ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCE

SCHOOL OF NURSING AND MIDWIFERY

DEPARTMENT OF NURSING

POSTGRADUATE PROGRAM

QUALITY OF PEDIATRICS EMERGENCY TRIAGE AND ASSOCIATED FACTORS AMONG NURSES WORKING AT PEDIATRIC UNIT OF PUBLIC HOSPITAL IN ADDIS ABABA, ETHIOPIA 2023: INSTITUTIONAL BASED CROSS SECTIONAL STUDY.

BY: SEID ENDRIS (BSc NURSE)

A RESEARCH THESIS SUMMITED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, SCHOOL OF NURSING AND MIDWIFERY, DEPARTMENT OF NURSING IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTERS OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING.

JUNE, 2023

ADDIS ABABA, ETHIOPIA.

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ADVISORS: DR. RAJALAKSHMI MURUGAN

(ASSOCIATE PROFESSOR)

Mrs. YESHY BERHAN. (BSc, MSc. LECTURER)

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APPROVAL SHEET

This thesis is my original work for the partial fulfillment of the requirement for the degree of Master of Science in Pediatrics and Child Health Nursing.

Name of Principal Investigator

Seid Endris (BSc Nurse) Signature: _____ Date: _____

Place: Addis Ababa University, College of Health Science, School of Nursing and Midwifery, Department of Nursing.

This thesis has been submitted with my/ our approval as university advisor(s).

Name of Advisors:	**Signature**	**Date**
1. Dr. Rajalakshmi Murugan (Ph.D., Associate Professor.).	_____	_____
2. Mrs. Yeshy Berhan (BSc, MSc, Lecturer).	_____	_____
Name of Examiner	**Signature**	**Date**
3. Mr. Tigistu Gebreyohannis (MSc, Ass. Professor)		_____
Department Head	**Signature**	**Date**
4. Dr, Girum Sebsbe (PhD. Associate Professor)	_____	_____

STATEMENT OF DECLARATION

I certify that this thesis is my original work by signing below. In the planning, data gathering, data analysis, and final writing phases, I adhered to all study ethics guidelines. Every piece of academic research that is referenced in the thesis has been acknowledged. I certify that I correctly cited and included references for each source used in this paper.

This thesis has been submitted to Addis Ababa University in partial fulfillment of the criteria for the master's degree in pediatrics and child health nursing. The thesis will be placed in a depository in the library at Addis Ababa University and made available to borrowers by library policies. I confirm that no other institution, wherever, has received this thesis to award any academic degree, diploma, or certificate.

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Investigator	**Signature**	**Date**
Seid Endris	_____	_____
Advisors	**Signature**	**Date**
Dr. Rajalakshmi Murugan(PhD, Asso Prof)	_____	_____
Mrs. Yeshy Berhan(MSc, Lecturer)	_____	_____

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ABBREVIATION AND ACRONYMS

AA	Addis Ababa
CGLs	Clinical Guidelines
CI	Confidence Interval
DKA	Diabetic Ketoacidosis
Eds	Emergency Departments
ER	Emergency Room
ETAT	Emergency Triage Assessment and Treatment
ETB	Ethiopian Birr
GC	Gregorian Calendar
HCWs	Health Care Workers
OR	Odds Ratio
PEDs	Pediatric Emergency Departments
PTS	Pediatrics Triage Scale
SPSS	Statistical Package for Social Science
TASH	Tikur Anbesa Specialized Hospital
USA	United States of America
WHO	World Health Organization
ZMH	Zewditu Memorial Hospital

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ABSTRACT

Background: Triage is a way of categorizing patients based on their specific needs and the resources available to treat their medical condition. Since misclassifying high-urgency patients as low urgency levels slows diagnosis and treatment, which may raise the risk of morbidity or fatality, the proper categorization of high-urgency patients is crucial for patient safety.

Objective: To assess the quality of triage and associated factors among nurses working in pediatrics units of public hospitals in Addis Ababa, Ethiopia.

Method: Institutional-based cross-sectional study design was used to conduct this study in selected public hospitals of Addis Ababa from March 3 to 27, 2023. The sample size was determined by single population proportion formula by using correction formula and a total of 165 samples were included in the study. Data was collected by using a self-administered questionnaire and observational checklist and then the data was coded, entered, and cleaned by Epi data version 4.6 and exported to IBM SPSS Version 26 for analysis. . Bivariate logistic regression analysis was used to check variables association with dependent variable individually. Variables found to have association with the dependent variable (p-value up to 0.25) were entered in to multiple logistic regression models for further analysis. Significant association was considered with a P- value of 0.05 and confidence interval of 95%.

Result: This study has a 100% response rate and the quality of pediatric emergency triage is 31.5%. Only 52 (31.52%) respondents have good quality on triage whereas the majority 113(68.48%) have poor quality. Level of qualification (AOR = 4.72, 95% CI (1.19 – 18.7)), Working experience (AOR=0.16, 95% CI (0.05-0.57)), Triage knowledge (AOR=0.02, 95% CI (0.003-0.08)), Training on ETAT (AOR= 0.02, 95% CI (0.002-0.13)), Time taken to triage patient (AOR=0.003, 95% CI (0.000-0.3)) were strongly associated with outcome.

Conclusion and Recommendation: The overall quality of Pediatric emergency triage services in the study area was poor. To increase triage quality, it is essential to teach nurses on ETAT+ guidelines, and additional research on patient is preferable to increase triage quality.

Keywords: Pediatrics, Emergency, Triage, Quality

1. INTRODUCTION

1.1. Background

According to the severity of their conditions and the resources that are available in the emergency room, patients are categorized using the triage system(1). Pediatric emergency conditions cover a wide range of diseases that need appropriate treatment because it is the only way to handle them in order to preserve lives and prevent/minimize disability because one of the services that would increase the likelihood of survival is emergency care, and a pediatric emergency unit is a crucial area of care in all medical facilities where pediatric emergencies are immediately handled on a regular basis(2).

The triage assessment of patients, when they arrive at the emergency unit, is a significant aspect of providing high-quality emergency treatment since it is a vital job obligation of healthcare workers and is crucial to the proper operation of modern emergency departments(3). The correct classification of high-urgency patients is important for patient safety because misclassifying high-urgency patients as low urgency levels delays diagnosis and treatment which may increase the risk of morbidity or mortality because overcrowding of emergency departments (EDs) is a widespread and ongoing issue(4). For the sake of patient safety and safeguard against under-triaging, pediatric triage scales (PTSs) are used to prioritize children for giving care(5).

Triage expertise is among the most crucial components of nurse supervision in an emergency room because patient clinical outcomes and emergency room productivity are impacted if triage knowledge is not applied at a standard level(6). When establishing the urgency of a patient for an accurate category and triage decision-making, the presence of qualified and trained emergency nurses is essential(7). The Canadian Triage and Acuity Scale (CTAS) has been employed in Saudi Arabia's tertiary MOH hospitals' urgent care centers for the past ten years, and its implementation has allowed ED nurses to solve problems more effectively(8).

