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EXPLORING THE EFFECTIVENESS OF TRIAGING SYSTEM AMONG HEALTHCARE PROFESSIONALS IN THE EMERGENCY DEPARTMENT OF UNIVERSITY BENIN TEACHING HOSPITAL

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ABSTRACT

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Emergency departments (EDs) are crucial in providing immediate care to critically ill patients, yet challenges such as overcrowding and limited resources often hinder effective service delivery. Triage systems are designed to ensure patients are prioritized according to the severity of their conditions, enhancing timely and efficient care. This study aimed to explore the effectiveness of the triaging system among healthcare professionals in the Emergency Department of the University of Benin Teaching Hospital (UBTH), Benin City. A descriptive cross-sectional research design was adopted. Data were collected using a structured self-administered questionnaire from 67 healthcare professionals, including nurses, doctors, and paramedics, selected through proportionate stratified random sampling. The data were analyzed using descriptive and inferential statistics with SPSS version 25. Findings revealed that most respondents had a high level of knowledge of triage principles and viewed the current system as effective in reducing patient waiting time, improving teamwork, and enhancing early detection of critical cases. However, factors such as limited triage tools, high patient inflow, and time constraints affected optimal implementation. The chi-square test ($\chi^2 = 0.0764$, $p > 0.05$) showed no significant relationship between knowledge and perceived effectiveness. The study concluded that while healthcare professionals at UBTH possess adequate triage knowledge, infrastructural challenges and workload pressures limit system efficiency. Strengthening triage protocols, continuous training, and adequate staffing were recommended to enhance emergency care outcomes.

Keywords: Triage System, Knowledge, Healthcare Professionals, Effectiveness, UBTH

Introduction

Emergency departments (EDs) are critical components of healthcare systems worldwide, providing immediate care to patients with acute illnesses or injuries. The increasing demand for emergency services, coupled with limited resources and overcrowding, has led to the implementation of triage systems (Sartini et al., 2022). Triage is a process of prioritizing patients based on the severity of their condition, ensuring that those with life-threatening conditions receive timely attention. The effectiveness of triaging systems relies heavily on the skills and knowledge of healthcare professionals working in the ED. Overcrowding is one of the most harmful problems for ED management and the correct estimation of time resource absorption by each type of patient plays a strategic role in dealing with overcrowding and correctly programming ED activity (Pearce et al., 2023). The University of Benin Teaching Hospital (UBTH) (triage unit), like many Nigerian tertiary hospitals, often faces significant overcrowding in its emergency unit, resulting in long wait times, frustration among patients and caregivers, and difficult working conditions for healthcare staff. Despite the recognized need for effective triage, reports from similar institutions have shown that many EDs either lack standardized triage tools or fail to implement them consistently (Madubuko et al., 2024). This inconsistency further compromises the quality of emergency care and places an additional burden on already overstretched staff.

Triage is usually performed in the ED by health care professionals who allocate designation and initiate emergency care before the patient is examined. Triage is used to prioritize multiple cases for immediate mass evacuation for emergency medical help in nearby hospitals (Obubu et al., 2023). Triage in the ED is typically carried out by nurses or doctors, who assess patients at first contact and assign them a priority level. This early decision determines whether a patient receives immediate intervention or is asked to wait for further evaluation (Conti et al., 2022). In mass casualty situations or natural disasters, triage becomes even more critical, serving as the primary mechanism for allocating limited medical resources in order to save as many lives as possible (Seo et al., 2024). For triage to be optimally effective, healthcare professionals must possess adequate training, competence, and confidence in using triage tools and systems. Studies conducted in Nigerian hospitals have revealed gaps in triage knowledge, limited access to training, and the absence of consistent triage policies, all of which hinder the delivery of quality emergency care (Adiele, 2021). Furthermore, the increasing volume of ED visits in urban hospitals underscores the urgent need to strengthen the triage system and ensure that staffs are adequately equipped to

manage patient flow efficiently (Soyemi & Aborode, 2022). Given these challenges, this study seeks to explore the effectiveness of the triaging system among healthcare professionals in the Emergency Department of the University of Benin Teaching Hospital. It aims to assess their level of knowledge, identify existing gaps, and examine how triage practices affect patient care and emergency service delivery.

Statement of the Problem

The emergency department (triage unit) is often the first point of contact for patients with urgent and life-threatening conditions. As such, the ability to accurately prioritize patients is critical to saving lives, improving outcomes, and ensuring the efficient use of limited healthcare resources. However, in many healthcare settings especially in developing countries like Nigeria triage systems are underdeveloped, inconsistently applied, or poorly understood by frontline healthcare workers (Adiele, 2022).

At the University of Benin Teaching Hospital (UBTH), the Emergency Department (triage unit) routinely experiences severe overcrowding, a high patient-to-staff ratio, and limited medical infrastructure, all of which complicate the triage process. Many patients present simultaneously with varying degrees of clinical urgency, yet the absence of a clearly structured and consistently implemented triage system often results in delayed interventions, mix prioritization, and avoidable complications (Detu et al., 2023). Critically ill patients may not receive prompt attention, while stable patients may be seen earlier simply because of arrival order or visible distress, rather than clinical need. Moreover, many healthcare professionals lack adequate training in standard triage tools such as the South African Triage Scale (SATS) or Emergency Severity Index (ESI), and often rely on intuition or experience to make quick decisions in high-pressure situations. This raises concerns about consistency, accuracy, and safety in patient categorization. Poor triage practices can result in increased morbidity and mortality, patient dissatisfaction, overcrowding, and legal or ethical challenges for care providers (Conti et al., 2022).

Despite the essential role of triage in emergency care, there is limited evidence regarding the current level of knowledge, attitude, and practice of healthcare professionals concerning triage at UBTH. There is also a lack of systematic evaluation of the effectiveness of the triage system in place, and how it influences patient outcomes, waiting times, and staff performance (Adiele, 2022). These gaps necessitate an investigation into the

effectiveness of the triaging system among healthcare professionals in the Emergency Department (triage unit) of UBTH. It is crucial to assess how well staffs understand and apply triage principles, identify existing barriers, and recommend strategies for improvement. Without such evidence, efforts to improve emergency care delivery may be misguided or ineffective.

Objectives of the study

The general objective is exploring the effectiveness of triaging system among healthcare professionals in the emergency department (triage unit) University of Benin Teaching Hospital, Edo state. While the specific objectives includes

1. To assess the level of knowledge of health care professionals on the triaging system in the Emergency Department (triage unit).
2. To examine the perceived effectiveness of the triaging system in improving patient outcomes and service delivery in the emergency department (triage unit) of University of Benin Teaching Hospital.
3. To identify factors influencing the effective implementation of the triaging system in the emergency department (triage unit) of University of Benin Teaching Hospital.

Research Question

1. What is the level of knowledge of health care professionals on the triaging system in the Emergency Department (triage unit) of UBTH?
2. How effective is the triaging system in improving patient outcomes and service delivery in the Emergency Department (triage unit)?
3. What factors influence the effective implementation of the triaging system among healthcare professionals?

Hypothesis

There is no significant relationship between the knowledge level of healthcare professionals and the effectiveness of the triaging system in the emergency department (triage unit) of University of Benin Teaching Hospital.

Literature Review

This chapter presents a review of literature relevant to the study. The discussion is organized under four main subheadings: the conceptual review, which provides definitions and explanations of key concepts related to the study; the empirical review, which highlights findings

from previous research and studies conducted in similar contexts; the theoretical framework, which outlines the guiding theories underpinning the study; and finally, the summary of literature review, which synthesizes the key points and identifies gaps that this research seeks to address.

Conceptual Review

Concept of Triage

Triage is a clinical decision-making process used in emergency medical settings to sort patients according to the urgency of their conditions. The goal is to ensure that those with life-threatening or time-sensitive issues receive immediate care while those with less severe conditions wait their turn. The concept, first popularized during the Napoleonic wars, has since evolved into a cornerstone of emergency medical care, particularly in crowded or resource-limited settings (Smith, 2024). In the context of emergency departments (EDs), triage serves as the first point of contact and can directly impact outcomes such as patient survival, length of stay, and satisfaction. As observed by Soyemi & Aborode (2022), a robust triage system reduces waiting time for critical patients and supports equitable resource allocation. In Nigeria, triage is especially critical due to the frequent overcrowding of emergency units and the shortage of skilled healthcare personnel (Adele, 2021).

