

RESEARCH ARTICLE

Assessment of Emergency Triage Knowledge, Practices, and Perceived Barriers to Effective Care Delivery Among Acute Care Staff in a Kenyan Tertiary Hospital

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ABSTRACT

Background: Triage ensures patients receive timely emergency care based on severity, but inadequate knowledge and training in resource-limited settings are linked to inconsistent prioritization and adverse outcomes. In Kenya, standardized triage protocols remain fragmented, particularly in county-level referral hospitals. This study assessed triage knowledge and described triage practices among emergency department staff at Nakuru County Referral and Teaching Hospital (NCRTH), Kenya. **Methods:** A facility-based descriptive cross-sectional study was conducted among the 62 eligible emergency department and acute care nursing staff at NCRTH. Data were collected using a structured, self-administered questionnaire assessing triage knowledge, training status, systems familiarity, and practices (Cronbach's alpha 0.81), and analysed in SPSS version 27 using descriptive statistics and multiple-response analysis. **Results:** Of 62 questionnaires distributed, 55 were returned (88.7% response rate). Most respondents were female (63.6%), aged 26-35 years (54.6%), and diploma-qualified (56.4%); 60.0% had received formal triage training. Colour-coded protocols were the most recognized system (34.5%), followed by the Emergency Severity Index (21.8%) and SATS/START (14.5%). Of the 55 nurses assessed, 49 (89.1%) accurately defined triage, most often citing patient prioritization (33.3%), outcome improvement (22.7%), and saving lives (12.1%) as its main importance. Practice was more variable: classification accuracy was 55.8%, category-assignment accuracy 66.7%, and intervention-identification accuracy 70.5%. Understaffing (42.6%), limited resources (31.9%), and inadequate training (29.8%) were the main barriers. **Conclusion:** Staff showed general awareness of triage, but practical application remained inconsistent, with gaps in training, systems familiarity, and uniformity of practice. Structured training and context-appropriate protocols are needed to strengthen emergency care delivery.

Keywords: triage; emergency department; knowledge; nursing practice; Kenya; resource-limited settings

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INTRODUCTION

Emergency care constitutes a critical component of health systems globally, playing a central role in reducing morbidity and mortality associated with acute conditions. Worldwide, emergency departments (EDs) face growing patient volumes and increasingly complex presentations, ranging from minor complaints to life-threatening emergencies (Zaboli et al., 2024). Within this environment, triage systems are essential for managing patient flow, prioritizing time-sensitive care, optimizing the allocation of limited resources, and improving patient outcomes (Mostafa&El-Atawi, 2024). Internationally recognized systems, including the Emergency Severity Index (ESI) and the Manchester Triage System (MTS), have been adopted in well-resourced settings; however, these models rely heavily on clinical experience, diagnostic infrastructure, and algorithms that are not readily transferable to resource-limited environments (Altalhi et al., 2025). The South African Triage Scale (SATS) and the Cape Triage Score (CTS) were developed to be more adaptable to African contexts, incorporating simplified scoring based on vital signs and clinical discriminators (Mould-Millman et al., 2021). Nevertheless, these tools may also demonstrate limitations in settings with junior or understaffed emergency teams, where subjective clinical judgment may compromise triage quality.

In sub-Saharan Africa, emergency departments face overwhelming patient volumes, limited infrastructure, and critical staffing shortages that collectively undermine the effectiveness of existing triage protocols (Oyedele et al., 2025). In many settings, triage decisions are guided by subjective clinical assessment or informal colour-coding systems rather than validated, standardized tools (Mould-Millman et al., 2021). This disparity contributes to delays in identifying critically ill patients, inefficient use of scarce resources, and inconsistent patient outcomes. In Kenya, triage implementation has been uneven; while the Emergency Medicine Kenya Foundation (EMKF) has made strides in staff training and equipping facilities with monitoring devices, standardized triage systems remain incompletely adopted in rural and county-level hospitals (Siegel et al., 2024). These systemic challenges create persistent knowledge and training gaps among healthcare providers, which may adversely affect the accuracy and consistency of triage decisions.