Most pediatric hospital deaths typically occur during the first 24 hours of admission, and they are typically brought on by easily treatable infections (9). And the initial 24 hours of hospitalization are the most vulnerable because of the sickness severity, delay in presentation, lack of resources, and delayed detection of the illness(10). WHO guideline shows delay in recognition, late presentation, lack of resources, and illness severity make the first 24 hours of hospitalization the most susceptible period (11).

1.2. Statement of the Problem

Poor triage decisions results in delay in treatment plans, and negative outcomes. Appropriate triage decisions shorten waiting times and leads to improved treatment outcome(12). Emergency room (ER) overcrowding can have serious effects on client safety and is basic issue for global public health(13). The risk of death of children before the age of five more than fifteen times higher in sub-Saharan Africa (14).

Emergency Triage Assessment and Treatment (ETAT) guideline is recommended by the World Health Organization (WHO) for use in most developing countries(15), and this system has been found to reduce mortality. However, the implementation and consistency remains a major gap in the health facilities. Furthermore, mismatch between the capacity of emergency departments and service demand and lack of inpatient beds results in patient crowd (16).

Proper triage decision-making requires expertise and experience of nurses working in emergency triaging (17). Studies suggested that, to perform triage with a high level of precision and competence, licensed nurses ought to finish a triage-specific training course as well as other relevant programs and qualifications(18).

A study conducted in Wolayta zone Ethiopia, reported that, only nine percent of nurses working in adult emergency setting and none of the nurses working in he pediatric emergency have training on triage assessment and treatment ETAT guideline(19).

Emergency service in Ethiopia lacks the fundamental infrastructures, facilities, tools, and human resources to providing emergency care and treatment (20). Improper implementation of ETAT+ guideline causes insufficient patient triage and treatment or patient over triage (21).
According to a study conducted in Canada, several methods, including: audit and feedback, reminder systems, simulation, and electronic decision-support tools have been suggested to improve triage (22).

However, there is gap in the literature that addressed the current study in the area. Therefore, this study aims to assess the quality of pediatric emergency triage and associated factors among nurses working at pediatric units of selected public hospitals in Addis Ababa.

1.3. Significance of the Study

Although Ethiopia has been implementing pediatric emergency triage evaluation and treatment since 2014, no research has been conducted to evaluate the quality of pediatric emergency triage and the associated factors in this study area.

This study be very crucial for every institution for appropriate treatment and prevention of future problems. It hopefully give baseline data for any intervention to be implemented at hospitals that have pediatric emergencies in Ethiopia.

The study also help policymakers and healthcare professionals to formulate effective childcare policy, and develop guidelines and regulations for the treatment and prevention of child death in pediatric emergencies. This study also serve as baseline information for another researcher.

2. LITERATURE REVIEW

This literature review is organized into two sections. The first section deals with literature related to the quality of triage in pediatric emergency departments and the second one is about factors associated with pediatric emergency triage.

2.1. Quality of Triage

Critical thinking and clinical decision-making abilities are required for the autonomous nursing role known as triage(23). Study done in the USA shows that differentiating ED patients based on the severity of their conditions helps to provide time-dependent therapies, reduce avoidable adverse events and clinical deterioration, decrease morbidity and mortality as well as potentially limit ED overcrowding (24). A Malaysian study demonstrates that training is an effective way to increase the knowledge and precision of nursing staff in making triage decision.(25).

Expectations as well as the number of clients visiting emergency departments around the globe are increasing(26). A rapid procedure known as triage is used whenever a patient's clinical condition changes in the hospital ward or when they arrive somewhere at the facility(9). Patient triage is a challenging task, especially when children are involved and health professionals must deal with several issues in these situations, including the failure to assess children remotely depending on the caregiver's speech, controlling parents' fear, and an absence of clinical practice guidelines in pediatrics EDs are few of challenge (27).

All clinical staff who work in crises must comprehend the guidelines for protecting children and adolescents and they must have a minimum level of understanding, skills, and competence in caring children and adolescents to increase quality of triage in the emergency department(28).

Asthma, noninfectious diarrhea, and infections of the upper airway were the most common acute conditions in the past few years among people who frequently visited emergency departments Furthermore, general hospital nurses were even less skilled at categorizing children than those working in specialized pediatric hospitals(29). Pediatric triage scales (PTSs) are used in emergency departments (EDs) to prioritize the treatment of children, which is vital to protect client health and avoid under-triage(30).

The ability of a charge nurse to make the right decisions in triage depends on their competence, experiences, and role, and when these qualities are paired with externally relevant workplace factors, they may have a favorable effect on the way patients are treated(31).

2.2. Associated Factors of Pediatrics Emergency Triage Quality

2.2.1. Health Care Facility Related Factors

Sera Lion's study reflects there is no training on ETAT before 2016 and in 2017 training was given and care quality increased after getting training on ETAT guideline(32) Another study done in Iran shows that the institution has to keep track of the usage of triage structures, collaborate with other emergency sections, and provide routine retraining triage training to nurses to improve their efficiency in this area (33).

According to a Persian study inadequate space at triage, a lack of adequate instruments such as a sphygmomanometer, and a lack of space suited for keeping clients until they are transferred to the ward cause client wait times to increase and treatments to be prolonged(34). Another study carried out in Guatemala revealed that minor practice modifications and effective resource allocation were all associated with improved pediatric care then after rapid and precise patient triage based on an effective triage system is feasible(35).

A Tanzanian study found that the quality of the triage is related to interpersonal relationships, motivated staff, a defined pediatric emergency triage and management plan, leadership, or administrative assistance(36). Another study done in Tanzania in four regions of ten hospitals in the country also shows the accessibility of materials and drugs used for emergency service is good but there is a shortage of guidelines, especially in regional hospitals than tertiary hospitals which affects the quality of care given for patient(37).

According to a study done at the government hospital in Somaliland, all institutions that treat children who are ill or injured should have the right assemblage of medications and materials like ETAT guidelines, For example, laboratory supports, medications and other crucial equipment are not available which had an impact on the care we provided and led to poor inappropriate care in low-income nations(38). Also study conducted in Sudan shows that only two of the eight medical centers examined in this study have formal triage protocols and systems in place(1).

According to a study done at the public hospital serving the Tigray area of Ethiopia the overall score for emergency service preparedness and accessibility is 64% and Nearly 50% of basic medical supplies are readily available(39). but another study done in Hawasa Ethiopia pointed discovered that there is a significant material deficit that impacts the efficacy of rapid triage services(19).

2.3.2. Health Care Workers Related Factors

A study conducted in the USA found that Health care workers in pediatric emergencies experience discomfort due to factors that prevent a proper triage system(40). The results of a study conducted at the Kwazulu Hospital in South Africa demonstrate a substantial correlation between the number of years of experience of nurses and their duties during triage, with ($p= 0.001$) being used to indicate the significance and these results indicated that the responsibilities that nurses can play during triage depend on their years of working experience as well(41). The ability of nurses to provide client care, communication skills, caring abilities, respect for the client, and expertise in diagnosis and treatment of the medical issue is among the elements that influence client satisfaction with nurse-led triage(42).