Triage is a fundamental clinical process in emergency healthcare settings, used to determine the priority of patients' treatments based on the severity of their condition. The term "triage" originates from the French word *trier*, meaning "to sort." In modern emergency departments (EDs), triage serves as a systematic method of rapidly assessing incoming patients to ensure that those in most critical need of medical attention receive it promptly (Obubu et al., 2023). Triage is not merely a task of sorting; it is a clinical decision-making process that requires healthcare professionals, often nurses or specially trained staff to evaluate symptoms, vital signs, and the potential for deterioration. The aim is to prevent delays in life-saving interventions by assigning acuity **levels** that dictate how urgently a patient needs to be seen (Soyemi & Aborode, 2022). This ensures a fair and effective allocation of limited resources, particularly in overcrowded or resource-constrained emergency settings. In environments such as the University of Benin Teaching Hospital, where patient influx is high and healthcare resources may be limited, triage plays a strategic role in managing workflow and preventing systemic overload. The growing pressure on emergency departments to attend to diverse and often severe patient cases has led to increased demand for effective triage systems (Adhikari et al., 2024). An improperly triaged

patient could suffer avoidable complications or even mortality, while misallocation of urgency can strain the system unnecessarily.

Triage is often conducted using standardized tools or scales, such as the Emergency Severity Index (ESI), Canadian Triage and Acuity Scale (CTAS), or the South African Triage Scale (SATS), depending on institutional practice. These tools aim to improve objectivity and consistency in decision-making by providing structured criteria for determining urgency levels (Conti et al., 2022).

Triage extends beyond initial assessment; it also encompasses early initiation of care, referral to appropriate service units, and coordination with emergency physicians. This means the triage nurse or paramedic plays a central role in influencing patient outcomes, especially in the first critical minutes of hospital arrival. However, the effectiveness of triage depends significantly on the knowledge, clinical judgment, experience, and workload of the healthcare professional involved, even the most sophisticated triage tool can fail if applied by inadequately trained or fatigued personnel (Adhikari et al., 2024).

In addition, the availability of resources, staffing ratios, ongoing training, and institutional support are all factors that can influence the reliability and efficiency of the triage process. As highlighted in previous studies, effective triage systems not only improve patient flow and outcomes but also reduce healthcare costs by minimizing unnecessary admissions and resource misuse (Conti et al., 2022)

Types of Triage Systems

Triage systems have evolved to suit different healthcare environments, ranging from mass casualty incidents to routine hospital emergency department use. These systems aim to standardize the process of prioritizing care based on clinical urgency, available resources, and healthcare infrastructure. Each system has its advantages, limitations, and appropriate context for use (Obubu et al., 2023). The major types of triage systems include:

Emergency Severity Index (ESI): The Emergency Severity Index (ESI) is a five-level triage system widely used in the United States and increasingly adopted in other countries due to its simplicity and predictive value. It was developed by the Agency for Healthcare Research and Quality (AHRQ). Prioritizes patients based on both acuity (how sick they are) and anticipated resource needs (how much care they will require) (Obubu et al., 2023). Levels range from:

Level 1: Immediate (e.g., cardiac arrest)
 Level 2: Emergent (e.g., chest pain, stroke symptoms)
 Level 3: Urgent (requires multiple resources, not immediately life-threatening)
 Level 4: Less urgent (single resource needed)
 Level 5: Non-urgent (no resources required)

Advantages:

- Easy to use after training
- Improves patient flow and reduces ED crowding
- Correlates well with hospital admission rates and length of stay

Limitations:

- Subjective if not applied consistently
- Less effective in pediatric cases without modifications (Obubu et al., 2023)

Application in Nigeria:

Though not officially adopted nationwide, some tertiary hospitals like the University College Hospital (UCH) and Lagos University Teaching Hospital (LUTH) have used modified versions of the ESI for categorizing patients (Detu et al., 2023).

South African Triage Scale (SATS): The South African Triage Scale (SATS) is one of the most practical triage systems developed for low- and middle-income countries, particularly in Africa. It combines clinical discriminators with a physiological scoring system called the Triage Early Warning Score (TEWS) (Conti et al., 2022).

Uses color-coded priority levels:

- Red: Immediate
- Orange: Very urgent
- Yellow: Urgent
- Green: Routine
- Blue: Dead

TEWS assigns scores based on vital signs like respiratory rate, heart rate, systolic blood pressure, temperature, and mobility status.

Advantages:

- Designed for resource-limited settings
- Quick and easy to use after training
- Good inter-rater reliability among nurses and clinicians

Limitations:

- May require recalibration for local disease burden
- May over-triage patients with abnormal vital signs but stable presentations

Application in Nigeria:

Several emergency units in Nigeria including UBTH and some federal teaching hospitals have started adapting SATS due to its ease of use and applicability in high-volume, low-resource settings (Detu et al., 2023).

Canadian Triage and Acuity Scale (CTAS): The Canadian Triage and Acuity Scale (CTAS) is a five-level system used across Canadian emergency departments. It categorizes patients based on the urgency of the need for physician intervention.

Level 1: Resuscitation

Level 2: Emergent

Level 3: Urgent

Level 4: Less Urgent

Level 5: Non-Urgent

CTAS includes specific complaint-based guidelines for multiple organ systems (e.g., cardiac, respiratory, trauma)(Kalan et al., 2024).

Advantages:

- Highly detailed and standardized
- Provides condition-specific guidelines
- Used in both adult and pediatric populations

Limitations:

- Requires advanced training
- Time-consuming compared to ESI or SATS (Kalan et al., 2024)

Manchester Triage System (MTS): The Manchester Triage System is widely used in the United Kingdom and parts of Europe. It is algorithm-based and complaint-driven. Based on over 50 flowcharts, each corresponding to a chief complaint (Porto, 2024), (e.g., chest pain, shortness of breath). Assigns patients to one of five categories based on the maximum wait time:

- Immediate (0 min)
- Very Urgent (10 min)
- Urgent (60 min)
- Standard (120 min)
- Non-Urgent (240 min)

Advantages:

- Very specific and structured
- Strong evidence base for use in high-income settings

Limitations:

- Requires detailed training and software integration
- May not be suitable for low-resource settings due to complexity (Porto, 2024).

Simple Triage and Rapid Treatment (START): The START system is designed for mass casualty incidents

(MCI), such as disasters, pandemics, or war zones. It focuses on rapid assessment in under 60 seconds per patient (Yilmaz et al., 2024). Patients are triaged based on:

- Respirations
- Perfusion (pulse/capillary refill)
- Mental status
- Color-coded categories:
- Red: Immediate
- Yellow: Delayed
- Green: Minor
- Black: Deceased or expectant

Advantages:

- Very fast and simple
- Does not require medical devices
- Effective for non-hospital environments

Limitations:

- Not useful in routine ED settings
- May overlook patients with internal injuries (Yilmaz et al., 2024)

Informal or Locally Developed Systems: In many Nigerian hospitals, triage is carried out based on experience, unwritten guidelines, or ad hoc decision-making. Patients may be seen on a “first-come, first-served” basis or based on visible signs of distress (Chinemerem, 2023).

Challenges of Informal Triage:

- High risk of under-triage (missing critical cases)
- Subjective and inconsistent
- No documentation or tracking
- Susceptible to corruption or favoritism

Transitioning from such informal systems to structured triage is crucial for improving emergency care in Nigerian hospitals like UBTH. (UBTH Emergency Unit Report, 2022).

Components of an Effective Triage System

- An effective triage system includes both technical and human components:
- Structured Guidelines: Clear, standardized protocols (e.g., flowcharts, checklists, risk stratification tools) to ensure consistency and reduce subjectivity.
- Well-Trained Personnel: Competent triage nurses or clinicians trained to assess acuity, interpret clinical signs, and make rapid decisions.
- Monitoring and Evaluation: Regular audits, feedback systems, and performance metrics (e.g., wait times, mortality rates) to ensure continuous quality improvement.
- Infrastructure Support: Functional triage rooms, access to vital sign monitors, and prompt

registration processes are critical (Chinemerem, 2023).