Nakuru County Referral and Teaching Hospital (NCRTH) is among the busiest county referral hospitals in Kenya, and its emergency department faces operational challenges. These mirror difficulties documented across Kenyan public hospitals more broadly, including overcrowding, insufficient staffing, and inconsistent or absent

standardised triage systems (Onyango et al., 2024). Clinical observations and informal reports indicate recurring delays in care delivery, misprioritization of critically ill patients, and variable patient flow management. Although the SATS has demonstrated promising outcomes in other Kenyan settings, including improved inter-rater reliability, reduced over-triage, and high sensitivity (92.2%) in predicting patient outcomes at Kenyatta National Hospital, its broader adoption across county hospitals has been hampered by systemic constraints, resource limitations, and inconsistent training programs (Wangara et al., 2019). Triage practice at NCRTH, therefore, remains largely improvised, contributing to variability in patient prioritization and care delivery.

Despite the critical role of triage in emergency care, facility-specific evidence on the triage knowledge and practices of emergency department staff at NCRTH is limited. Existing training gaps and the absence of context-appropriate triage protocols pose a significant public health concern, as suboptimal triage may delay life-saving interventions and contribute to preventable mortality. Understanding these gaps is essential for developing evidence-based, locally adapted interventions to strengthen emergency care delivery at the institutional and county levels. This study therefore assessed the knowledge and triage practices of emergency department staff at Nakuru County Referral and Teaching Hospital, Kenya, with the ultimate objective of informing the development of a context-specific, evidence-based triage framework to enhance emergency care.

METHODS

Study Design

A facility-based descriptive cross-sectional study design was employed. Cross-sectional designs are appropriate for studies seeking to characterize the prevalence of knowledge, attitudes, and practices at a specific point in time (Cummings, 2018). Data were collected between March - May 2024 using structured, self-administered questionnaires. This design enabled the simultaneous assessment of triage knowledge, training status, and self-reported triage practices among the target population within a defined period.

Study Setting

The study was conducted at Nakuru County Referral and Teaching Hospital, a Level 6 teaching and referral hospital situated in Nakuru County, within Kenya's South Rift Valley. NCRTH serves a large catchment population across Nakuru and neighboring counties and manages high patient volumes across multiple acute care areas.

Units included in the study were the Emergency Department (ED), Intensive Care Unit (ICU), Renal Unit, and Burns Unit, all of which routinely manage acutely and critically ill patients requiring rapid clinical decision-making. The hospital was selected as the study site due to its high patient acuity, its status as a regional referral center, and the documented absence of a facility-wide standardized triage protocol.

Study Population

The target population comprised all qualified nurses directly involved in the management of acutely and critically ill patients in the emergency department and selected acute care units (ICU, Renal Unit, and Burns Unit). These units were purposively selected because staff working within them routinely make triage decisions and maintain direct contact with critically ill patients. The study focused on emergency care staff with frontline triage roles. Inclusion Criteria: (1) Registered nurses, (2) Actively deployed in the Emergency Department (ED), Intensive Care Unit (ICU), Renal Unit, or Burns Unit, (3) Minimum of three months of continuous clinical experience, and (4) Direct involvement in patient assessment, triage, or acute care decision-making. Exclusion Criteria: (1) staff on annual, sick, or study leave during the data collection period, (2) Nurses with less than six months of experience in the ED, ICU, Renal Unit, or Burns Unit, (3) Nurses assigned to non-critical care departments within the ED, such as the medical and pediatrics outpatient clinics, (4) Nurses in administrative or managerial roles without direct patient care responsibilities.

Sampling Procedure

Participants were selected from all nurses meeting the inclusion criteria across the four study units (Emergency Department, Intensive Care Unit, Renal Unit, and Burns Unit). The original design specified proportional stratified sampling with systematic random selection within strata, using duty rosters as the sampling frame. However, the accessible eligible population across all four units was small 75 nurses (NCIRTH record 2023), close to the minimum sample size required. A census approach was therefore adopted in place of random sampling, with all 75 eligible nurses invited to participate. Of these, 62 were successfully reached and enrolled during the data collection period. The study used stratified random sampling to ensure representation across all acute care units. The study population consisted of 75 nurses distributed across four strata: Accident and Emergency (23), Burns Unit (12), and specialized acute wards comprising ICU (18), Emergency Ward (9), and Renal Unit (13), totaling 40.