Korean study reflects that the pain scale was incorrectly applied to the Korean triage and acuity scale algorithm, which was the primary cause of miss-triage(43). Research from Indonesia demonstrates the importance of Health - care workers in improving the quality of care provided in triage, which is influenced by knowledge ($p = 0.017$), working experience ($p = 0.023$), and training ($p = 0.041$) and Competency is one factor to improve the quality of care in emergencies which include triage(44). And a Taiwan study reveals that factors such as professional experience, emergency care experience, triage experience, and whether nurses have a triage certificate all significantly affect the quality of care(45).

A study conducted in Tanzania shows that the chance of getting guidelines and training on it is less than 50% and nurses who are working in a regional hospital has a low chance to use guideline and getting training on it(37). Another study conducted in a remote area of South Africa demonstrates the benefits of proper triage training for triage nurses such benefits include increased efficiency and increased preparedness for performance and the more training or training exercises nurses participate in, the higher their level of performance development(46). But a study done in Hawasa Ethiopia, found that just 19.8% of those who participated had passed the Triage Officer Course, 6.9% had taken the Basic Trauma Life Support (BTLS) course, and 7.9% had gone to a trauma in nursing care seminar (35).

2.4, Conceptual Framework

The theoretical structure that follows was developed by taking into account the previous assessment of the quality of triage and related factors. This emphasizes the factors required for the study's success and demonstrates how the special factors used in the study relate to each other (32, 35, 36, 38, 41, 45).

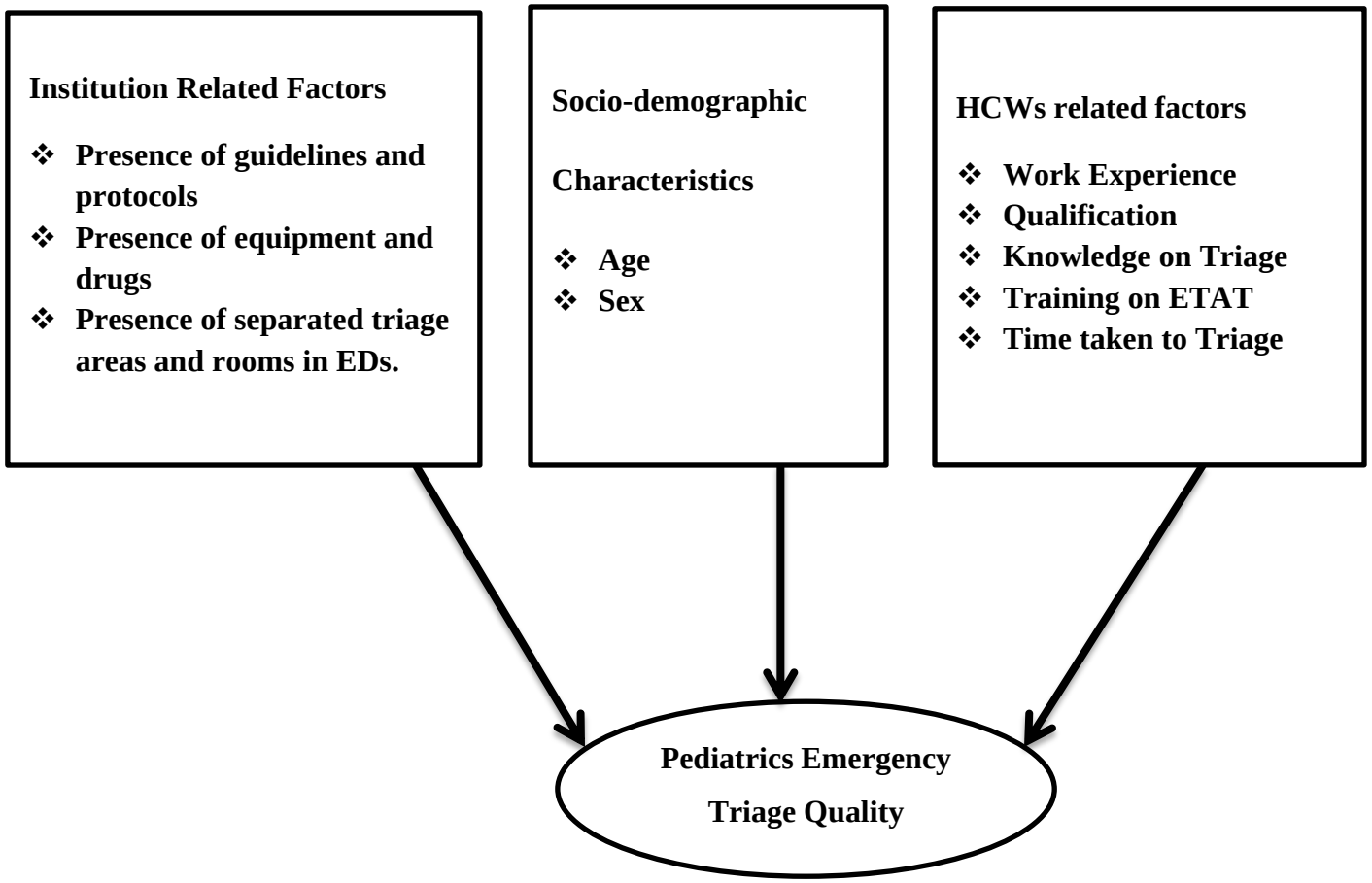

Figure 1: Conceptual Framework

3. OBJECTIVES

3.1. General Objective

- To assess the quality of pediatric emergency triage and associated factors among nurses working at pediatrics units of public hospitals in Addis Ababa Ethiopia 2023.

3.2. Specific Objective

- To determine the quality of Pediatric emergency triage among nurses working at pediatrics units of selected public hospitals in Addis Ababa Ethiopia, 2023.
- To identify factors that affect the quality of pediatric emergency triage among nurses working at pediatrics units of selected public hospitals in Addis Ababa Ethiopia, 2023.

4. METHODOLOGY

4.1. Study Area

The investigation was carried out among nurses employed in selected public hospitals with pediatrics service in Addis Ababa, Ethiopia. Addis Ababa is the capital city of Ethiopia and head quarter for Africa with an estimated population of more than 5 million and an annual increase of 4.4 percent, the capital has an overall area of 527 square kilometers, and is organized by 11 sub-cities, and 121 districts (referred to locally as "woredas")(47). There are 13 public hospitals in Addis Ababa, distributed throughout 11 sub cities. Five of them are federal hospitals, six are run by the Addis Ababa health bureau, one is run by the police, and one is controlled by the military(48). The study was conducted in Tikur Anbesa specialized hospital, Zewditu Memorial Hospital, Yekatit 12, and St. Paulo's Hospital.

4.2. Study Design and study period

- Institutional-based cross-sectional study design conducted from March 3- March 27, 2023.

4.3. Population

4.3.1. Source Population

- All nurses working at pediatrics units of all government hospitals in Addis Ababa.

4.3.2. Study Population

- All Nurses working at pediatrics units of selected government hospitals in Addis Ababa.

4.3.3. Study Units

- Randomly Selected nurses who are working at pediatrics units of selected government hospitals in Addis Ababa who fulfill eligibility criteria.

