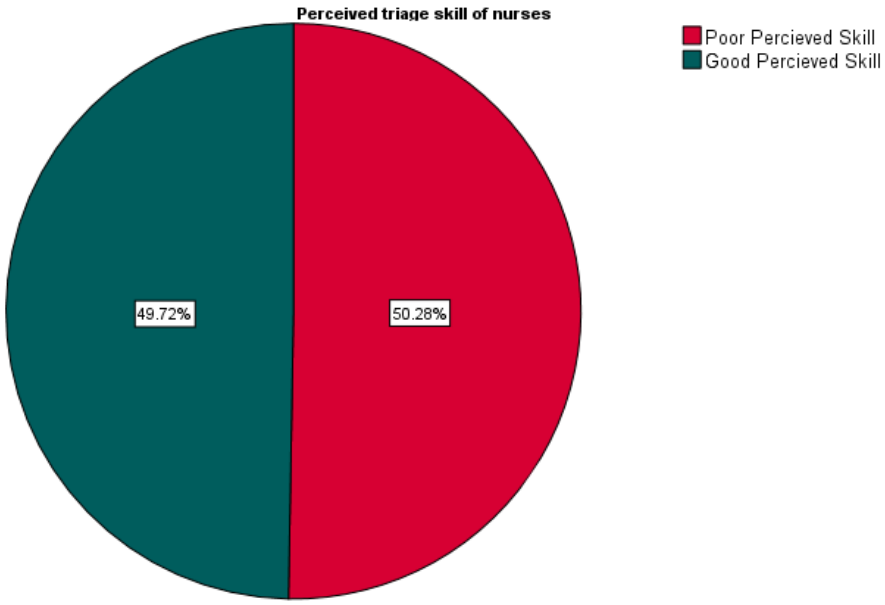


Figure 3: Nurses' perceived triage skill in the emergency centers of selected government hospitals in Addis Ababa, Ethiopia, 2023.

5.5. Factors associated with triage knowledge of nurses

After being filtered for multi-co-linearity by the variance inflation factor (VIF), which had a mean of 1.001, socio-demographic characteristics such as educational level and triage working experience of nurses were candidates to multivariable regression at a P-value below 0.25. Similarly, in multivariable regression, both factors educational level and triage working experience were significant predictors for triage knowledge at a P-value of <0.05.

Respondents who had diploma in nursing were with a lower likelihood of having good triage knowledge than these MSc holders (AOR = 0.121; 95% CI: 0.024-0.606) and these with BSc in nursing educational level had a lower likelihood of having good triage knowledge than these MSc nurses (AOR = 0.274; 95% CI: 0.104-0.723). These nurses with triage working experience of 3 years and below had less likely to have good triage knowledge than nurses with more than 3 years working experience (AOR = 0.275; 95% CI: 0.137-0.550)**(Table 3).**

Table 3: Socio-demographic factors associated with triage knowledge of nurses in bivariate and multivariable analysis, in public hospitals found in Addis Ababa, Ethiopia, 2023 (n= 179).

Factors	Triage knowledge		Crudes Odds ratio (95 percent CI)	Adjusted Odds ratio (95 percent CI)	Sig
	Good	Poor			
Educational level					
Diploma Nurse	3	10	0.150(0.032,0.703)	0.121(0.024,0.606)	**0.010***
BSc Nurse	56	86	0.326(0.131,0.811)	0.274(0.104,0.723)	**0.009***
MSc Nurse	16	8	1	1	
Triage experience					
≤ 3 years	17	51	0.305(0.157,0.591)	0.275(0.137,0.550)	**<0.001***
> 3 years	58	53	1	1	

5.6. Factors associated with perceived triage Skill of nurses

After being filtered for multi-co-linearity by the variance inflation factor (VIF), which had a mean of 1.114, socio-demographic factors such as age category of participants, sex of participants, educational level, currently working status in triage room, training experience during the past three years, availability of equipment's used for triaging emergency patients and triage knowledge of nurses were candidates to multivariable regression at a P-value below 0.25.