When any of these components are missing or suboptimal as is often the case in Nigerian settings triage becomes ineffective, leading to preventable morbidity or mortality (Detu et al., 2023).

Role of Healthcare Professionals in Triage

Triage effectiveness is intrinsically linked to the knowledge, clinical judgment, and communication skills of the healthcare professionals who conduct it. These include:

- Nurses: Often serve as the first point of patient contact. They conduct initial assessments, record vital signs, and classify patient acuity levels.
- Physicians: May re-triage complex cases or intervene directly in high-acuity scenarios.

Paramedics and Other ED Staff: Play supportive roles, especially in pre-hospital triage and mass casualty scenarios (Seo et al., 2024). Healthcare professionals must interpret a range of clinical presentations often with limited diagnostic tools while under time pressure. Their decisions can be influenced by fatigue, stress, patient load, or even cultural biases. In Nigeria, a lack of regular triage training programs and high staff turnover further compounds this challenge (Olusegun-Joseph et al., 2021).

Challenges to Effective Triage in Nigerian Emergency Department

While triage is essential, its implementation in Nigeria faces several systemic and operational barriers:

- Inadequate Training: Many healthcare professionals in Nigeria have never received formal triage training. Instead, decisions are made based on experience or observation (Adiele, 2021).
- Lack of Standardized Protocols: Triage systems are not uniformly adopted across hospitals. Some facilities use handwritten notes without a scoring system or color code.
- Overcrowding and Staff Shortage: Nigerian EDs are often overwhelmed with patients. With too few staff, particularly during night shifts, proper triage is difficult to sustain (Detu et al., 2023).
- Resource Constraints: Lack of basic triage equipment like thermometers, pulse oximeters, or blood pressure monitors can make assessments inaccurate or impossible (UBTH Emergency Unit Report, 2022).

Despite these challenges, facilities that have implemented structured triage systems even partially

report better outcomes and improved workflow (Peta et al., 2023).

Concept of Triage Effectiveness

Triage effectiveness refers to the degree to which a triage system accurately identifies patient acuity levels and ensures timely intervention. According to Donabedian's model of healthcare quality (structure, process, and outcome), triage effectiveness is seen in:

- Accurate categorization of patients
- Shorter waiting times
- Reduced in-hospital mortality
- Higher patient satisfaction
- Improved emergency department throughput

Relevance of Triage to Patient Outcomes

Effective triage contributes directly to patient outcomes, which include:

- Time to treatment
- Length of hospital stay
- Clinical deterioration or improvement
- Patient complaints or litigation
- Morbidity and mortality rates

The correlation between triage accuracy and outcomes underscores the need for Nigerian hospitals especially tertiary centers like UBTH to strengthen their triage processes as part of broader emergency care reform.

Strategies for improving triage

Standardization of Triage Protocols

One of the major weaknesses in emergency care across Nigerian hospitals is the inconsistent or absent use of formal triage systems. Establishing a nationally endorsed, standardized triage protocol such as the South African Triage Scale (SATS) or a modified Emergency Severity Index (ESI) suitable for the Nigerian context can improve reliability and uniformity. Hospitals should adopt a written triage policy with clearly defined acuity categories, color codes, and criteria for escalation. Protocols must be adapted to local disease profiles and emergency caseloads (Peta et al., 2023).

Continuous Training and Capacity Building

Training is a critical pillar for improving triage accuracy and efficiency. Many triage errors stem from a lack of clinical skills or misinterpretation of presenting symptoms. Regular in-service training, simulation-based education, and case scenario discussions can enhance nurses' and doctors' assessment abilities. Pre-employment orientation for all emergency healthcare workers should include standardized triage protocols (Chinemerem,

2023). Hospitals should encourage interdisciplinary training to ensure team cohesion and shared understanding of triage goals.

Use of Digital and Decision-Support Tools

Introducing technology into triage can reduce subjectivity and assist in clinical decision-making. Electronic triage tools (e-triage) with embedded decision algorithms can guide healthcare workers in classifying patients correctly, especially in busy EDs. Mobile applications that use vital sign inputs to suggest triage levels (e.g., SATS App, Triage Trak) are useful in settings with limited expertise. Telemedicine triage support consultation with offsite emergency physicians can support junior or overwhelmed staff. Conti et al. (2022) noted that decision-support systems increased both speed and accuracy of triage, particularly for less experienced clinicians.

Infrastructure and Resource Optimization

Triage is not just a clinical task; it requires adequate physical space, tools, and supplies. Designating a well-equipped triage zone near the emergency department entrance ensures quick assessment and flow control. Equip triage areas with functional thermometers, sphygmomanometers, pulse oximeters, glucometers, and other essential devices. Ensure constant availability of triage charts, risk calculators, and documentation templates. Where resources are limited, donor partnerships or hospital development boards can be engaged to sponsor equipment.

Monitoring, Evaluation, and Feedback

Triage systems must be audited regularly to ensure effectiveness. Establish a Triage Quality Assurance Committee within each ED to review triage logs, outcomes, and inconsistencies. Conduct monthly morbidity and mortality reviews (MMR) to evaluate triage-related delays and misclassifications. Use real-time feedback mechanisms, such as debriefs after critical cases or shifts, to encourage reflective learning (Conti et al., 2022).

Policy Advocacy and Institutional Support

For triage improvements to be sustainable, there must be administrative and policy backing. Hospital leadership should integrate triage performance metrics into departmental key performance indicators (KPIs). Regulatory bodies like the Nursing and Midwifery Council of Nigeria (NMCN) and Medical and Dental Council of Nigeria (MDCN) should mandate triage education in professional licensing and continuous professional development (CPD) requirements. Develop national

triage implementation guidelines in collaboration with stakeholders such as the Federal Ministry of Health and emergency medicine associations.

Staffing and Workload Management

High patient-to-staff ratios contribute to rushed or inaccurate triage. Adequate staffing should be ensured during peak hours and in high-burden departments. Consider task shifting: deploying trained community health officers or emergency medical technicians to assist with preliminary assessments and documentation. Implement shift rotations that prevent staff burnout and allow for adequate rest and recovery (Seo et al., 2024).

Community Education and Pre-Hospital Triage

Improving triage begins even before patients arrive at the hospital. Public awareness campaigns can educate communities on emergency symptoms that warrant urgent care. Paramedics and first responders should be trained in pre-hospital triage so that patients are appropriately categorized before arriving at the ED. Encourage the use of emergency helplines where trained personnel can provide basic triage advice over the phone. In countries like Rwanda and Ghana, these measures have reduced overcrowding and enhanced emergency response times (Gorick, 2024)

Theoretical Review

Callista Roy's Adaptation Model

This study is guided by Sister Callista Roy's Adaptation Model, developed in 1976. It is a widely respected nursing theory that conceptualizes individuals and groups as adaptive systems who respond to environmental changes. Roy proposed that the goal of nursing is to promote adaptation in four major domains physiological, self-concept, role function, and interdependence so that individuals can achieve optimal health and well-being.

The central premise of Roy's model is that human beings are biopsychosocial beings in constant interaction with their internal and external environments. When exposed to stimuli whether positive or negative individuals and groups use coping mechanisms to respond. The effectiveness of this adaptive response determines health status. In this framework, adaptation is seen as dynamic and continuous process involving both innate and acquired mechanisms.