4.4. Eligibility Criteria

4.4.1 Inclusion Criteria

- All nurses who were employed and working at pediatric units of selected public hospitals.

4.4.2. Exclusion Criteria

- Nurses who were on annual leave, sick leave, and maternity leave during the data collection period and nurses who have work experience of less than 6 months because having more experience had significant association with outcome.

4.5. Sample Size Calculation

Utilizing the single population proportion formula for single proportion population, the research's final number of samples is calculated., $\mathbf{ni} = \frac{\left(\frac{\mathbf{za}}{\mathbf{2}}\right)\mathbf{2p(1-p)}}{\mathbf{d2}}$

Where ni = Initial estimated sample size, Z = Confidence level (alpha, α), P = prevalence, and d = marginal error, Since there is a previous study in Ethiopia but no prevalence on triage quality and p-value taken as 0.5 With a 95% confidence level and margin of error (0.05)

n= (**1.96**) (**0.5**)(**0**.41) / **(0.05)** ² =384 with 10% none response rate n = 422.4 ~ **422**

- Since the total population is less than 10,000 and the calculated sample size is less than the total population, so correction formulas are used which is

$\mathbf{N = n/1 + n/N}$ = 422 / 1+ 422 / 272 ~ 165

Nf = 165

Where n = calculated sample size and N = total population

4.6. Sampling Procedure

Among all 13 public hospitals four public hospitals in Addis Ababa with pediatric units were selected by lottery method, study populations were chosen. The entire number of nurses employed by every facility in pediatrics units was initially acquired in order to determine the research's respondents. Additionally, sampling units were chosen for each hospital by proportionally dividing the overall sample for each study hospitals and again in each hospital proportional allocation was done for each units or emergency room and wards. And the research units were selected via a method known as simple random sampling up to the required data collected from each study units. Proportional sample size allocation = $\frac{\boldsymbol{nf*Nj}}{\boldsymbol{N}}$

Where, **N** = total number of nurses working in pediatrics units in four public hospitals

nf =final sample size of the study, which is 165

$\boldsymbol{Nj}$ =number of nurses in pediatric units of each public hospital.

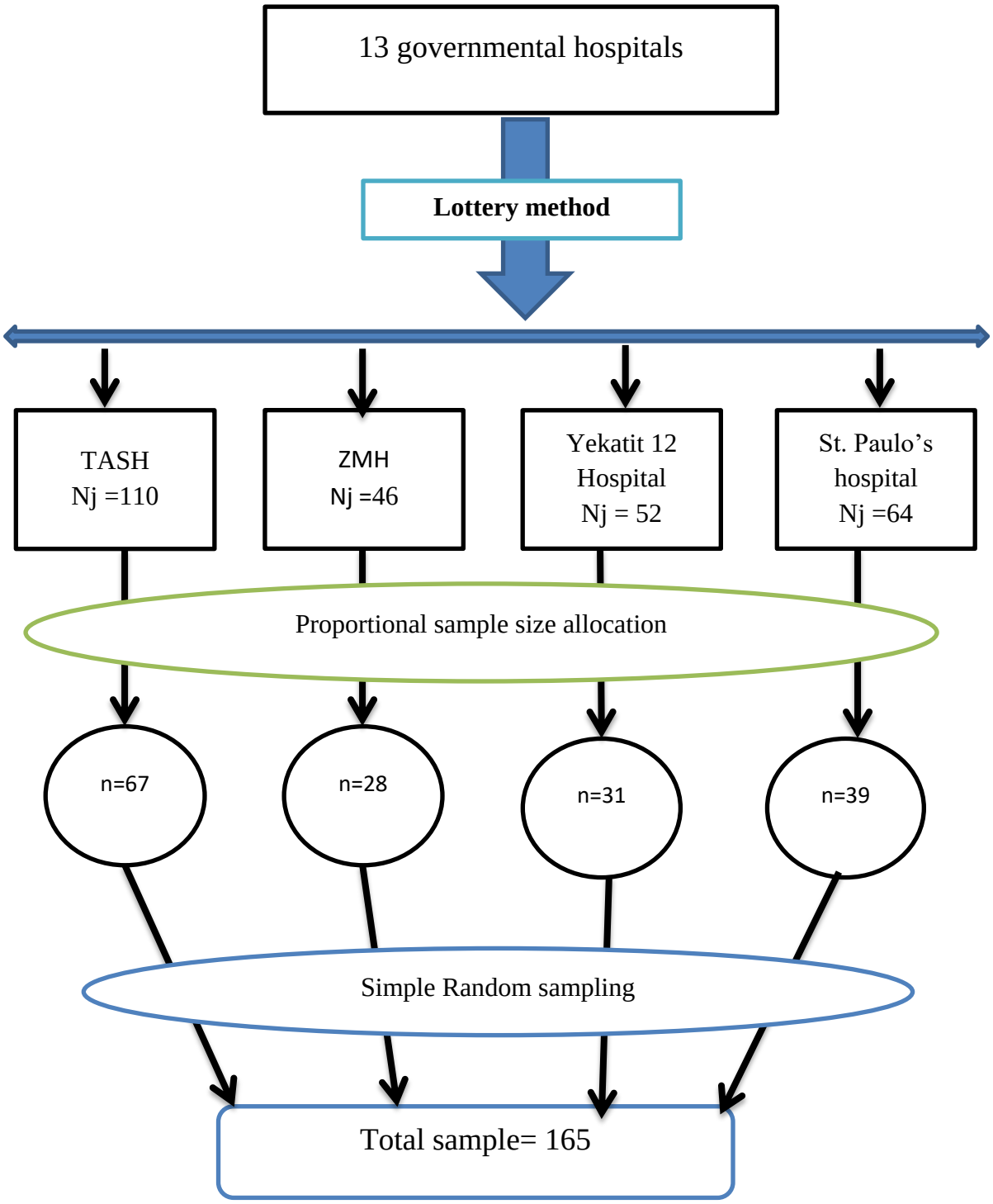

Figure 2: Sampling Procedure

4.7. Variables

4.7.1. Dependent Variable

- Pediatric Emergency Triage quality

4.7.2. Independent Variable

- **Socio-demographic factors**: Age, Sex
- **HCWs-related factors:** work experience, qualification, knowledge of triage, Time taken to categorize patient, and training on ETAT
- **Institutional factors**: Presence of guidelines and protocols, Presence of Emergency drugs and Fluids, Presence of equipment, Presence of separate area for triage in EDs.

4.8. Operational Definition of Terms

- **Good Quality triage** is present if a child with emergency or priority indications is immediately classified without delay, Nurse Get training on ETAT, Good triage knowledge, and basic triage infrastructures are available in study hospitals' triage units(19). This was determined by mean value of each variable so, mean value for knowledge was 0.55 (mean above 0.55 indicate good knowledge), mean value for ETAT training was 0.40 (mean above 0.40 had training on it), mean value for time taken during triaging was 0.25 (mean above 0.25 had triaged patient without delay), mean value for infrastructure was 0.61 (mean above 0.61 shows materials available in the unit) and after computing those four variables the mean was 0.315 (mean above 0.315 indicates good quality triage)
- **Poor quality triage**: if there is delay in child triage **or** not taking training on ETAT **or** lack of fundamental triage infrastructure **or** having poor knowledge of nurses about triage(19). This was determined by mean value of each variable so, mean value for knowledge was 0.55 (mean below 0.55 indicate poor knowledge), mean value for ETAT training was 0.40 (mean below 0.40 had no training on it), mean value for time taken during triaging was 0.25 (mean below 0.25 not triaged patient without delay), mean value for infrastructure was 0.61 (mean below 0.61 means materials was not available in the unit) and after computing those four variables the mean was 0.315 (mean below 0.315 indicates poor quality of triage).