However, in a multivariable regression, factors such as training experience during the past three years and availability of equipment's used for triaging emergency patients were significant predictors of perceived triage skill at a P-value of <0.05. Participants who have been attended either training or workshop during the past three years had 5 times higher odds of good perceived triage skill than these without training experience (AOR = 4.973; 95% CI: 2.137-11.574). On the other hand, respondents who was said as absence equipment's used for triaging emergency patients had lower likelihood of good perceived skill than these who said available (present) (AOR = 0.328; 95% CI: 0.152-0.709)**(Table 4).**

Table 4: Socio-demographic factors associated with perceived triage skill of nurses in bivariate and multivariable analysis, in public hospitals found in Addis Ababa, Ethiopia, 2023 (n= 179).

Factors	Perceived triage skill		Crudes Odds ratio (95 percent CI)	Adjusted Odds ratio (95 percent CI)	Sig
	Good	Poor			
Age in years					
≤ 30	62	70	0.656(0.335,1.284)	0.715(0.325,1.574)	0.405
> 30	27	20	1	1	
Sex					
Male	32	46	0.537(0.295,0.977)	0.552(0.275,1.111)	0.096
Female	57	44	1	1	
Educational level					
Diploma nurse	8	5	0.960(0.239,3.853)	1.061(0.202,5.563)	0.944
BSc nurse	66	76	0.521(0.214,1.269)	0.601(0.203,1.774)	0.356
MSc nurse	15	9	1	1	
Currently working status in triage					
Yes	28	36	0.689(0.372,1.273)	0.799(0.384,1.660)	0.547
No	61	54	1	1	
Training experience					
Yes	78	49	5.933(2.788,12.628)	4.973(2.137,11.574)	**< 0.001***
No	11	41	1	1	
Availability of equipment					
Absent	18	50	0.203(0.104,0.394)	0.328(0.152,0.709)	**0.005***
Present	71	40	1	1	
Triage knowledge					
Poor knowledge	46	58	0.590(0.324,1.075)	0.602(0.296,1.224)	0.161
Good knowledge	43	32	1	1	

6. Discussion

The success of medical treatment depends on quick and accurate patient triage. Previous studies have shown that appropriate triage of injured patients has decreased deaths and enhanced resource use. The admission and stabilization processes for patients can be facilitated and the treatment trend of patients may be identified with the use of an accurate triage system(31).

Since nurses handle most triage tasks, their choices directly determine how quickly medical care is provided, and any failure to provide triage services has significant impacts. This research evaluated the nurses' knowledge and perceived skills towards triage as well as related aspects in the adult emergency centers of chosen governmental hospitals in Addis Ababa, Ethiopia.

6.1. Knowledge of nurses towards ED triage

The proportion of poor triage knowledge of nurses in this study was 58.1%, with a 95% C.I. (51, 65.3). This is similar with studies done in Indonesia on which more than half (58 percent) of the respondents had low triage knowledge and similarly, a study done in Dar es Salaam, Tanzania, 67 percent of respondents knew what triage was all about but only 58 percent of respondents had no any knowledge of waiting times for patients in different categories who had been triaged. In general, about half of participants knew nothing about triage and it was also consistent with a study conducted in Hawassa, Ethiopia on which, 51.5 percent of the respondents had poor triage knowledge (8,19,26). This might be due to the educational status and triage experience of the participants.

Regarding the definition of triage; 62%, with a 95% CI (55,69) of the respondents was defined it correctly in this study. Similarly, 67 percent of the respondents in a study done in Dares salaam, Tanzania had good knowledge on the definition of triage(8). It is also similar with a study done in Tamale Metropolis, Ghana, and found that 61.5 percent of the nurses knew what triage meant(25).

However, the proportion of poor triage knowledge in this study is higher than a study done in USA, on which 43.3 percent of the emergency units were triaged by nurses who had absence of educational preparation on triage(16). A similar study conducted in a Swedish emergency room revealed that 57.7 percent of the respondents had good triage(32). This is also greater than studies done in Tehran, Iran, where 53.9 percent of participants demonstrated knowledge about triage, and Tamale Metropolis, Ghana, where 62.6 percent of respondents demonstrated good knowledge in triage(25,33).