Concepts of the Roy Adaptation Model

- **Adaptive System** – Roy views people (or groups) as adaptive systems who respond to environmental stimuli through coping mechanisms.
- **Stimuli** – These are inputs from the environment that require a response. Stimuli are classified into:
 - **Focal stimuli** – the most immediate stimulus requiring attention (e.g., patient overload in ED),
 - **Contextual stimuli** – other contributing conditions (e.g., inadequate staff, limited triage tools),
 - **Residual stimuli** – background factors (e.g., previous training, burnout, or beliefs about triage).
- **Coping Mechanisms** – These are the systems (regulator and cognator) by which an individual or group deals with stimuli. In individuals, the **regulator subsystem** responds via automatic neural, chemical, and endocrine responses, while the **cognator subsystem** involves perception, judgment, learning, and emotions.
- **Adaptive Modes** – There are four main adaptive modes through which individuals or groups respond:
 - **Physiological Mode** – how the body responds physically (e.g., fatigue or alertness in a triage nurse),
 - **Self-Concept Mode** – how one views oneself (e.g., professional identity and confidence),
 - **Role Function Mode** – the ability to perform expected roles (e.g., nurse acting as triage officer),
 - **Interdependence Mode** – relationships and support systems (e.g., teamwork and supervision).
- **Adaptation** – This is the outcome when a person or group responds positively to environmental stimuli, demonstrating effective coping and functioning. Maladaptation, on the other hand, occurs when coping is ineffective.

Application of the Roy Adaptation Model to This Study

The Emergency Department (ED) is a high-stress; high-demand environment characterized by rapid patient turnover, unpredictable case severity, and resource limitations. Healthcare professionals, especially nurses and doctors, are constantly required to adapt to changing stimuli, such as patient surges, emergencies, and

procedural demands. In this setting, the effectiveness of triage a process that demands critical thinking, prioritization, and fast judgment can be understood using Roy's model.

Focal stimuli in this study include high patient influx and triage responsibilities, which demand quick prioritization and decision-making under pressure.

Contextual stimuli include factors such as inadequate staffing, lack of formal triage training, insufficient access to triage tools, and institutional expectations. These all influence the healthcare provider's response to the primary demand of effective triage.

Residual stimuli involve past experiences, beliefs, fatigue, and burnout, which may shape the healthcare professional's judgment or willingness to adhere to triage protocols.

How healthcare professional cope with these stimuli determines their adaptation outcome, which in this study is reflected in their ability to perform triage accurately and efficiently. Those who are well-trained and supported adapt better they demonstrate high triage accuracy, confidence, and resilience. In contrast, professionals without adequate training or who work under intense, unsupported conditions may show signs of maladaptation, such as triage errors, slow response times, or emotional exhaustion.

The model's four adaptive modes can also be directly mapped to the ED triage context:

- In the physiological mode, fatigue, alertness, and stress responses affect the triage nurse's efficiency.
- In the self-concept mode, healthcare workers who lack confidence or question their professional role may hesitate or second-guess their triage decisions.
- In the role function mode, a triage officer must clearly understand and perform their responsibility in assessing and categorizing patients effectively.
- In the interdependence mode, teamwork, communication with doctors and fellow nurses, and supervisory support are crucial to successful triage.

In essence, this theory supports the core idea of this study: triage effectiveness is not just a technical skill, but an adaptive response to environmental, psychological, and institutional demands. Improving triage outcomes at UBTH therefore requires a focus not only on tools and protocols, but also on supporting healthcare workers through training, leadership, role clarity, and workload management to enhance their adaptation and overall effectiveness in emergency care delivery.

Empirical Studies

Assessing the level of knowledge of health care professionals on the triaging system in the Emergency Department.

Eaid (2021) conducted a study to examine emergency nurses' knowledge of triage systems and to identify the variables that influence this knowledge. The research was a cross-sectional descriptive study carried out between April and June 2021, involving 48 nurses working in the Emergency Department (ED) at Buraydah Central Hospital in the Qassim region of Saudi Arabia. Data were collected using a self-administered questionnaire, which included sections on sociodemographic information and triage knowledge. A non-probability purposive sampling technique was employed to select participants. The study found that the majority of the participants (68.8%) were female, with an average age of 31.79 years. Overall, the nurses demonstrated a moderate level of knowledge regarding triage systems. Several factors were found to significantly influence their level of knowledge. These included holding a Bachelor of Science in Nursing degree ($p = 0.005$, $B = 10.659$), having five or more years of experience in the field ($p = 0.002$, $B = 10.670$), and having received training related to triage ($p = 0.001$, $B = 12.418$). In conclusion, the study revealed that while emergency nurses possessed a moderate understanding of triage systems, their knowledge was significantly affected by their educational background, years of professional experience, and participation in triage training programs. Based on these findings, the study recommended the implementation of regular training sessions and educational programs to enhance triage knowledge among emergency nurses, thereby improving the quality of care and patient outcomes in emergency settings.

AlShatarat et al. (2022) conducted a cross-sectional, descriptive, and correlational study to assess triage knowledge and practices among emergency nurses at King Fahad Medical City (KFMC), Saudi Arabia. Data were collected from February to April 2021 using a validated self-reported questionnaire. A total of 147 emergency nurses participated. Findings showed that nurses generally had high levels of triage knowledge and practice, though some gaps and incorrect practices were identified. No significant differences in knowledge or practice were found based on demographics such as gender, job title, qualifications, or prior training ($p > 0.05$). Most participants (95.9%) had access to triage systems, and 53.7% used them daily. Additionally, 46.9% reported that only professional nurses conducted triage. A

significant positive correlation was observed between triage knowledge and practice ($r = 0.486$, $p < 0.01$), indicating that higher knowledge levels were associated with better triage performance. The study recommends further training to address knowledge deficits and improve practice consistency.

Adiele (2022) conducted a quantitative descriptive study to assess nurses' knowledge and perceived skills related to triage practice in the emergency departments of three tertiary hospitals in Enugu State, Nigeria. The study aimed to evaluate how well nurses understand and implement triage to ensure timely care and appropriate resource allocation based on patient needs. Data were collected over four months from 74 nurses who had worked for at least three months in the emergency units. A structured, pre-tested self-report questionnaire was administered, with 74 of 83 distributed questionnaires returned. Analysis was performed using SPSS version 24. Findings revealed that nurses had moderate levels of triage knowledge (51.4%). Perceived skills in patient assessment and triage varied by institution: nurses at NOHE and UNTH reported high skills, while those at ESUTH showed moderate to low skills across assessment, categorization, and allocation of patients. For instance, only 42% of nurses at ESUTH reported high skills in patient categorization. The study also found weak relationships between triage implementation and factors such as triage knowledge, years of experience, triage skills, and professional certification. Notably, neither years of ED experience nor triage skills showed a significant relationship with actual triage practices. In conclusion, the study highlighted that many ED nurses lacked sufficient knowledge and consistent triage skills, emphasizing the need for ongoing training and retraining to improve response times, reduce overcrowding, and enhance resource utilization in emergency care settings.

Examination of the perceived effectiveness of the triaging system in improving patient outcomes and service delivery in the emergency department

Brevidelli et al. (2021) conducted a retrospective cohort study to assess the effectiveness of a triage system based on the Canadian Triage and Acuity Scale (CTAS) in a private emergency department in São Paulo, Brazil. The study analyzed 254,730 patient records from 2017 to 2018 at a high-complexity medical center, using descriptive statistics and Pearson's chi-square test to explore associations between triage priority levels and clinical outcomes. A univariate logistic regression model was applied to assess the predictive value of triage categories for hospitalization and mortality. Results showed that 60% of cases were non-urgent, while 30.8% were classified as urgent. A strong association was found between higher triage priority levels and worse clinical

outcomes: patients categorized as “semi-urgent” had over 12 times the likelihood of hospitalization or death compared to non-urgent cases, while “emergency” cases had over 100 times the risk. Additional risk factors for hospitalization or death included being male, over 50 years of age, and being seen in 2018. The study concluded that the CTAS-based triage system was effective in predicting clinical outcomes aligned with severity levels, marking the first such validation in a Brazilian context. It also highlighted the high demand for emergency services for low-acuity conditions, prompting broader reflections on the socio-cultural and economic factors influencing emergency care usage and the need for responsive public health policies.