4.9. Data collection tool

The survey instrument was adapted in accordance with the results of a prior study conducted in Ethiopia's Wolayta zone after getting permission from principal investigator (19). These tools include empirically choosing samples, carefully building instruments (questionnaires), verifying by an experienced investigator and academician, and pretesting. The tools used for this investigation were created by carefully adjusting conventional questions of a previous research project. The tool had three parts that evaluated the socio-demographic of nurses, their familiarity with pediatric emergency triage, and the usage of observation checklists written in plain English.

4.10. Data Collection Procedure

After collecting ethical clearance letters were submitted to the hospital research team to get permission to collect data from study participants then study participants selected randomly.

Data was collected using a standardized self-administered questionnaire and observational checklist and the questionnaire was given to participants after telling the aim of the study and getting their permission randomly for those who fulfill the inclusion criteria. The researcher was in charge of overseeing the entire study's administration, developing the last questionnaire that determining training needs, and assigning gatherers and supervises. Two certified BSC nurses served as the data collectors. And information was gathered from Monday through Friday until the necessary data was gathered.

4.11. Data Quality Assurance

This entails thoroughly modifying the typical survey forms, choosing the sample, gathering data, and instruments that to be utilized in order to guarantee reliability and validity in this study.

Pretesting was conducted at Minilik II Hospital among 5 % of total sample size one week before actual data collection period and data discarded or not included in main research. The questionnaire was examined for clarity, thoroughness, and validity prior to actual data collection,

To guarantee that every one of the data takers were using the same knowledge of the study item and survey management techniques, training was provided. Each day, an MSc nurse and the project's primary investigator assigned and oversaw a training session that covered the study's objectives, privacy, and how to interact with study respondents and information collectors.

4.12. Data Processing and Analysis

Epi-data version 4.6.0.0 statistical software was used to enter and clean the data before transferring it to IBM SPSS version 26 for additional analysis. Data was presented using tables and graphs. Computing analysis was applied first similar variables computed then each variable listed in operational definition computed together again to describe the outcome. To examine each variable's relationship with the variable of interest, bivariate logistic regression analysis was utilized. A P-value of less than 0.05 was regarded to indicate a significant relationship between a variable and the variable of interest. Variables that were found to be connected with the variable of interest (p-value up to 0.25) were put into multiple logistic regression models for additional analysis. The ratio of odds with a 95% confidence interval was used to describe the strength of relationship among the dependent and independent variables.

4.13. Ethical Consideration

Addis-Ababa University's College of Health Science Ethical Committee and the Addis Ababa Public Health Research and Emergency Management Directorate provided their ethical clearance and approval, respectively. The School of Nursing and Midwifery provided formal notifications to the chosen hospitals. Prior distributing a questionnaire, oral consent was sought from every responder after stating the study's goal and potential benefits.

Every stage of response received in the current research was kept private. Code numbers were employed rather than names of individuals in order to maintain secrecy. The research respondents were made aware of their legal entitlements to decline enrollment, reject to respond to any questions, and resign at any time without suffering any negative consequences.

4.14. Dissemination Plan

Results of the research will be delivered to the College of Health Sciences at Addis Ababa University. Selected Ethiopia public hospitals, the Addis Ababa public health research and emergency management directorate, and the Addis Ababa municipal health bureau will get the report's findings. The final product will be presented at various meetings and health-related meetings, particularly those focused on children's health care challenges, as well as submitted to national as well as global publications for future use.

5, RESULT

5.1 Socio-Demographic Characteristics of Respondent

This study considered 165 nurses working in pediatrics units of selected public hospitals in AA with a 100% response rate. Of the total respondent, 85(51.5%) were female, 80(48.5%) were male in sex and the mean (±SD**)** age of respondents were 33.26 (±6.534) years and the age of the majority of participants 74(44.8%) were in between 20–30 years and the other 65(39.4%),25(15.2%) and 1(0.6%) were between the age of 31 – 40, 41–50 and above 50 years respectively. The majority 99(60%) of respondents had a BSc degree, 26(15.8%) had an MSc degree and 40(24.2%) had a Diploma, and the majority 92(55.8%) of them had working experience of 6 – 10 years, 45(27.3%) had less than 5 years and 28(17%) have above ten years of experience. (Table 1)

Table 1: Socio-demographic characteristics of respondents

Item	Variable	Frequency(n=165)	Percent
Sex	Male	80	48.5
	Female	85	51.5
Age	20-30	74	44.8
	31-40	65	39.4
	41-50	25	15.2
	>50	1	.6
Experience	< 5 year	45	27.3
	6 -10 year	92	55.8
	>10 year	28	17
Qualification	Diploma	40	24.2
	BSc	99	60
	MSc	26	15.8

5.2, Knowledge of Respondents

From a total of 165 respondents with a 100% response rate the prevalence of knowledge on knowledge assessment question was 73.5% and the mean (±SD) of respondents on triage knowledge assessment question was 30.8848 (±7.07142) and respondents who answer assessment question above the mean value were taken as having good triage knowledge which is 91 (55.15%) and respondents who answer below the mean value were taken as having poor triage knowledge which is 74 (44.85%) of the total respondent which indicates that above half of the study participants had good triage knowledge and 44.85% had poor triage knowledge.

From a total of 165 participants 121 (73.3%) were define triage,123 (74.5%) were know the criteria for priorities patients, only 51(30.9%) respondents knew about a place where triage takes place, and only 76(46.1%) knew the required time needed to triage patient.(Figure 3)