Sample Size Determination

Because the accessible eligible population within the study units was smaller than this figure,

a finite population correction formula was applied using the formula: $n_n = n / [1 + (n - 1)/N]$, where N represents the eligible population size (75 nurses across the four study units). This yielded a corrected minimum required sample size of 62 participants. Proportional allocation was then applied, yielding 19 nurses from Accident and Emergency, 10 from the Burns Unit, and 33 from the specialized acute wards. Within each stratum, the Duty Rota was used to generate a complete list of eligible nurses on duty. From these lists, computer-generated random numbers were used to select participating nurses, minimizing selection bias. After briefing each selected nurse on the study objectives, the study enrolled only those who voluntarily consented. This approach strengthened the validity of the findings by ensuring proportional representation across units, reducing sampling error, and ensuring that the results reflected the range of triage knowledge and practices among emergency care staff in the hospital setting while maintaining ethical standards of voluntary participation and confidentiality.

Data Collection Tools

Data was collected using a structured, self-administered questionnaire developed by the researcher. The questionnaire comprised four sections: (i) demographic and professional characteristics; (ii) triage training history; (iii) knowledge and familiarity with triage systems; and (iv) perceptions regarding the components of a context-appropriate triage protocol. The tool was pre-tested at Machakos Level 6 Hospital among six emergency department nurses (representing approximately 10% of the study sample) to assess feasibility, clarity, and content validity. Feedback from the pre-test was used to refine item wording and confirm alignment with study objectives. Internal consistency was assessed using Cronbach's alpha, which yielded a coefficient of 0.81, indicating good reliability.

Data Collection Procedure

Two Bachelor of Science in Nursing (BScN)-trained research assistants were recruited to support the principal researcher during data collection. They were oriented to the study objectives, ethical principles, the distribution of the questionnaire to eligible participants, and data quality standards before data collection. Eligible participants were approached during their scheduled work shifts, briefed on the study purpose, and invited to participate. Written informed consent was obtained from all willing participants before administering the questionnaires.

Questionnaires were self-administered and collected on the same day or within 24 hours. The principal investigator conducted daily supervisory visits throughout the data collection period, with multiple check-ins scheduled to align with staffing patterns in the study units. Specifically, visits were made during the morning shift (8:00-10:00 AM) and the afternoon shift (2:00-4:00 PM) to monitor completion rates and address challenges in wards operating on two shifts. In the Emergency Department, which operates a straight shift, supervisory visits were conducted at midday (12:00-1:00 PM) to ensure adherence to protocol and monitor completion rates.

Data Quality Control

Several measures were implemented to ensure data quality. Before data collection, the questionnaire was pretested and refined based on participant feedback. Research assistants received standardized training to ensure consistent administration procedures. During data collection, the principal investigator reviewed completed questionnaires daily for completeness and legibility. The principal investigator entered the data, and a randomly selected 10% of questionnaires underwent double-entry verification to detect and correct entry errors.

Data Management and Analysis

Data were entered and analysed using SPSS Statistics version 27.0 (IBM Corporation, Armonk, NY). Demographic characteristics, triage training status, and triage knowledge were summarized with descriptive statistics. Categorical variables were presented as frequencies and percentages.

For the multiple-response item assessing perceived benefits of triage, multiple-response analysis was used; frequencies and percentages for the triage-familiarity item were computed as simple proportions of the total number of respondents ($N = 55$). No inferential statistical tests were performed because the primary study objective was descriptive. Data are presented in tabular and narrative formats.

Ethical Considerations

Ethical approval was obtained from the Kenyatta National Hospital-University of Nairobi Ethics and Research Committee (KNH-UoN ERC; Reference: P615/08/2023) and the National Commission for Science, Technology and Innovation (NACOSTI; Reference: NACOSTI/P/24/32944). Institutional research authorization was granted by NCRTH management prior to data collection (NCRTH/R&EC/VOL 1/2023).

All participants were fully informed of the study's purpose, procedures, voluntary nature, and their right to withdraw at any time without consequence. Written informed consent was obtained from each participant. Confidentiality was maintained throughout by assigning unique identifiers to all questionnaires; no personal identifiers were recorded. Data were stored on a password-protected computer accessible only to the research team and will be securely retained for at least five years after publication.

RESULTS

Response Rate and Participant Characteristics

Of the 62 questionnaires distributed to emergency department and acute care staff at NCRTH, 55 were completed and returned, yielding a response rate of 88.7%. Seven questionnaires were not returned because participants were unavailable during follow-up. The high response rate supports the reliability of the findings and reduces the likelihood of non-response bias. Table 1 summarizes the demographic characteristics of study participants. Most respondents were female (63.6%), and most were aged 26 to 35 years (54.6%), representing an early- to mid-career workforce. In terms of professional experience, 34.5% of participants worked in hospital settings for two to five years, while 16.4% had more than 20 years of experience, indicating a mix of early-career and experienced personnel. Regarding professional cadre, Nursing Officer III constituted the largest proportion (40.0%), followed by Nursing Officer I and II (18.1% each). Diploma holders formed the majority (56.4%), with 27.3% holding bachelor's degrees. Most participants (89.1%) reported prior experience in the emergency department; however, 38.2% had worked in the ED for less than one year, suggesting limited depth of exposure for a substantial proportion of the workforce.