Butler et al. (2023) conducted an integrative review to examine whether ongoing triage education improves triage accuracy, knowledge, or behaviour. The researchers systematically searched five databases for studies involving triage-based education interventions. Thirty-four studies met the inclusion criteria, 31 were quantitative and three employed mixed methods. Each study was critically appraised using the Critical Appraisal Skills Programme (CASP), the TIDieR Checklist, and thematic analysis. Of the 34 studies, 18 demonstrated improvements in triage accuracy, while seven reported increases in knowledge. Six studies found no improvement in accuracy. Sixteen studies assessed changes in triage behaviour, with the majority showing improvement post-intervention, although five showed no change. Notably, only three studies directly compared different educational interventions. Overall, the review identified 53 opportunities for change across the studies, with 41 showing positive outcomes. The authors concluded that triage education can effectively enhance triage accuracy, knowledge, and behaviour. However, they emphasized the need for further research to determine whether these improvements are sustained over time.

Corkery et al. (2021) conducted a systematic review to examine the impact of team triage on waiting times in adult emergency departments. The review included quantitative studies such as randomized controlled trials, cohort studies, and quasi-experimental designs. Using the PICO framework, the authors performed a structured search across databases including Cochrane, CINAHL, and MEDLINE. Twelve studies met the inclusion criteria and were appraised using a recognized quality assessment checklist. Data were extracted and analysed narratively. Findings indicated that incorporating senior emergency doctors alongside triage nurses facilitated more timely clinical decision-making and appropriate initiation of investigations. Additionally, early bed requests and prompt referrals to specialists contributed to reduce waiting times. The implementation of team triage

was associated with fewer patients leaving without being seen, lower mortality rates, and improved patient satisfaction. In conclusion, the review found that team triage effectively reduces emergency department waiting times and enhances overall patient outcomes.

A more recent study by Okoro et al. (2023) titled “*A Multi-Site Review of Emergency Triage Systems in Tertiary Hospitals in Southern Nigeria*” examined how triage protocols affected clinical efficiency and mortality rates. The study was carried out in four tertiary hospitals, including UBTH. It employed comparative cross-sectional design and used a triage evaluation checklist, patient records, and structured interviews with nurses. A total of 120 healthcare workers participated. Data were analyzed using ANOVA and Chi-square tests. The study found that hospitals with formalized triage systems and trained triage nurses had 30% lower patient mortality and 45% faster average treatment initiation. UBTH was noted to have a working triage desk but inconsistent tool usage. The authors recommended digital triage tracking systems and continuous triage-specific capacity building to boost effectiveness.

Identification of factors influencing the effective implementation of the triaging system in the emergency department

Hwang and Shin (2022) conducted a cross-sectional study to examine the factors influencing triage competence among emergency room nurses in South Korea, with a focus on work-related stress, nurse–physician collaboration, and clinical reasoning competence. The study included 156 emergency nurses with at least one year of emergency department (ED) experience. Data were collected using self-reported questionnaires and analyzed through multiple regression using SPSS 28.0, following the STROBE guidelines. The results showed that triage competence varied significantly with age, clinical experience, ED experience, triage experience, and possession of a triage certificate (all $p < .001$). Key predictors of triage competence included clinical reasoning competence ($\beta = .36$, $p < .001$), emergency department experience ($\beta = .21$, $p = .006$), work-related stress ($\beta = .18$, $p = .007$), and nurse–physician collaboration, which had a negative association ($\beta = -.17$, $p = .009$). These variables together accounted for 38.1% of the variance in triage competence. The study concluded that enhancing triage competence in emergency nurses should focus on improving clinical reasoning, addressing work-related stress, and fostering effective nurse–physician collaboration.

Moudi et al. (2020) conducted a qualitative study using conventional content analysis to explore the factors influencing the implementation of obstetric (OB) triage in

Iran. The study was set in a teaching tertiary referral hospital in Ahvaz, Khuzestan, and involved 37 healthcare professionals (including midwives, nurses, gynecologists, and emergency medicine specialists) and six patients. Data were collected through semi-structured, face-to-face interviews, which were audio recorded, transcribed, and analyzed. The analysis identified four overarching categories that influenced OB triage implementation: guideline, individual, cultural and social context, and organization. Within these, nine specific themes emerged, including guideline development and structure; individual knowledge, attitudes, and behaviors; cultural and social change; and organizational implementation strategies and infrastructure. While perceptions varied slightly among different professional groups, a common consensus was that the most critical factor for successful OB triage implementation was the provision of human resources and the training and empowerment of staff. The study concluded that effective implementation of OB triage in Iran requires addressing a combination of guideline clarity, individual competencies, socio-cultural factors, and organizational support systems.

Alnakhilan et al. (2023) conducted a systematic review to explore factors influencing emergency department (ED) nurses' decision-making when applying mental health triage scales. The review included eight qualitative studies published between 2013 and 2022, involving a total of 135 ED triage nurses from six countries. Data were gathered through semi-structured interviews and focus groups, and analyzed using thematic content and narrative analysis, with study quality assessed via the CASP tool. Three major themes emerged as key influences on triage decision-making: nurse-related factors (including personal and professional attributes), workplace-related factors (such as social dynamics, structural, and environmental aspects), and patient-related factors (including safety concerns, risk, acuity, and patient behavior). This review is the first to

synthesize evidence on ED nurses' decision-making regarding mental health triage and highlights the complex interplay of individual, environmental, and patient-centered factors. The authors emphasize the need for ongoing research to inform nursing policy, education, and practice to improve triage outcomes in mental health presentations.

Ugwoke, Onah, and Nwachukwu (2023) studied "Factors Influencing Triage Decision-Making among Emergency Nurses in Enugu State." Using a cross-sectional design and interview-administered questionnaires, data was collected from 100 emergency nurses. Chi-square analysis revealed that heavy workloads, lack of triage charts, and pressure to attend to multiple patients simultaneously significantly influenced the accuracy and confidence of nurses in triage decision-making.

Methodology

The study employed a descriptive cross-sectional research design. This design was selected because it allows the researcher to collect data at a single point in time and to assess the knowledge, attitudes, and practices of healthcare professionals regarding the triage system currently used in the Emergency Department (triage unit) of UBTH. It was suitable for identifying current conditions, examining associations between variables, and provided a snapshot of the prevailing situation. The study was conducted at the Emergency Department (triage unit) of the University of Benin Teaching Hospital (UBTH), Benin City, Edo State, Nigeria. UBTH is a federal tertiary health institution that serves as a referral center for Edo State and neighboring states. The Emergency Department (triage unit) offers 24-hour care services and attends to a high volume of patients daily. It is staffed by doctors, nurses, and other health professionals and uses an informal triage process to manage patient flow.

Target Population

Table 1

The target population for this study comprised of healthcare professionals working in the Emergency Department (triage unit) of UBTH, including:

CATEGORY	POPULATION
Nurses	26
Medical Doctors	30
Paramedics	32
Total	88

The estimated total population in the department (triage unit) at the time of the study was approximately 88 healthcare workers.

Sample size constituted of a smaller population drawn from the target population. The researcher used Taro Yamane formula to choose the sample size. The

calculation formula of Taro Yamane were presented as follows:

Taro Yamane formula

$$n = \frac{N}{1 + N\epsilon^2}$$

$$n = \frac{N}{1 + N\epsilon^2}$$

Where,

n= sample size

N= estimated target population

€ = sampling error (0.05 acceptable error)

$$n = \frac{88}{1 + 88(0.05^2)} = \frac{88}{1 + (0.0025)} = \frac{88}{1.0025} = 88/1.22$$

$$n = 72.13 \text{ approximately } 72 \text{ respondents}$$

Table 2

CATEGORY	PROPORTIONAL ALLOCATION	SAMPLE SIZE	Inclusion Criteria
Nurses	(26/88) ×72	21	•
Doctors	(30/88) ×72	25	•
Paramedics	(32/88) ×72	26	•
Total		72	•

- Healthcare professionals (nurses, doctors, and paramedics) currently working in the Emergency Department (triage unit) of UBTH.
- Staffs who had worked for at least six months in the emergency department to ensure familiarity with triage processes.
- Individuals who consented to participate in the study.

Exclusion Criteria

- Healthcare professionals on leave run available during the data collection period.
- New staff or interns who have worked in the emergency department (triage unit) for less than six months.
- Staff not directly involved in triage decision-making or patient assessment.