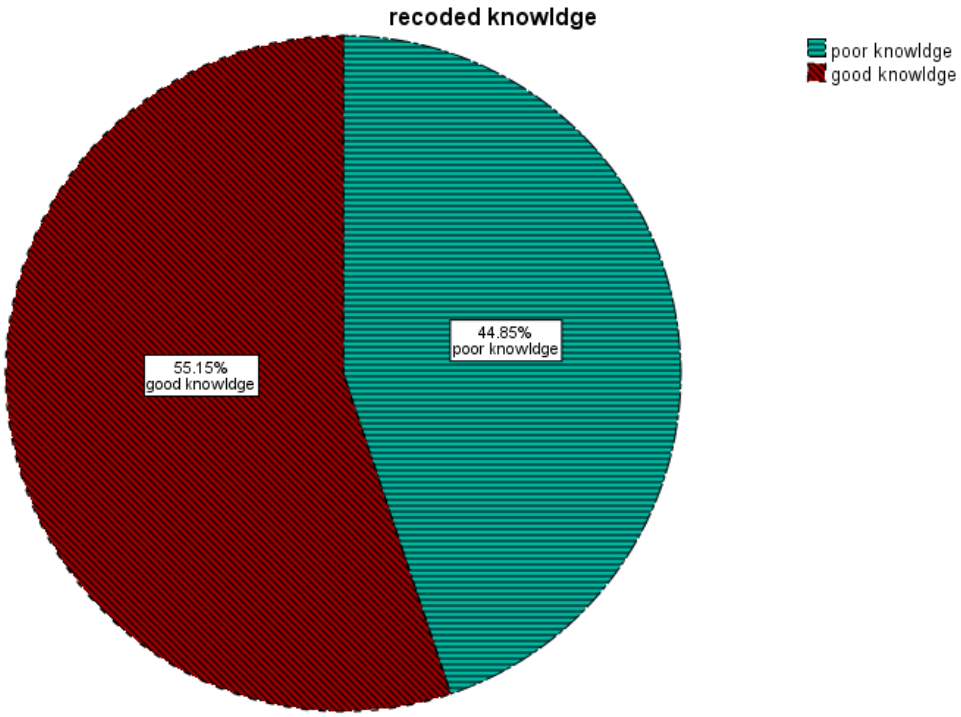

Figure 3: Shows Knowledge of Participants on Triage Assessment Questions.

5.3, Training on ETAT+ Guideline

This study results finding reveal that training on Ethiopian ETAT+ Guideline out of a total of 165 participants 66(40%) were had training, and 46(27.9%) nurses were taken training within Five years period and the remaining 20(12.1%) were got training before Five years, so they should be updated again but there is no updated guideline within the recent five years and there is a gap in giving training for health care workers. (Table 2)

Table 2: Training on ETAT+ guidelines and when they trained

Variable		Frequency(n=165)	Percent
Trained on ETAT	Yes	66	40
	No	99	60
When got training	Before 5 year	19	11.5
	Within 5 year	47	28.5

5.4, Availability of Guideline, Materials, Emergency Drugs, and Triage Space

This study was conducted in four selected public hospitals in Addis Ababa and the mean (±SD) value of availability of infrastructure is 21.5 (±57735). And all hospitals had ETAT guidelines and triage protocols which are available in the triage area in trushcart by hard copy and soft copy in their computer.

Regarding materials listed in ETAT+ Ethiopian guideline majority of materials were available in each hospital and they were functional but in all hospitals umbilical catheters were not available and in two hospitals Intraocious needles and card boards were not available whereas other materials like monitors, suction machines, oxygen cylinder with gauge, oxygen concentrator, glucometer with test strip, nebulizer, thermometer, suction machine suction tube were available.

In case of fluids, all hospitals where this study was conducted had all types of fluids including 40% glucose in their emergency unit with a minimum of one bag for each type of fluid used for emergency treatment of patients like NS, RL, and 5%DW were available.

In case of emergency drugs listed in the ETAT+ Ethiopia guideline, 75% 0f study hospitals had all emergency drugs but in 25% of the study hospital salbutamol puff were not available but the other emergency drugs were available at the emergency unit.

In case of the Emergency Room, all hospital's emergency departments were located in front of the hospital gate it can be found easily by a patient, and had a separate triaging area with enough space(can occupy a patient who is coming by wheelchair with one attendant) also had separated treatment area.

5.5, Supervision and Nurses for Emergency Triage

The study was conducted in four hospitals and each hospital has an emergency triage area and a minimum of two nurses assigned for triaging patients in all programs. Each HCWs are assigned based on department schedule but only 75 % of hospitals have supervisors in their unit but one hospital didn't have supervision and follows the nurses assigned in the unit.

5.6, Time Taken to Triage Patient

Nurses observed when they categorize patients immediately after the patient arrived in the triage area, from the total of 165 participants only 41(24.8 %) of respondents categorized the patient immediately within 20 seconds but the majority of study participants need above 20 seconds to categorize patients. whereas 76(46.1 %) respondents knew minimum time required to triage patient is 20 seconds. (Table 3)

Table 3: Nurses observed how long they take time to triage

Variable		Frequency(n=165)	Percent
Time taken to triage patient	< 20 second	41	24.8
	>20 second	124	75.2
Total		165	100

5.7, Outcomes of Quality of Triage

In this study, the mean value of triage quality is 0.3152 with SD = ±0.465, and only 52 (31.52%) respondents have good quality on triage whereas the majority 113(68.48%) have poor quality on triage, and the total percentage of quality of triage in Addis Ababa public hospitals is **31.5** percent. (Figure 4)

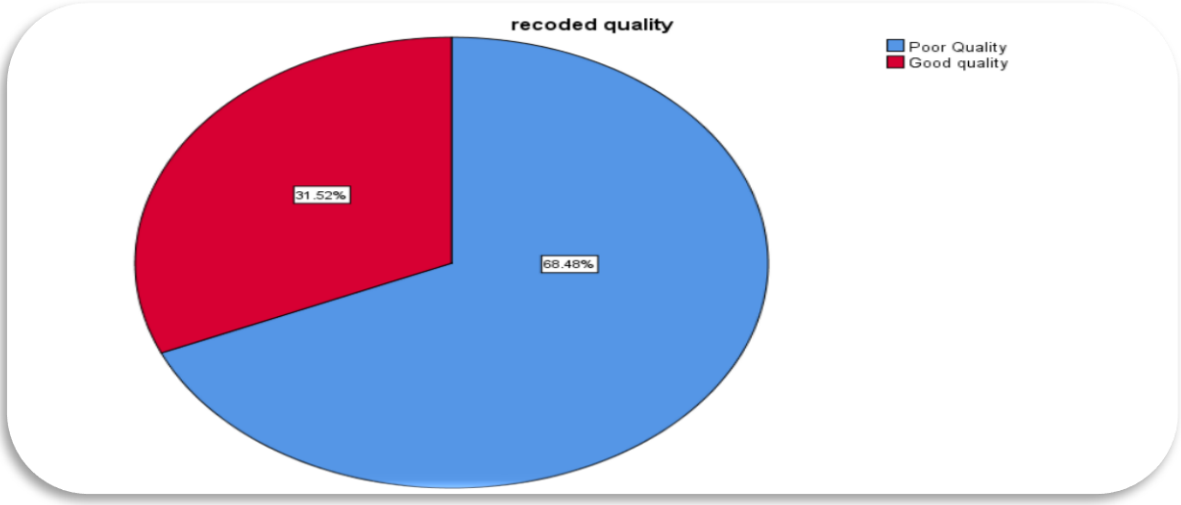

Figure 4: Shows Outcomes of Triage Quality in AA public hospitals

5.8, Factors Associated with the Outcomes

Factors associated with the quality of pediatrics emergency triage showed that nurses with Msc qualifications, nurses who worked less than 10 years, nurse's knowledge about triage, nurse's ETAT training, and time taken during the triaging process were strongly associated with the quality of pediatrics emergency triage at P-value less than 0.05.