Table 1:
Demographic Characteristics of Study Participants

Variable	Category	n	%
Gender	Male	20	36.4
	Female	35	63.6
Age (Years)	21-25	9	16.4
	26-30	15	27.3
	31-35	15	27.3
	36-40	6	10.9
	41-45	3	5.5
	46-50	2	3.6
	>50	5	9.0
Years Worked in Hospital	<1 year	5	9.1
	1-2 years	5	9.1
	2-5 years	19	34.5
	5-10 years	9	16.4
	10-20 years	8	14.5
	>20 years	9	16.4
Professional Cadre	Enrolled Nurse	3	5.5
	Nursing Officer III	22	40.0
	Nursing Officer II	10	18.2
	Nursing Officer I	10	18.1
	Senior Nursing Officer	5	9.1
	Principal Registered Nurse	3	5.5
	Chief Nursing Officer	2	3.6
Level of Education	Diploma	31	56.4
	Bachelor's Degree	15	27.3
	Higher Diploma (Nephrology)	6	10.9
	Certificate	2	3.6
	Master's Degree	1	1.8
Prior ED Experience	Yes	49	89.1
	No	6	10.9
Duration in ED	Never worked	6	10.9
	Less than one year	21	38.2
	One to two years	10	18.2
	Three to four years	9	16.4
	Four to five years	5	9.1
	More than five years	4	7.3

Note: Percentages are Column Percentages Calculated using N = 55. Percentages may not Sum to 100 due to Rounding.

Status of Triage Training and Knowledge of Triage Definition Among Nurses

When asked whether they had received formal training in a triage system, 60.0% (n = 33) of respondents reported having received it, while 40.0% (n = 22) reported no such training. However, when asked to define triage as a concept in emergency care, as shown in Table 2, the majority of nurses demonstrated a strong understanding: 49 of 55 respondents (89.1%) provided an accurate definition. Only six respondents (10.9%) were unable to define triage correctly.

Table 2:

Accuracy of Nurses' Definitions of Triage at NCRTTH, Kenya (N = 55)

Definition of Triage	Frequency (n)	Percentage (%)
Correct definition	49	89.1
Incorrect definition	6	10.9
Total	55	100

Note: Frequencies and Percentages are Based on N = 55 Participants.

Knowledge and Familiarity with Triage Systems

Familiarity with triage systems was assessed by asking participants to identify the single system they were most familiar with. As shown in Table 3, colour-coded triage was the most frequently cited system (n = 19; 34.5%), The Emergency Severity Index (ESI) was recognized by 21.8% (n = 12) of respondents, and SATS/START by 14.5% (n = 8). Internationally recognized five-level systems, including the Canadian Triage and Acuity Scale (CTAS) (7.3%) and the Manchester Triage System (MTS) (3.6%), were largely unfamiliar. Percentages were calculated using the total number of participants as the denominator.

Table 3:

Familiarity with Selected Emergency Department Triage Systems

Triage System	Frequency (n)	Percentage (%)
Color Coding	19	34.5
South African Triage Scale (SATS) and START Triage	8	14.5
Emergency Severity Index (ESI)	12	21.8
Canadian Triage and Acuity Scale (CTAS)	4	7.3
Immediate/Delayed/Minor/Expectant (IDME)	3	5.5
Labor Ward Triage	3	5.5
Manchester Triage System (MTS)	2	3.6
Sieve Triage	2	3.6
Reverse Triage	1	1.8
Incidental/Descriptive Triage	1	1.8
Total Responses	55	100.0

Note: Participants were asked to indicate the triage system they were most familiar with. Percentages were calculated using the total number of respondents (n = 55) as the denominator. Thus, the percentages represent the proportion of participants reporting familiarity with each triage system.

Perceived Importance of Triage in the Emergency Department

Staff perceptions of the value of triage in the emergency department were assessed using a multiple-response question. Accordingly, percentages in this table were calculated based on the total number of responses rather than the total number of participants. As shown in Table 4, the most commonly cited benefit was patient prioritization (n = 22; 33.3%), followed by improving patient outcomes (22.7%), and saving lives and classifying patients based on severity (each 12.1%). The role of triage in resource optimization (10.6%) and delay prevention (9.1%) received less emphasis.