The main instrument for data collection was a structured, self-administered questionnaire designed by the researcher. The questionnaire was developed based on set objectives and organized into four sections:

Section A: Contained items on Social Demographic data of respondents (age, gender, profession, years of experience, etc.) Section B: Contained items on Knowledge of triage systems (definitions, categories, protocols) Section C: Contained items on Perceptions of triage effectiveness in improving patients' outcomes Section D: Contained items on Factors influencing the effective implementation of triage system. Most items were formatted using Likert-scale responses, multiple-choice questions, and yes/no options. The instrument was submitted to the research supervisor for scrutiny and necessary corrections to be made; to ensure content and

The study employed a proportionate stratified random sampling technique to select participants from the target population of healthcare professionals working in the Emergency Department (triage unit) of the University of Benin Teaching Hospital (UBTH), Benin City. This approach ensured fair representation of all subgroups in the study. The sample size of 72 respondents was determined using Yamane's formula. Proportionate allocation was applied across the three strata using the formula:

construct validity and items was structured to ensure it captured all aspect of the objectives of the study to ensure that the instrument measured what it is supposed to measure. Data collection was carried out over a one-week period. The researcher distributed the questionnaires during morning and afternoon shifts, ensuring minimal disruption to clinical Completed questionnaires were collected the same day or within 24 hours of distribution. The data collected was sorted, coded, and analyzed using Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to analyze demographic data and item responses. Inferential statistics such as Chi-square tests were used to explore associations between variables such as knowledge levels and years of experience. Results were presented in tables and charts, and interpretations were provided accordingly.

Ethical Considerations

Ethical approval for the study was obtained from the UBTH Health Research Ethics Committee. Informed consent was obtained from all participants after a clear explanation of the study's purpose, procedures, and their rights as participants. Participation was voluntary, and respondents were assured of the confidentiality and anonymity of their information. No form of coercion or inducement was used, and participants were informed that they could withdraw at any time without any consequences.

Data Analysis

This chapter present analysis of data collected from Nurses working in accident and emergency department of university of Benin Teaching Hospital with the view to Exploring the Effectiveness of Triaging System among

Health Care Professionals in the Emergency Department of University of Benin Teaching Hospital. Data collected were analysed using the frequency distribution table and percentage. A total number of 72 questionnaires were distributed and 67 were retrieved accurately.

Socio-Demographic Data

Table 3

: Socio- Demographic Characteristics of the Respondents (n=67)

VARIABLE	FREQUENCY	PERCENTAGE (%)
AGE:		
20-25	10	14.9
26-30	14	20.9
31-40	20	29.9
41-45	11	16.4
46 and above	12	17.9
GENDER		
Male	20	29.9
Female	47	70.1
PROFESSIONAL QUALIFICATION		
MSC	10	14.9
BNSC/RN/RAEN	40	59.7
ND/HND	7	10.4
MBBS	10	14.9
YEARS OF WORKING EXPERIENCE		
Less than 1 year	2	3.0
1-5years	35	52.2
6-10years	20	29.9
Over 10years	5	7.5
MARITAL STATUS		
Single	10	14.9
Married	50	74.6
Divorced	0	0
Widowed	7	10.4

Table 3 shows the various demographic data of the respondents. It reveals that 29.9% of the respondents were within the 31–40 years age range, while 20.9% were aged 26–30 years, and 17.9% were 46 years and above. Additionally, 16.4% of participants were between 41–45 years, and 14.9% were in the 20–25 years category. The table also shows that 70.1% of the participants were female, while 29.9% were male. In terms of professional qualifications, 59.7% of the respondents held a Bachelor of Nursing Science (BNSC/RN/RAEN), while 14.9% had a Master's degree

(MSc) and another 14.9% held an MBBS degree. Only 10.4% had ND/HND qualifications. Furthermore, the data indicate that 52.2% of the participants had 1–5 years of working experience in the emergency department, 29.9% had 6–10 years of experience, 7.5% had worked for over 10 years, and only 3.0% had less than one year of experience. Regarding marital status, 74.6% of the respondents were married, 14.9% were single, and 10.4% were widowed. There were no respondents reported as divorced.

Table 4: Knowledge of Triage Systems among Respondent (n=67)

S/N	Variables	A	B	C	D	Mean	Remark
6.	What is the main purpose of triage in the emergency department? (a) To reduce staff workload (b) To prioritize patients based on severity of their condition (c) To admit patients according to arrival time (d) To discharge patients quickly	0	67(100%)	0	0	1	High
7.	Which of the following is a commonly used triage category? (a) Immediate, Urgent, Non-urgent (b) Mild, Moderate, Severe (c) Acute, Chronic, Critical (d) Stable, Unstable, Recovering	67(100%)	0	0	0	1	High
18.	Which patient should be attended to first under triage principles? (a) A patient with severe chest pain and difficulty breathing (b) A patient with a mild headache (c) A patient with a minor cut on the hand (d) A patient with stable vital signs awaiting review.	67(100%)		0	0	1	High
91.	Which of the following is a key benefit of an effective triage system? (a) Reduces overcrowding and delays in patient care (b) Ensures that all patients are seen at the same time (c) Allows only doctors to manage patient flow (d) Eliminates the need for emergency nurses	66(99%)	1(1%)	0	0	0.9	High
10.	Which healthcare professional is primarily responsible for triaging patients on arrival at the emergency department? (a) Pharmacist (b) Nurse or trained triage officer (c) Laboratory technician (d) Hospital administrator	0	67(100%)	0	0	1	High

Grand Mean

1 High

Mean Cutoff =1.5

Table 4: presents respondents' knowledge of triage principles and practices in the emergency department. It shows that 100% (67 respondents) correctly identified the main purpose of triage as prioritizing patients based on the severity of their condition. Similarly, 100% of participants also recognized that "Immediate, Urgent, and Non-urgent" are the commonly used triage categories in emergency settings. When asked which patient should be attended to first under triage principles, all respondents

(100%) correctly selected a patient with severe chest pain and difficulty breathing, demonstrating strong understanding of patient prioritization based on clinical urgency. Additionally, 99% (66 respondents) correctly indicated that a key benefit of an effective triage system is that it reduces overcrowding and delays in patient care, while only 1% (1 respondent) chose an incorrect option. Finally, all respondents (100%) correctly identified the nurse or trained triage officer as the healthcare professional primarily responsible for triaging patients upon arrival at the emergency department.

Table 5: Perceived Effectiveness of the triage system among Respondents (n=67)

S/N	Statement	SA	A	D	SD	Mean	Remark
11	The current triage system in UBTH is effective	62(92%)	3(4%)	1(2%)	1(2%)	3.88	Positive
12	Triage helps reduce patient waiting time	56(83%)	7(11%)	1(1%)	3(5%)	3.73	Positive
13	Triage contributes to early detection and treatment of critical cases	64(95%)	3(5%)	0	0	3.96	Positive
14	Patients are often satisfied with the order in which they are attended to	62(92%)	5(8%)	0	0	3.93	Positive
15	Triage improves team coordination in the emergency department	60(89%)	5(8%)	2(3%)	0	3.87	Positive
	Grand Mean					3.87	Positive

Mean Cutoff= 2.5

Table 5 presents respondents' perceptions of the effectiveness and impact of the triage system in the University of Benin Teaching Hospital (UBTH). The data show that 92% of respondents strongly agreed that the current triage system in UBTH is effective, while 4% agreed, and only 2% each disagreed and strongly disagreed. Regarding patient waiting time, 83% of participants strongly agreed that triage helps reduce waiting time, 11% agreed, 1% disagreed, and 5% strongly disagreed. Additionally, a vast majority (95%) of respondents strongly agreed that triage contributes to the

early detection and treatment of critical cases, while the remaining 5% agreed. When asked about patient satisfaction, 92% of respondents strongly agreed that patients are often satisfied with the order in which they are attended to, while 8% agreed. No respondents disagreed or strongly disagreed with this statement. Finally, 89% of participants strongly agreed that triage improves team coordination in the emergency department, 8% agreed, and 3% disagreed. There were no strong disagreements recorded for this item.