This discrepancy may be due to the real differences in triage knowledge, data collection tool, national guidelines and assessment methods differences.

On the other hand, the proportion of poor knowledge in the current research is less than a study undertaken in three hospitals affiliated with Mazandaran University of Medical Sciences in Sari, Iran, as well as Lahore, Pakistan, 69 percent of participants and 79.9 percent of responders, respectively, had inadequate knowledge of triage(23,24).This disparity could be due to the difference in hospital set up, national guidelines, assessment methods, and curriculum vary across different countries.

6.2. Perceived skill of nurses towards ED triage

The proportion of poor perceived skill was 50.3%, with a 95% CI (43, 57.6) in the current research. This is consistent with study carried out in Dar es Salaam, Tanzania found that more than half (52 percent) of the respondents were unable to place the patient in the proper triage category (8) and more than half (52.9%) of the nurses who participated in the study in Addis Ababa, Ethiopia demonstrated a moderate degree of triage skill (27). This could be because many nurses who worked in the emergency room were not given triage-related training.

However, the proportion of poor perceived skill in this study is higher than with other studies, only 34.6% of participants in a study at east Java Province, Indonesia felt that their overall triage skill was poor, while 23.8% of the participants in Hawassa, Ethiopia felt that their overall triage skill was poor (19,26).

This disparity might be due to a difference in national guidelines, study setting and sample size. For example, the study conducted in Hawassa included only 101 participants versus 179 respondents in this study.

In this study, educational level and triage experience of nurses were significant predictors of triage knowledge, as well as training experience and availability of equipment's were important determinants of perceived triage skill of nurses. Respondents with diploma and BSc in nursing educational status had a lower likelihood of having good triage knowledge than these MSc nurses.

In addition, those nurses with triage working experience of 3 years and below had less likely to have good triage knowledge than nurses with more than 3 years working experience. It is consistent with a study conducted in Hawassa specialized hospital, Ethiopia in which educational level and triage experience were significantly associated with triage knowledge(26).

Regarding to perceived triage skill, participants who have been attended either training or workshop during the past three years had 5 times higher odds of good perceived triage skill than these without training experience. On the other hand, respondents who was said as absence equipment's used for triaging emergency patients had lower likelihood of having good perceived skill than these who said available.

It is in line with study done in east Java Province, Indonesia on which triage skill of nurses had significant positive association with factors such as, triage knowledge and training experience and it is also agreed with studies conducted in Shiraz University of medical sciences, Iran and a study in Addis Ababa, Ethiopia on which training experience was significant predictors of perceived triage skill(19,27,28). This is also consistent with a study done in Dares salaam, Tanzania revealed that lack of basic equipment's in triage was one of the predictors of poor triage(8).

This is evidenced by the fact that having triage experience, a higher level of education, and triage training status could be improved nurses' knowledge and capacity in emergency department. In addition, a lack of equipment in the triage area makes it difficult for nurses to assess patients accurately, thoroughly, and effectively. This results in poor decision-making and poor prioritization of patient care, both of which can result in avoidable disabilities or fatalities.

7. Strengths and limitation of the study

7.1. Strengths of the study

- This study was multi-centered, which increases the representativeness of the findings.
- This study used ODK version 2022.1.2 software to collect the data, along with a Kobo Toolbox humanitarian response server to store the collected data and minimize data collector error.

7.2. Limitation of the study

- One limitation of this study was that triage skill was measured using self-administered questions only. Participatory observation might be a more useful technique, as it would probably decrease any negative effects of self-reporting.
- The data was limited to public hospitals, restricting generalization to the overall health facilities.

8. Conclusion and Recommendations

8.1. Conclusion

The results give us a greater understanding of emergency nurses' triage knowledge and perceived skill in the city of Addis Ababa, Ethiopia. The knowledge and perceived skill of triage was suboptimal. As nurse's knowledge about triage is a key tool in triage decision making, there is the need to improve on nurse's knowledge level and skills in triaging at the ED, because little above average score of nurses" knowledge about triage is not impressive.