Table 4:***Perceived Importance of Triage Utilization Among NCRTTH Emergency Department Staff (N = 55)***

Perceived Benefit	Frequency (n)	Percentage (%)
Prioritizing Emergency Patients	22	33.3
Improving Patient Outcomes	15	22.7
Saving Lives	8	12.1
Classifying Patients Based on Severity	8	12.1
Optimizing Resources and Managing Surges	7	10.6
Saving Time and Preventing Delays	6	9.1
Total	66	100.0

Note: Multiple responses were allowed for this question. A total of 66 responses were recorded from 55 participants. Percentages were calculated using the total number of responses (n = 66) as the denominator; therefore, the percentages sum to 100%.

Triage Protocol Awareness Among Emergency Department Staff

Table 5 presents the distribution of participants' responses on awareness of triage protocols currently in use at the facility. Awareness was notably inconsistent, with a substantial proportion of respondents unsure whether a protocol existed. Colour-coded triage was the most frequently self-reported system currently in use (n = 9), while ESI (n = 3) and SATS (n = 1) were reported by fewer respondents. Smaller numbers cited the Glasgow Coma Scale and Sieve Triage (n = 2 each), and American-Based Triage and START Triage (n = 1 each). A further eight participants believed a triage protocol existed but could not identify a specific system, eighteen indicated that no triage protocol was in place, and a further nine were uncertain.

Table 5:***Awareness of Triage Protocols Used at NCRTTH Emergency Department (N = 55)***

Protocol/System Identified	Yes	No	Not Sure	Total
Existing Triage Protocol	8	18	9	35
American-Based Triage	1	0	0	1
Color Coding	9	0	0	9
Emergency Severity Index (ESI)	3	0	1	4
Glasgow Coma Scale (GCS)	2	0	0	2
South African Triage Scale (SATS)	1	0	0	1
Sieve Triage	2	0	0	2
START Triage	1	0	0	1
Total	27	18	10	55

Note: Frequencies are based on responses from the 55 study participants. Participants were asked to identify the triage protocol or system they believed was in use at the facility, or to indicate uncertainty about whether a formal protocol existed. Respondents who named a specific protocol are reported under that protocol's row; respondents who could not name a specific protocol are reported under 'Existing Triage Protocol,' classified as believing a protocol existed, believing none existed, or being unsure. The categories are based on participants' self-reported awareness and perceptions of current triage practices.

Assessment of Emergency Care Practice Using Simulated Case Scenarios

A baseline assessment of 55 emergency care providers was conducted to assess ED staff's application of emergency care principles. Participants were asked to describe 15 scenarios involving various emergency conditions. A series of questions addressed (a) the emergency condition, (b) the type of emergency, (c) the triage category, and (d) appropriate nursing care.

While 27 participants reported using a triage system, their responses indicated reliance on non-standardized sorting criteria, such as physical assessment and vital signs.

Accuracy of Emergency Condition Identification by ED Staff

Table 6 summarizes participants' accuracy across four simulated triage-related tasks: identifying emergency conditions, classifying emergency type, assigning triage categories, and selecting appropriate interventions, each assessed across 15 clinical scenarios.

On average, participants correctly identified 55.8% of emergency conditions, with performance ranging widely from 13% to 100% across respondents, reflecting heterogeneity in clinical judgment.

Table 6:

Accuracy of NCRTTH Emergency Department Staff in Simulated Triage-Related Tasks (N = 55)

Task	Mean Accuracy (%)	Range (%)
Identification of emergency conditions	55.8	13-100
Classification of emergency type	55.8	7-100
Assignment of triage category	66.7	7-87
Selection of appropriate interventions	70.5	13-100

Note: Each task was assessed across 15 clinical scenarios. Accuracy reflects the percentage of scenarios each participant answered correctly, averaged across the 55 study participants; range reflects the lowest and highest individual accuracy scores observed.

Accuracy in the Classification of Emergency Type

There was poor consistency among participants in classifying emergencies across the presented medical, trauma, obstetric, and psychiatric cases, an important factor in subsequent triage decisions. Participants had an overall classification accuracy of 55.8% (Table 6).

Accuracy of Triage Category Assignment

Performance in categorizing patients according to triage urgency was good but varied. Accuracy of triage category assignment was 66.7% (Table 6).