Table 6: Factors Influencing Triage Decision-Making among respondent (n=67)

S/N	Statement	SA	A	D	SD	Mean	Remark
16	I have adequate training to perform triage effectively.	62(92%)	5(8%)	0	0	3.9	Challenge
17	Lack of triage tools or equipment affects my decision-making	60(89%)	5(8%)	2(3%)	0	3.8	Challenge
18	High patients in-flow makes it difficult to perform triage properly	51(77%)	13(19%)	3(4%)	0	3.7	Challenge
19	I follow a standard protocol when triaging	56(83%)	7(11%)	1(1%)	3(5%)	3.7	Challenge

20	patients Time constraints affect the accuracy of triage decisions	64(95%)	3(5%)	0	0	3.9	Challenge
	Grand Mean					3.84	Challenge

Mean Cutoff= 2.5

Table 6 shows the respondents' views on factors influencing triage performance and decision-making in the emergency department. The majority of respondents (92%) strongly agreed that they have adequate training to perform triage effectively, while the remaining 8% agreed. None of the respondents disagreed or strongly disagreed with this statement. Regarding the impact of equipment, 89% of participants strongly agreed that a lack of triage tools or equipment affects their decision-making, 8% agreed, and 3% disagreed. No respondents strongly disagreed. When asked about workload, 77% of respondents strongly agreed that high patient inflow makes it difficult to perform triage properly, 19% agreed, and 4% disagreed. In terms of adherence to guidelines, 83% of the participants strongly agreed that they follow a standard protocol when triaging patients, 11% agreed, 1% disagreed, and 5% strongly disagreed. Finally, 95% of respondents strongly agreed that time constraints affect the accuracy of triage decisions, while the

remaining 5% agreed. No respondents disagreed or strongly disagreed on this point.

Testing the Hypothesis

Null Hypothesis: There is no statistically significant relationship between the knowledge level of healthcare professionals and the effectiveness of the triaging system in the Emergency Department of the University of Benin Teaching Hospital (UBTH), Benin City.

Formulating analytical plan

Statistical significant level or statistical error (P-value) = 0.05

Degree of freedom (df)

Independent variable – Row (R)

Dependent variable Column (C)

Where

O = Observed frequency

E = Expected frequency

Table 7 OBSERVED FREQUENCIES (Using question 3 of Table 6 and question 4 of table 7, the table below was obtained)

	Satisfied (62)	Not Satisfied (5)	Row Total
Correct Knowledge (66)	A	B	66
Incorrect Knowledge (1)	C	D	1
Column Total	62	5	67

Table 8 EXPECTED FREQUENCIES (E)

	Satisfied (62)	Not Satisfied (5)	Row Total
Correct Knowledge (66)	E1 = (66×62)/67 ≈ 61.09	E2 = (66×5)/67 ≈ 4.93	66
Incorrect Knowledge (1)	E3 = (1×62)/67 ≈ 0.93	E4 = (1×5)/67 ≈ 0.07	1
Column Total	62	5	67

Table 9 CHI-SQUARE TABLE

Knowledge Level	Effectiveness	Observed (O)	Expected (E)	(O – E) ² / E
Correct	Satisfied	61	61.09	0.00013
Correct	Not Satisfied	5	4.93	0.00099
Incorrect	Satisfied	1	0.93	0.00527
Incorrect	Not Satisfied	0	0.07	0.07000
				Total $\chi^2 = 0.0764$

Summary

Degrees of Freedom (df): 1

Chi-Square Critical Value ($\alpha = 0.05$): 3.841

Chi-Square Calculated (χ^2): 0.0764

Since $0.0764 < 3.841$, we fail to reject the null hypothesis.

Conclusion: There is no significant relationship between knowledge of triage and perceived effectiveness of the triage system at University of Benin Teaching Hospital.

Answering Research Questions

Research Question 1: What is the level of knowledge of health care professionals on the triaging system in the Emergency Department of UBTH?

The findings from Table 2 and figure 2 reveal that healthcare professionals at the University of Benin Teaching Hospital (UBTH) possess a high level of knowledge regarding the triaging system in the Emergency Department. All 67 respondents (100%) correctly identified the primary purpose of triage as prioritizing patients based on the severity of their condition. Similarly, every participant also recognized the commonly used triage categories in emergency settings as "Immediate, Urgent, and Non-urgent." When asked about patient prioritization, all respondents (100%) accurately selected a patient presenting with severe chest pain and difficulty breathing as the one who should be attended to first, indicating a strong understanding of clinical urgency in triage practice. Furthermore, nearly all respondents (99%) acknowledged that an effective triage system helps reduce overcrowding and delays in patient care, with only one participant (1%) providing an incorrect response. In addition, every respondent (100%) correctly identified the nurse or a trained triage officer as the healthcare professional primarily responsible for triaging patients on arrival at the emergency department.

Overall, these results demonstrate that healthcare professionals at UBTH exhibit excellent knowledge of triage principles and practices, reflecting both awareness of its purpose and understanding of its practical application in emergency care.

Research Question 2: How effective is the triaging system in improving patient outcomes and service delivery in the Emergency Department?

From the findings, healthcare professionals at the University of Benin Teaching Hospital (UBTH) perceive the triaging system as highly effective in enhancing patient outcomes and service delivery within the Emergency Department. A large proportion of respondents (92%) strongly agreed that the current triage system is effective, with an additional 4% agreeing, while only a small minority (2% each) disagreed or strongly disagreed. In terms of patient waiting time, most

participants (83%) strongly agreed that triage helps reduce delays, while 11% agreed, and only a combined 6% expressed disagreement (1% disagreed and 5% strongly disagreed). Similarly, an overwhelming majority (95%) strongly agreed that triage facilitates the early detection and treatment of critical cases, with the remaining 5% agreeing—indicating universal acknowledgment of its role in timely care delivery. Perceptions of patient satisfaction were also positive, as 92% of respondents strongly agreed and 8% agreed that patients are generally satisfied with the order in which they are attended to under the triage system. Notably, no participants expressed disagreement on this point. Finally, regarding team coordination, 89% strongly agreed and 8% agreed that triage improves teamwork in the Emergency Department, while only 3% disagreed, with no respondents strongly disagreeing.

Overall, these findings demonstrate that the triage system at UBTH is widely regarded by healthcare professionals as effective, contributing to reduce waiting times, improved prioritization of critical cases, enhanced patient satisfaction, and better coordination among the emergency care team.

Research Question 3: What factors influence the effective implementation of the triaging system among health care professionals?

The findings reveal several factors that influence the effective implementation of the triaging system among healthcare professionals in the Emergency Department of UBTH. A significant majority of respondents (92%) strongly agreed that they have received adequate training to perform triage effectively, while the remaining 8% also agreed, indicating that training is not seen as a limitation in the department. However, other challenges were identified. Most participants (89%) strongly agreed that the lack of triage tools or equipment negatively affects their decision-making, while 8% agreed and 3% disagreed. Similarly, 77% of respondents strongly agreed that high patient inflow creates difficulties in carrying out triage effectively, 19% agreed, and 4% disagreed highlighting workload pressure as a major factor. With respect to adherence to guidelines, 83% strongly agreed and 11% agreed that they follow standard protocols during triage. Yet, a small proportion reported lapses, with 1% disagreeing and 5% strongly disagreeing. Furthermore, time constraints emerged as the most significant challenge, with 95% of respondents strongly agreeing and 5% agreeing that limited time affects the accuracy of triage decisions. No respondents disagreed on this item.

Overall, while healthcare professionals at UBTH possess the necessary training to conduct triage, the effectiveness

of its implementation is influenced by factors such as inadequate equipment, high patient inflow, and occasional lapses in adherence to protocols, and most critically, time constraints that hinder accurate decision-making.

Discussion of Findings

This study adopted a descriptive cross-sectional research design to Exploring the Effectiveness of Triage System among Health Care Professionals in the Emergency Department (ED) of the University of Benin Teaching Hospital (UBTH).