There was a relationship (0.027) between educational qualification and outcome, (Those nurses who had MSc qualification were 5 times better during triaging when compared to nurses with Diploma qualification). There was also an association seen between the work experience of nurses and the quality of triage, (84% of nurses who worked more than 10 years had better triaging quality than both nurses with less than 5 years and 6 to 10 years of working experience with a P value of 0.008 and 0.005 respectively). There was also a strong relation between times taken during triage and nurses' triage quality, (the triage quality was better when it was done within 20 seconds when compared to greater than 20 seconds with a P value of 0.000). A strong

association was also seen between nurse's knowledge about triaging and triage quality, (98% of nurses who had good knowledge about triage were better with quality triage than nurses who had no adequate knowledge of triaging with a P value of 0.000). 99.4% of nurses who took ETAT training had a good quality of triaging compared to nurses who did not take training (P= 0.000)(Table 4).

Table 4: Bivariate and Multivariate logistic regression which shows factors associated with the outcome of triage quality in PEDs of selected public hospitals, 2023.

Variable	Value	Outcome		COR	AOR	P-value
		Good Quality	Poor Quality			
Level of Qualification	MSc	12	14	3.43(1.15 - 10.23)	4.72(1.19 – 18.7)	**0.027**
	BSc	32	67	1.91(0.79 – 4.61)	2.204(0.72 – 6.77)	0.167
	Diploma	8	32	1	1	1
Working Experience	< 5 years	15	30	0.43(0.17 – 1.14)	0.16(0.04 – 0.61)	**0.008**
	6 – 10 years	22	70	0.27(0.11 – 0.66)	0.16(0.05 – 0.57)	**0.005**
	>10 years	15	13	1	1	1
Triage Knowledge	Poor	2	72	0.023(0.005 – 0.099)	0.02(0.003 – 0.08)	**0.000**
	Good	50	41	1	1	1
ETAT training	No	7	92	0.036(0.014 – 0.09)	0.02(0.002 – 0.13)	**0.000**
	Yes	45	21	1	1	1
Time taken to Triage	>20 second	13	111	0.006(0.001 – 0.028	0.003(0.000 – 0.3)	**0.000**
	< 20 second	39	2	1	1	1

6, DISCUSSION

Quality of pediatric emergency triage is similar to other institutional based cross-sectional studies done in resource-limited countries like Somaliland and Sudan (1,3). This study revealed that the quality of pediatrics emergency triage has poor quality (there is a delay in child triage **or** nurses not taking training on ETAT **or** a lack of fundamental triage infrastructure **or** having poor knowledge of nurses about triage).

In this study 60% of study participants are not trained on ETAT this is higher than a study done in Iran (42%) this may be due to differences in country development(31). And this is below than study done in Tanzania (78%) of study participants had no formal training either in triage or patient care this may be due to the study done in regional hospitals(37) and this is almost similar to a study done in Ethiopia (56%) of study participant got training this may be similarity in resource allocation or monitoring from local or national government officials(19). This shows that there is a shortage of training. So, there should be an improvement to give training on emergency care and triaging for HCWs who are working in the emergency department.

This study shows there is poor knowledge of nurses on triage and this is in line with other similar studies in the USA and Tanzania (4,37) which may affect the quality of triage and this may be because of a lack of training on ETAT guidelines and other related courses, so there is need to improve knowledge of HCW by giving training for all nurses working in pediatrics units of hospitals in the country to increase the quality of emergency triage.

This study revealed that there is good resource availability in the study area but in all hospitals there is no umbilical catheter and in 50% of hospitals there is no Intraocious needle and cardboard to make splints also in 25% of the study area there is no salbutamol puff. But other infrastructures were available and also emergency room is located in front of the hospital gate it has a separate triage area and enough space for triaging and this is higher than studies done in Persia, Sudan, Somaliland and Ethiopia Hawasa (34, 38, 19, 1) which have poor access for emergency equipment's this may be because of limitation of resource and studies conducted out of the capital city of the country and which is similar with studies done in Tanzania and Tigray region of Ethiopia. This may be because of a study done in the capital city of the country and its similarity with resource allocation and budgeting (37, 39).

In this study, there is a significant association between working experience < 5 years (p=0.008), experience 6-10 years (p=0.005), and triage quality like studies done in Taiwan, Indonesia, South Africa, and Ethiopia(19,41,45,46). And also there is significant association p=0.27 between level of qualification and the outcome this is similar with study done in Pakistan (6), and Ethiopia. (18)

This study also indicates that knowledge had a significant association with triage quality (p = .00, (AOR = 6.832, 95% CI (0.210 - 0.353)) and which is similar to studies done in Indonesia(42), Ghana, and Ethiopia (19,45). This may be because getting information and reading guidelines and updating HCWs' knowledge is mandatory to increase the quality of care and triage in the emergency departments of the hospital.

Getting training on ETAT guidelines is significantly associated with triage quality (p = 0.000, AOR= 0.02, 95% CI (0.002 – 0.13)) which is similar to the study done in Sera lion (p = 0.005), Indonesia study also shows training had a significant association with outcome (p = 0.041). Taiwan study was also similarly significant (32,48,45). And in my study time taken to triage patients had a significant association p=0.000 with triage quality but there is no other study that had a significant association for comparison. This result indicates as a patient triaged immediately the quality of triage becomes good.

7, CONCLUSION AND RECOMMENDATION

7.1, Conclusion

This study indicated that the overall quality of pediatric emergency triage service was poor and needs improvement which may be described as absence of training, absence of protocols, poor HCWs knowledge on principles of triage absence of regular supervision and monitoring, and absence of child appropriate triage. By providing teaching for HCWs on ETAT+ Ethiopia who were providing care to children, by enhancing supportive supervision, and by developing easy-to-implement measures such as using CPGLs to improve the quality of care for hospitalized children, the pediatric emergency triage process can be improved.

7.2, Recommendation

❖ For Hospitals

- The hospitals should avail essential infrastructures, materials, and drugs that are used for emergency management.
- The hospital should give training for all health professionals specially ETAT guideline.
- Continuous supervision and evaluation are must to ensure the quality of care given to clients.

❖ For Researchers

- There is a research gap in the area and future studies may focus on identifying factors associated with major causes of pure quality of emergency triage.

❖ For FMOH and Policymakers

- For the proper triaging, treatment, and prompt intervention, develops national pediatric emergency care guidelines and plan training program for HCWs.

❖ For Healthcare professionals

- To give competent care to their patients, healthcare practitioners should pay close attention to the quality of pediatric emergency triage services, refresh their knowledge of modern ED services, or undergo training in the fundamentals of pediatric emergency triage assessment and treatment.
- HCWs should integrate the simple and appropriate CPGLs for the categorization of pediatric emergencies to enhance the quality of care for pediatric emergency

8, STRENGTHS AND LIMITATIONS OF STUDY

8.1, Strength

- This study is the first study in a study area in discipline and it gives baseline information for hospitals, Health care workers, FMOH, and other researchers.
- The study identifies major gaps in the study area and assesses the availability of essential materials by observational checklist rather than using self-report.
- Fairly longer time used for data collection.

8.2 Limitation

- It is better to include clients in the study to identify further gaps.
- Materials that are not available in the triage area at data collection time are taken as absent but they may be available in-store.
- Mixed study was better to assess quality.
- Using self-administered questioners expose for bias.