Accuracy of Proposed Nursing Interventions

Participants achieved better results in suggesting initial management for emergencies once the emergencies were identified, with an overall accuracy of 70.5% (Table 6).

Challenges to Effective Triage and Emergency Care Delivery

Participants identified multiple barriers to effective triage and emergency care delivery. Among triage-specific challenges, understaffing was cited most frequently (42.6%), followed by limited resources (31.9%), inadequate training (29.8%), lack of equipment and supplies (23.4%), high patient load (19.1%), communication problems (12.8%), and the absence of a formal triage protocol (12.8%). For broader operational challenges in real-time emergency care, understaffing (46.2%) and insufficient training (38.5%) remained the most prevalent concerns, alongside a lack of equipment and supplies (36.5%), limited resources (34.6%), communication issues (21.2%),

overcrowding (13.5%), burnout and occupational stress (9.6%), and the absence of an approved standard triage protocol (7.7%). At the systemic level, limited resources (48.9%) and understaffing (42.6%) again emerged as the primary barriers, with communication failures (31.9%), lack of equipment and supplies (31.9%), and absence of a triage protocol or training (31.9%) also prominently reported. Safety concerns involving aggressive relatives (10.6%) and delayed decision-making (4.3%) were also identified.

DISCUSSION

This study offers contextual evidence on triage knowledge and practice among emergency department staff at NCRTTH, a high-volume county referral hospital in Kenya. The high response rate of 88.7% strengthens the credibility of the findings and reduces non-response bias. The results show that the workforce is generally familiar with the concept and value of triage, yet gaps persist in formal training, knowledge of standardized triage systems, and consistency in practice.

Sociodemographic Characteristics

The predominance of female respondents (63.6%), diploma-trained staff (56.4%), and mid-level nursing cadres in the study sample aligns with the established composition of the Kenyan public hospital nursing workforce. National data indicate that approximately 76% of public sector nurses in Kenya are female, with most in basic nursing cadres (Wakaba et al., 2014).

The relatively young age profile, with most participants aged 26 to 35 years, reflects an early-to mid-career workforce whose clinical competencies in emergency triage may benefit from structured mentorship and continuing professional development. This finding is important because specialized training equips nurses with advanced assessment skills and competencies for managing time-critical conditions.

Only 12.7% of respondents reported specializing in emergency nursing, and 1.8% held postgraduate qualifications. This low level of specialized training is concerning, given that effective triage requires prompt clinical judgment, sound prioritization skills, and familiarity with validated protocols (Gholipour et al., 2025). Furthermore, although 89.1% of participants reported prior ED experience, 38.2% had less than one year of such experience, indicating considerable variability in the depth of clinical exposure. This variability is likely to affect triage confidence, accuracy, and consistency, reinforcing the need for standardized training programs.

Status of Triage Training and Knowledge of Triage Definition

The finding that 40.0% of ED staff had not received formal triage training is a significant patient safety concern in a setting where timely triage is critical to outcomes. This finding suggests that a substantial proportion of staff may make triage decisions without standardized competencies, potentially leading to inconsistent patient prioritization and variability in clinical decision-making. Similar gaps have been documented across low- and middle-income countries (LMICs), where formal triage education is often fragmented, inconsistent, or absent (Boutemine et al., 2026).

In Kenya, a study at two public hospitals found that only half of ED staff could correctly identify triage categories using the Emergency Triage Assessment and Treatment (ETAT) system (Kamau et al., 2024). A Ugandan study also reported misclassification of critically ill patients due to a lack of structured triage tools (Rovati et al., 2025). These findings collectively show that inadequate training perpetuates inconsistent triage decisions and care delays in under-resourced emergency settings. Because triage determines urgency and the sequence of care, inadequate training may contribute to under-triage or over-triage, with implications for patient safety, resource allocation, and emergency department efficiency.