Educational level and triage experience of nurses were significant predictors of triage knowledge, while training experience and availability of triage equipment's were significant predictors of perceived triage skill. Those diploma and BSc in nursing holders were with lower likely of having good knowledge as compared with MSc nurses and those with three years and below triage experience had lower likelihood of having good knowledge than those with above three years.

In addition, respondents who was said as absence equipment's used for triaging emergency patients had lower likelihood of having good perceived skill than these who said available. Whereas, participants who had taken a workshop or training during the past three years had higher odds of having good perceived triage skill than these had not.

8.2. Recommendations

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 Hospital Administrators

- To facilitate and give educational opportunities for emergency nurses.
- To fulfill hospital equipment's and tools.

To Researchers

- Further study is needed 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 nursing educational programs and training courses on triage knowledge and triage skill for nurses.

To FMOH and Federal Ministry of Education

- Trainings and education should be given by hospitals and the ministry of health to improve triage skills and knowledge. Workshops and in-service training should be conducted, then emergency department nurses should regularly engage in continuing professional development to raise their level of knowledge and skill.
- To incorporate triage course in nursing curriculum.

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Annexes

Annexes- 1: information sheet

Name of the investigator: Bete Mengist (MSc Candidate)

Thesis-Title: Triage knowledge and skills among nurses in adult emergency departments of selected public hospitals in Addis Ababa, Ethiopia, Dec. 2022–Jun/2023.

Thesis-Objective: To assess knowledge and skills of triage and associated factors among nurses in adult emergency department of three selected public hospitals in Addis Ababa, Ethiopia, Dec. 2022–Jun/2023.

Study-Techniques: To achieve the planned objective of the study, which includes; socio-demographic data, triage knowledge assessment questions, a triage skill assessment questions and Checklist to assess availability of equipment, which assists nursing triage was collected from nurses by structured self-administered questionnaire.

Confidentiality: The collected information was kept confidential and was used only for research purpose. No one except the investigator of the research had access to the information collected. The name and/or other personal information of participants was not notified in any report. All paper and computer record of the study was kept in a secured place under look when was not in use.

Person to contact: If the data collectors, supervisors, or other health center administrative staffs had any question regarding the study they were free to contact me in person or by the following addresses.

Cell phone: 0911566274

Email: betemengist4@gmail.com

Annex- 2: A check list for data collection tool

Data was collected using a structured self-administered questionnaire which was adapted from a similar study conducted in southern part of Ethiopia, Hawassa specialized hospital (28). And was adjusted according to the study's objectives and study design to collect data on Triage knowledge and skills among nurses in adult emergency departments of selected public hospitals in Addis Ababa, Ethiopia, 2023.

Consent form

Good morning/afternoon, my name is _____I am from Addis Ababa University. The objective of this study is to assess knowledge and skills of triage and associated factors among nurses in adult emergency department of three selected public hospitals in Addis Ababa, Ethiopia, 2023.

The finding of the study will be contributed to helping improve the knowledge and skills of triage among nurses in adult emergency department and assist the researchers, planners, and policymakers as a baseline for further interventions.

To conduct this study a letter of permission was obtained from Addis Ababa University. If you would like to participate in these questionnaires, this may take at most 20 minutes of your precious time. All the information that you are going to provide will remain confidential and you don't need to mention your name or any other identification. For this reason, you kindly requested to give your sincere and truthful answer. All this is completely voluntary bases and you have the right to refuse participation. Participation or non-participation and refusal to answer questions will not affect your personal and occupational life. Are you willing to participate in the study? Please confirm your answer by checking in either of the boxes below. Thank you.

Agreed Not agreed

If you agreed to take part in to this study, please get ready to answer all the questions as soon as possible. Your genuine participation and answers help us to meet our objective. We would like to thank you again for your willingness.

Name of the data collector: _____ signature: _____

Date of the data collection: _____

English Version Questionnaire

Questionnaire to assess Triage knowledge and skills among nurses in adult emergency departments of selected public hospitals in Addis Ababa, Ethiopia.