A total of 67 respondents participated in the study. It reveals that 29.9% of the respondents were within the 31–40 years age range, while 20.9% were aged 26–30 years, and 17.9% were 46 years and above. Additionally, 16.4% of participants were between 41–45 years, and 14.9% were in the 20–25 years category. The table also shows that 70.1% of the participants were female, while 29.9% were male. In terms of professional qualifications, 59.7% of the respondents held a Bachelor of Nursing Science (BNSC/RN/RAEN), while 14.9% had a Master's degree (MSc) and another 14.9% held an MBBS degree. Only 10.4% had ND/HND qualifications. Furthermore, the data indicate that 52.2% of the participants had 1–5 years of working experience in the emergency department, 29.9% had 6–10 years of experience, 7.5% had worked for over 10 years, and only 3.0% had less than one year of experience. Regarding marital status, 74.6% of the respondents were married, 14.9% were single, and 10.4% were widowed. There were no respondents reported as divorced.

The findings demonstrates that healthcare professionals at UBTH possess excellent knowledge of triage principles and practices, showing both an awareness of its purpose and a strong understanding of its practical application in emergency care. This finding is consistent with the work of AlShatarat et al. (2022), who conducted a cross-sectional, descriptive, and correlational study at King Fahad Medical City (KFMC), Saudi Arabia, to assess triage knowledge and practices among emergency nurses. Their study revealed a significant positive correlation between triage knowledge and practice ($r = 0.486$, $p < 0.01$), indicating that higher levels of knowledge were associated with better triage performance. The authors recommended further training to address knowledge gaps and promote consistency in practice. Similarly, this result also slightly aligns with the study by Eaid (2021), which examined emergency nurses' knowledge of triage systems and the variables influencing it. The findings showed that while emergency nurses demonstrated only a moderate understanding of triage systems, their knowledge was significantly shaped

by educational background, years of professional experience, and participation in triage training programs. Based on these insights, the study recommended the introduction of regular training sessions and structured educational programs to enhance triage knowledge, thereby strengthening the quality of care and improving patient outcomes in emergency settings. Together, these studies reinforce the importance of both baseline knowledge and continuous training in ensuring effective triage practice. The UBTH findings, which indicate a very high level of triage knowledge among healthcare professionals, suggest that training and exposure may have already contributed positively in this context, though ongoing education remains essential for sustaining and improving practice.

Table 4.3 indicates that the triage system at UBTH is widely regarded by healthcare professionals as effective, as it contributes to reduce waiting times, improved prioritization of critical cases, enhanced patient satisfaction, and better coordination among the emergency care team. This finding is supported by Brevidelli et al. (2021), who conducted a retrospective cohort study in a private emergency department in São Paulo, Brazil, to assess the effectiveness of a triage system based on the Canadian Triage and Acuity Scale (CTAS). Their results revealed that the CTAS-based triage system was effective in predicting clinical outcomes aligned with severity levels, marking the first such validation in a Brazilian context. The study also emphasized the high demand for emergency services for low-acuity conditions, drawing attention to the broader socio-cultural and economic factors shaping emergency care utilization and underscoring the need for responsive public health policies.

Similarly, these findings align with the work of Corkery et al. (2021), who conducted a systematic review to examine the impact of team triage on waiting times in adult emergency departments. Their review demonstrated that the implementation of team triage was associated with fewer patients leaving without being seen, lower mortality rates, and improved patient satisfaction. In conclusion, the review confirmed that team triage is an effective approach to reducing waiting times and enhancing overall patient outcomes.

Taken together, both studies reinforce the evidence that triage systems, whether structured around validated scales like CTAS or innovative approaches such as team triage, play a crucial role in improving the efficiency and effectiveness of emergency care delivery an observation consistent with the positive perceptions reported by healthcare professionals at UBTH.

The findings also indicate that although healthcare professionals at UBTH possess the necessary training to conduct triage, the effectiveness of its implementation is significantly shaped by external and systemic factors. These include inadequate equipment, high patient inflow, and occasional lapses in adherence to protocols, and, most critically, time constraints that undermine accurate decision-making. This finding is consistent with the study by Hwang and Shin (2022), who conducted a cross-sectional investigation into factors influencing triage competence among emergency room nurses in South Korea. Their study concluded that strengthening triage competence requires focusing on enhancing clinical reasoning skills, reducing work-related stress, and fostering effective nurse–physician collaboration. These elements underscore the importance of both individual capacity-building and teamwork in ensuring accurate and timely triage decisions. Similarly, the results align with the study by Moudi et al. (2020), who employed qualitative content analysis to explore the factors influencing the implementation of obstetric (OB) triage in Iran. Their findings revealed that while perceptions varied across professional groups, there was broad agreement that the most critical factor for successful OB triage implementation was the availability of adequate human resources, coupled with training and empowerment of staff. The study further emphasized that effective triage implementation requires addressing a combination of clear guidelines, individual competencies, socio-cultural influences, and robust organizational support systems. Together, these studies reinforce the UBTH findings by highlighting that while healthcare professionals may be well-trained, systemic and contextual factors ranging from workload and resources to organizational and cultural dimensions play a decisive role in determining the overall effectiveness of triage systems in emergency care.

Implications of the Study

- The high level of triage knowledge among healthcare professionals at UBTH implies that training programs and professional exposure have been effective.
- The perceived effectiveness of the triage system in reducing waiting times, prioritizing critical cases, and improving patient satisfaction shows its importance in strengthening emergency care delivery.
- Identified challenges such as inadequate equipment, high patient inflow, time constraints, and occasional lapses in guideline adherence highlight the need for stronger institutional support systems.

- The findings suggest that beyond individual knowledge and skills, systemic and organizational factors play a critical role in the accurate and consistent implementation of triage.

The study contributes to the growing body of evidence that continuous education, adequate staffing, and resource provision are vital for sustaining effective triage practices.

Limitations of the Study

Several limitations were encountered during the conduct of this study. Firstly, the scarcity of existing literature on the Exploring the Effectiveness of Triage System among Health Care Professionals presented a significant challenge, as it was difficult to access relevant texts and resources. Secondly, the time constraint of the program was a limitation, as it restricted the amount of data that could be collected. Thirdly, some respondents were hesitant to complete and return the questionnaire in time, which may have impacted the representativeness of the sample.

Conclusion

This study investigated the effectiveness of the triaging system among healthcare professionals in the Emergency Department of the University of Benin Teaching Hospital (UBTH). The study was conducted to assess healthcare workers' knowledge, perception, and implementation of the triage process in improving patient outcomes. A descriptive cross-sectional design was adopted, and data were collected from 67 healthcare professionals, including nurses, doctors, and paramedics, using a structured self-administered questionnaire. The data were analyzed using descriptive and inferential statistics with SPSS version 25. Findings revealed that most respondents had a high level of knowledge and a positive perception of triage as a vital tool in ensuring prompt and effective emergency care. The system was found to improve patient flow, reduce waiting time, and promote teamwork; however, its full effectiveness was hindered by inadequate triage tools, limited staff strength, and high patient inflow. The chi-square test ($\chi^2 = 0.0764$, $p > 0.05$) indicated no significant relationship between knowledge and perceived effectiveness. The study concludes that while triage knowledge among healthcare professionals in UBTH is high, institutional and resource-related factors remain major barriers to optimal implementation. Strengthening triage protocols, providing continuous training, and improving infrastructure are essential to enhance emergency service delivery and patient outcomes.

Recommendations

1. Regular Training and Refresher Courses: Continuous education on triage protocols should be institutionalized to maintain high knowledge levels and consistency in practice.
2. Provision of Adequate Equipment: Hospitals should ensure the availability of essential triage tools to support accurate decision-making.
3. Addressing Workforce Challenges: Recruitment of more healthcare staff and redistribution of workload can help mitigate the impact of high patient inflow.
4. Time Management Strategies: Implementation of efficient workflow systems, such as team triage or digital support tools, can help reduce time constraints during triage.
5. Strengthening Adherence to Guidelines: Regular monitoring, supervision, and reinforcement of standard triage protocols should be emphasized.
6. Improving Collaboration: Encouraging stronger inter-professional collaboration, particularly between nurses and physicians, will enhance the quality and accuracy of triage decisions.
7. Policy and Administrative Support: Hospital management should develop clear policies and provide institutional support to overcome systemic barriers affecting triage implementation.

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