Regarding triage knowledge, the study found that 49 of 55 nurses (89.1%) accurately defined triage, indicating a high level of theoretical knowledge. In practice, accuracy in identifying emergencies was 55.8%, correct classification across all acuity levels was 55.8%, assignment of the appropriate triage category was 66.7%, and appropriate interventions were initiated in 70.5% of scenarios, the highest of the four performance domains, suggesting that clinical intervention skills were comparatively stronger than the identification and classification of emergency conditions. These findings highlight a gap between knowledge and consistent classification of emergency conditions. Comparative evidence supports these observations. A systematic review by Ouellet et al., (2025) emphasized that although triage knowledge is generally adequate, variability in practice persists due to subjective interpretation of borderline cases. Similarly, Wolf et al. (2025) found that establishing triage competencies requires not only theoretical understanding but also verification processes to ensure reliability in practice. A scoping review by Shin et al., (2025) concluded that optimizing triage education through simulation and structured training significantly improves consistency, confirming the benefits observed in the scenario-based approach (Shin et al., 2025). These findings align with earlier international studies that report high reliability in life-threatening emergencies but lower agreement in intermediate cases. For example, research examining rural, remote, and outpost triage nurse decision-making in Australia found that accuracy declined progressively with each less urgent triage category, underscoring the need for standardized protocols and decision-support systems to strengthen consistency (Ekins & Morphet, 2015). Collectively, these studies reinforce the conclusion that knowledge alone is insufficient, and that structured training and a standard triage protocol are essential to strengthen triage practice.

Familiarity with Triage Systems

Respondents' awareness of standardized triage systems is limited and varied. Colour-coded triage was most frequently recognized (34.5%), but it is largely informal and lacks clinical discriminators and validated scoring mechanisms found in standardized tools.

The predominance of colour-coded triage suggests reliance on simple, familiar approaches that may be easier to implement but could increase subjectivity and variability in patient prioritization. Awareness of the ESI (21.8%) and SATS/START (14.5%) was modest, and familiarity with CTAS (7.3%) and MTS (3.6%) was minimal. This pattern reflects a broader tendency across LMICs to rely on simplified or facility-specific approaches because of the complexity and resource demands of five-level triage systems (Font-Cabrera et al., 2023). Triage instruments developed in high-income settings may not be directly applicable in resource-limited contexts, where differences in infrastructure, staffing configurations, and case mix require tailored adaptations (Adhikari et al., 2024). Limited familiarity with validated triage systems may compromise consistency in triage decisions and hinder the identification of patients requiring urgent intervention. The findings highlight the need to develop and implement a simplified, validated triage system that is contextually appropriate for NCRTTH and similar county hospitals.

Knowledge towards the Benefits of Triage

Staff awareness of triage's key benefits was encouraging overall. The predominant emphasis on patient prioritization (33.3%), improved outcomes (22.7%), and saving lives (12.1%) reflects a strong patient-centered orientation and recognition of triage as a clinical decision-making tool. These perceptions are important because positive attitudes toward triage are likely to enhance staff engagement with triage processes and support adherence to triage protocols. These are aligned with evidence that effective triage systems reduce ED overcrowding, shorten time to treatment, and improve survival rates (Alharbi, 2026). However, the comparatively low recognition of triage's role in resource optimization (10.6%) and delay prevention (9.1%) suggests limited appreciation of triage as an operational tool to improve patient flow and system efficiency. This may reflect the high-pressure, time-sensitive work environment in which respondents operate, where immediate clinical concerns naturally dominate cognitive attention (Rosedale et al., 2011; Zachariasse et al., 2019). Limited recognition of these broader functions may reduce opportunities to use triage to improve emergency department efficiency and resource utilization. Targeted education on the system-level benefits of triage may help broaden staff understanding and support more comprehensive implementation.

Awareness of and self-reported use of triage protocols at NCRTTH were highly inconsistent. A considerable proportion of respondents were unsure whether a formal protocol existed, and colour-coded triage was the most frequently cited system in use.

This pattern aligns with findings from LMIC settings, where implementation of triage protocols is marked by fragmentation and reliance on individual training and prior exposure (Phillips et al., 2025). In contrast, research from high-income settings indicates that structured triage systems such as the ESI and MTS achieve compliance rates exceeding 90% (Zaboli & Turcato, 2026). This contrast suggests that protocol utilization in resource-constrained environments depends not only on the availability of a tool, but also on the adequacy of training, the clarity of institutional guidelines, and system-level enforcement. At NCRTTH, the absence of a facility-endorsed, standardized triage protocol likely contributes to the observed variability in practice.