Socio-demographic Data

Demographic Data Sheet Code: … … … … … … … …

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 ☐ emale

3. Educational level;

1 ☐ Diploma in Nursing 2 ☐ chelors in Nursing

3 ☐ ostgraduate in Nursing 4 Others 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. Did you attend any training, course or workshop during the past three years?

Yes ☐ no ☐

Knowledge of triage: this section assessed the participants' knowledge of triage.

1. Define triage
   .....
   .....
2. How long should a patient with the following color code wait for treatment in the casualty or emergency unit. (select your answer from here: less than 10min, immediate, less than 60 min, less than 240min)
   (a) Red…….
   (b) Orange…….
   (c) Yellow…….
   (d) Green…….

Assume you are at the casualty or emergency unit as a triage nurse. Assign priorities to the following patients who come for emergency health care services with the following conditions. (*Label as P1 (Red), P2 (Orange), P3 (Yellow/Green): where P1 stands for first priority, P2 second priority, and P3 third priority*)

1. An Adult patient. Breathing with difficult. Respirations of 8/min, Systolic blood pressure of 80mmHg…….

2. An Adult patient. Fast breathing. Coughing. Respirations of 40/min, Temperature of 39 degrees centigrade ……

3. An Adult patient. Face burn. On severe pain. Respirations of 29, Pulse rate of 129/min……

4. Female. Pregnancy. walking. Trauma. Respirations of 20/min, Pulse rate of 100/min, and Systolic blood pressure of 130mmHg…….

5. Adult patient. Walking. Feeling discomfort. Headache. Systolic blood pressure 200mmHg…….

6. Adult patient. Skin moderate pale, cool, and dry. Reacts to voice. Respirations of 28/min, pulse rate of 110/min, Systolic blood pressure of 90mmHg…….

7. Adult patient on stretcher. Controlled bleeding. Weak peripheral pulse. Respirations of 20/min, pulse rate of 100/min, Systolic blood pressure of 130mmHg…….

8. Adult patient with chest pain radiating to the left arm. Walking. Respirations of 30/min, pulse rate of 110/min, Systolic blood pressure of 90mmHg……

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**				
		Very good (5)	Good (4)	Fair (3)	Poor (2)	Need improvement (1)
	Rapid Patient Assessment					
1	Aassess patient include vital signs with rapid assessment in 2-5 minutes					
2	Aassess or ask chief complaint of the patient rapidly					
3	In unconscious patients, look in the upper airway such as blood, vomit, foreign bodies, edema, 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 trust and head tilt					
7	Perform clear airway by correct position by jaw trust without head tilt if the patient suspect cervical spinal					

No	Triage skills	Perceived Triage Skill				
		Very good (5)	Good (4)	Fair (3)	Poor (2)	Need improvement (1)
8	Perform to insert oropharyngeal or nasopharyngeal airway					
9	Look at the chest about patient chest abnormal movement					
10	Assess rate and depth of respirations to observe (B) breathing rate and patternrhythm 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	Feel air blow from the patient with my cheek					
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)					

No	Triage skills	Perceived Triage Skill				
		Very good (5)	Good (4)	Fair (3)	Poor (2)	Need improvement (1)
20	Assess of the capillary refill					
21	Assess the temperature the patients					
22	Assess the patient with diaphoresis					
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	Catagorization 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					

No	Triage skills	Perceived Triage Skill				
		Very good (5)	Good (4)	Fair (3)	Poor (2)	Need improvement (1)
	Patient allocation					
32	Make a decision to allocate the patient with priority 1 (Resuscitation in ED) in the right place					
33	Make a decision to allocatethe patient with priority 2 (Critical care in ED) in the right place					
34	Allocate 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					

Check list to assess availability of equipment which assists nursing triage.(Availability of resources used for triaging of emergency patient)

No	Equipment name	Present	Absent
1.	Thermometer		
2.	Pulse oximetry		
3.	Glucometer with strep		
4.	Triage assessment form		
5.	Pain assessment scale		
6.	Stethoscope		
7.	Bag valve mask (Ambo bag)		
8.	Sphygmomanometer		
9.	Triage acuity rating guidelines		
10.	Oropharyngeal airway		
11.	Neck collar		
12.	Triage assessment tool		
13.	Triage sheet		