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10, ANNEX

Annex 1- Information Sheet:

Greetings: Good morning/afternoon! Hello.

My name is _____ am a member of the research team involved in a master of pediatrics and child health nursing student project at Addis Ababa University. I am conducting a study to determine the quality of triage and associated factors among nurses working in pediatrics units, the results of this study will be used to improve services offered to children which improve the outcome of the disease in the long run.

Risks and discomfort: There are no risks involved except the time you take in answering the questions. It take about 15- 20 minutes of your time.

The benefit of the study: There are no direct benefits to you as an individual participant. But accordingly, the result provide important information on addressing the problem of the quality of triage and associated factors by creating a convenient programmatic approach to give appropriate service to the respective population.

Incentive: There is no financial or material incentive for participating in this study.

Confidentiality: Study data was coded so that it was not be linked to your name. All information obtained in the course of this study was held in confidence.

Rights of Participants: You have a full right either to participate or refuse as well as to quit in the middle or at any time you want after you start participating in this study. You may respond to all the questions or you may not answer questions you don't want to answer.

Person to contact: The development of this study was revised and authorized by Addis Ababa University, College of Health Science, School of Nursing and Midwifery. If you have any questions, you can contact any of the individuals listed below (Investigators and Advisors)

1, Seid Endris, Addis Ababa University, College of Health Science, Department of Pediatrics and Child Health Nursing MSc student: principal investigator

Cell phone: +251-921526280, E-mail: seididris3052@gmail.com

2. Dr. Rajalakshmi Murugan (Asso. Professor)

Cell phone +251911721193, Email rajisomanathan@gmail.com

3. Mrs. Yeshy Berhan (MSc, Lecturer)

Cell phone +251993933411, Email yeshiworkberhan@gmail.com

Annex 2: Data collection tools

English version Questionnaire Related to Quality of Pediatrics Emergency triage and associated factors among Nurses working at pediatric unit of a public hospital in Addis Ababa, Ethiopia,2023.

Instructions: Read each question carefully and tick your answer on the box

Part 1. Socio-demographic Characteristics of Nurses

01. Age? (in years)_____

02. Sex? ☐ 1. Male ☐ 2. Female

03. Level of qualification? ☐ 1. Masters in Nursin ☐ 2.Degree Nurse ☐ 3. Diploma Nurse

04. Working experience: _____year _____month(s)

Part 2. Knowledge of Nursies in Pediatric Emergency Triage.

05. What is triaging?

☐ 1. Sorting of patients into priority groups according to their needs and resources available

☐ 2. Rapid assessment of cases

☐ 3. Rapid treatment of cases

06. According to the ETAT guideline hospital registration must be done after triaging the child.

☐ 1 Yes ☐ 2. No

07. What criteria do you use to triage a child?

☐ 1. Order of arrival ☐ 2. Chief complaint of patient ☐ 3. Child vital signs

08. What are important signs (s) to categorize patients for providing immediate (**Emergent**) treatment? (More than one answer is possible).

☐ 1. Central cyanosis
☐ 2. Obstructed or absent breathing
☐ 3. Circulation problem/shock signs
☐ 4. Coma or Unconscious
☐ 5. Convulsion
☐ 6. Severe respiratory distress
☐ 7. Severe dehydration
☐ 8. Bleeding (spontaneous or trauma
☐ 9.Poisoning within 1hr / acute eye poi
☐ 10. Open fracture by major trauma

09. What are the Priority sign(s) to categorize patients for providing rapid attention or **urgent** treatment? (More than one answer is possible).

☐ 1. Severe pallor
☐ 2. History of poisoning
☐ 3, Severe pain
☐ 4. Edema of both feet
☐ 5. Severe visible wasting
☐ 6. Burn
☐ 7. Referral for urgent treatment
☐ 8. Respiratory distress
☐ 9. Sick child aged less than two months
☐ 10. Child is very hot or very cold

10. Where should triage assessment and treatment take place?

1. In emergency room **2.** In ward **3.** In outpatient department **4.**In all places

11. How long does it take to triage a child with any emergency or priority signs?

1. Within 20 seconds **2.** 5-10 minute **3.**30-40 minutes **4.**More than 1 hrs

12. What are components assessed after a child arrived at the triage area? (> 1 answer is posible)

1. Airway 2. Breathing 3. Circulation 4. Dehydration

13. What are common emergent signs during airway assessment? (> 1 answer is possible)

1. Obstructed or absent breathing 2. Central cyanosi 3.Severe respiratory distress

14. What are common Signs of severe respiratory distress?(> 1 answer is possible)

1.Severe lower chest indrawing 2.Use of auxiliary muscles 3. Head nodding

15. What are common emergent signs during circulation assessment?(> 1 answer is possible)

1. Cold skin 2.Capillary refill longer than 3 seconds 3.Weak and fast pulse

16. What are common signs of Sevier dehydration?(> 1 answer is possible)

1. Lethargy 2.Sunken eyes 3.Very slow skin pinch 3.Unable to drink

17. What is the criteria to say a child has a full conscious level during triaging of a sick child?

1.If the child is Alert
2. Child responding to Pain
3.Child responding to Voice
4.Child who is Unresponsive to Voice

18. What is the first step during Triaging a sick child?

1. Look for emergency signs
2. Treat any emergency signs you find
3. Call a senior health worker
4. Look for any priority signs
5. Place priority patients at the front
6. Move on to the next patient

Part 3: Training on ETAT and Nurse Time Taken to Triage Patient

21. Have you trained on ETAT+ guidelines? 1. Yes 2.No

22. When do you get training? Before _____ years _____ months

23. Nurse observed how much time taken to categorize patients after arriving at an emergency

≤ 20 sec 5 – 10 minutes > 30 minutes

Part Four: Observation checklists on the availability of materials in PEDs of each Hospital	NA	AV	Quantity
Supervision for triage			
Protocols for emergency triage			
Standardized guidelines for triaging patient			
assigned nurse for the triage unit in each shift			
Non-consumable			
Nebulizer			
Glucometer			
Oropharyngeal (Guedel) Airways: at least 3 different sizes			
Intraocious needle			
Self-inflating bag with mask 3 different sizes			
Electric (foot) suction pump with suction catheters			
Oxygen concentrator or oxygen cylinder with gauge & nasal prong			
Digital BP cuff			
Manual BP cuff with a stethoscope			
Pulse oximetry for PSo2			
Thermometer			
Adhesive tape and cotton			
Cardboard to make splints			
IV cannulas different size			
Umbilical catheter			
Test strips for blood sugar measurement			
DW 5% glucose or half-strength Darrow's with 5% glucose			
Ringer's lactate or 0.9% normal saline			
40% glucose			
IV Diazepam or Lorazepam			
Adrenaline IV			
Salbutamol puff			
The emergency room found near to in front of the hospital gate			
Is there any separate room for triage			
Is there enough space for triaging in a triage room			

Quality of pediatric emergency triage and associated factors among nurses working at pediatrics units of government hospitals in Addis Ababa Ethiopia 2023.

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