Triage practice and challenges to effective triage and emergency care

The study demonstrated considerable variability in emergency recognition, classification, and prioritization among the emergency care providers. Although participants generally recognized emergency conditions and recommended appropriate nursing interventions, performance was less consistent in emergency classification and assigning triage priority. These findings suggest that emergency care providers often relied on individual clinical judgment and experience rather than standardized decision-support tools when prioritizing patients (Porto, 2024). Similar observations have been reported across many low- and middle-income countries, where the absence of structured triage systems contributes to inconsistent emergency assessment, delayed identification of critically ill patients, and insufficient utilization of limited emergency care resources (Adhikari et al., 2024). The barriers to effective triage identified in this study, namely understaffing (42.6%), limited resources (31.9%), and inadequate training (29.8%), are consistent with those documented across LMIC emergency care settings and are recognized as key determinants of triage quality and consistency. High patient loads and a lack of equipment are well documented in the literature as contributing to care delays, including delays in time-critical interventions such as sepsis management. Communication challenges, though less prominently reported in this study, have been identified in other research as a significant systems-level barrier to triage efficiency and care coordination (Gao et al., 2022). Occupational stressors, including burnout and work pressure (9.6%), align with evidence indicating that emergency nurses in resource-limited settings experience high levels of occupational stress that may impair performance and increase the risk of errors (Adriaenssens et al., 2015).

The comparatively lower reporting of burnout relative to structural factors in this study may suggest that system-level constraints are more salient to providers, or that burnout remains under-acknowledged within the local institutional culture (Tawfik et al., 2019). Additionally, safety concerns involving aggressive relatives (10.6%) are consistent with evidence of workplace violence as an occupational hazard in LMIC emergency departments, with implications for staff well-being and safe practice.

Strengths

This study had several notable strengths. The high response rate of 88.7% minimized non-response bias and enhanced the representativeness of the findings. The study engaged frontline staff across multiple acute care units at a high-volume referral hospital, yielding contextually relevant data on real-world triage practices. The inclusion of diverse professional cadres enriched the findings by capturing a range of perspectives on triage knowledge, training, and utilization.

LIMITATIONS

Several limitations must be acknowledged. The cross-sectional design precluded causal inferences about the determinants of triage knowledge or practice. The study was conducted at a single facility, limiting the generalizability of the findings to other settings with differing resource profiles and patient populations. Reliance on self-reported data introduced the potential for social desirability bias, whereby respondents may overstate their triage knowledge or practice. Inferential statistical analyses were not performed, limiting the ability to identify significant associations between participant characteristics and outcomes of interest. Future multi-site studies incorporating direct observational methods and inferential analyses would strengthen the evidence base.

Conclusion

Emergency department and acute care staff at Nakuru County Referral and Teaching Hospital demonstrate general awareness of triage and its clinical importance. However, gaps remain in formal triage training, familiarity with standardized triage systems, and the consistency with which triage is applied in practice. In the absence of a standardized triage protocol, patient prioritization continues to be guided by individual clinical judgment and locally improvised approaches, contributing to variability in emergency care delivery. These findings provide a clear evidence base for targeted, structured interventions at NCRT and similar county-level hospitals in Kenya.

The study supports the urgent need to develop and implement a context-specific, evidence-based triage protocol tailored to the operational realities of NCRT. When paired with ongoing, competency-based triage training, such

a protocol can standardize patient prioritization, reduce care delays, and improve emergency health outcomes. Addressing structural barriers, including understaffing and resource constraints, alongside training initiatives will be critical to achieving sustainable improvements in the quality of emergency care at the institutional and county levels.

Recommendations

Based on the study findings, the following recommendations are made for relevant stakeholders:

Engage actively in structured, competency-based triage training programs to strengthen knowledge of standardized triage systems and promote uniform triage practice.

Advocate adoption of validated, simplified triage tools suited to resource-limited settings. Develop and implement a facility-specific, evidence-based triage protocol that incorporates the clinical parameters most endorsed by frontline staff, including vital signs, random blood sugar, GCS assessment, and presenting complaint. Establish a formal, periodic triage training and skills-update program for all emergency department and acute care staff, prioritizing personnel who have not previously received triage training. Develop and disseminate national guidelines for triage in county-level emergency departments, including minimum standards for staffing, training, and protocol implementation. Allocate resources to address identified structural barriers, including staffing shortfalls, equipment shortages, and training budget constraints. Conduct multi-facility observational studies to directly assess triage practices and evaluate the impact of standardized triage protocols on patient outcomes, triage accuracy, and emergency care efficiency across county hospitals in Kenya. Consider longitudinal designs to monitor the sustainability of training interventions.

DECLARATIONS

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

All authors contributed to the study's conception and design. The lead author conducted data collection and analysis. All authors approved the final version submitted for publication and are accountable for all aspects of the work.

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Data Availability Statement

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

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