PATIENTS' MANAGEMENT OUTCOME OF TRIAGED AND CODED PATIENTS AT ACCIDENT AND EMERGENCY DEPARTMENT, KENYATTA NATIONAL HOSPITAL, KENYA

Daniel Kimutai Chelal

A Thesis Submitted in Partial Fulfillment of the Requirement for the Award of the Degree of Masters of Science in Advanced Nursing Practice (Trauma and Emergency Nursing) of Masinde Muliro University of Science and Technology

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DECLARATION

This thesis is my original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a degree or any other award.

Signature ..... Date 21/9/2023

Chelal Daniel Kimutai

HNR/G/01-53744/2019

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a thesis entitled **"Patients' Management Outcome of Triaged and Coded Patients at Accident and Emergency Department, Kenyatta National Hospital, Kenya".**

Signature ..... Date 21/9/2023

Dr. Tecla Sum

Department of Paramedical Sciences

Masinde Muliro University of Science and Technology.

Signature ..... Date 21/09/2023

Dr. Everlyne Morema

Department of Community Health Nursing and Extension,

Masinde Muliro University of Science and Technology.

DEDICATION

I dedicate my research work to my lovely wife and my children who have been a great and wonderful source of encouragement to me. God bless them.

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May God's favor and blessings be with you always !

ABSTRACT

The goal of triage is to prioritize patients who require the most urgent care and increase efficiency when resources are insufficient to treat all patients as per their degree or grade of injury. An effective and efficient emergency center triage system should be able to sort both trauma and non-trauma patients according to level of acuity. It also involves treatment as per the physiological parameters, either coded as red, orange, yellow, green or black. Kenyatta National Hospital has adopted the South African Triage Score (SATS) which has proven to be effective in monitoring the patient's physiological parameters, it involves the use of a score form called triage early warning scores (TEWS). Several studies have found that emergency triage is an effective way to speed up the triage process, decrease waiting times, and boost patient outcomes in first-world nations. Low-income or limited-resource situations, on the other hand, present unique obstacles that might have a substantial effect on the selection and application of the most suitable triage scale and the success of its implementation. Some of the examples of such challenges include shortages of material and human resources, poor record keeping practices, as well as space. The broad objective of the study was to evaluate the outcome of triaged and coded patients at accident and emergency department, Kenyatta National Hospital. The study was a cross sectional study involving the triaged and coded patient's flagged by scores using the Triage Early warning score (TEWS) whereby structured questionnaire were used as well as an observation checklist. Study site was accident and emergency department, Kenyatta National Hospital. The target population were all coded patients at accident and emergency unit, a sample of 385 patients were used during this study, data collection was through structured questionnaires and checklist to assess the healthcare provider and institutional related factors. Pilot study was done at Kakamega county referral hospital. Data analysis was done using statistical package for social sciences (SPSS) version 25, descriptive and inferential statistics was used to test the associated of the factors in relation to the outcomes. Odds ratio was used to test the strength between the provider and health facility factors associated with the management outcome of triaged and coded patients, a one-way analysis of variance was be used to the differences in mean scores in the institutional and provider factors. Data was presented in tables and bar graphs. The study results indicated that patient related factors had significant influence on management outcome of triaged patients' (t-statistic=.210, p-value = 0.039 < 0.05). The other findings revealed that provider related factors had significant influence on management outcomes of patients triaged (t-statistic=13.055, p-value=0.002< 0.05). Further study results indicated that there was a positive and significant relationship between institutional related factors and management outcome of triaged patients'. This is depicted by a Pearson correlation coefficient r=0.452 p-value =0.008< 0.05 which was significant at 0.05 level of significance. This implies that improved institutional related factors result in an increase in management outcome of triaged patients'. It's therefore important to note that patients related factors, provider related factors and institutional related factors have an impact on the outcome of triaged and coded patients in accident and emergency department, Kenyatta national hospital. Thus, it's important for the institution to invest in human resource capacity, procurement of equipment and drugs to be used as well as improve on infrastructure. Further research to be done to determine the patient satisfaction levels as well as the staff training needs assessment.

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LIST OF ABBREVIATIONS AND ACRONYMS

A&E	–	Accident and Emergency
COVID -19	–	a coronavirus disease 2019 is a communicable disease caused by coronavirus which causes illness to humans
ED	–	Emergency Department
ERC	–	Ethics Review Committee
GDP	–	Gross Domestic Product
ICU	–	Intensive Care Unit
KNH	-	Kenyatta National Hospital
LMICs	–	Low Medium Income Countries
MEWS	–	Modified Early Warning Score
NACOSTI	–	National Commission for Science and Technology Innovation
PFC	–	Pediatric Filtering Clinic
PTWG	–	Pediatric Triage Working Group
RRA	–	Resuscitation Room A
RRB	-	Resuscitation Room B
SATS	–	South African Triage Scale
TBI	–	Traumatic Brain Injury
TEWS	-	Triage Early Warning Scores

USA – United States of America

WHO – World Health Organization

OPERATIONALISATION OF TERMS

Evaluation – the end result of an ongoing medical treatment or intervention.

Factors – the variables that affects an event, decision or situation.

Healthcare provider- a team of medical personnel in a health facility who provide emergency and trauma services.

Institution –a place where medical services are offered

Mortality –In this study it implies death of a patient in the process of medical care

Outcome –the end result of an ongoing treatment before, during or after interventions

Triage – the process of sorting patients in accident and emergency based on their need for immediate medical attention, it involves prioritizing medical care first to those who are at more risk of death.

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter highlighted on the triage process and its importance and also the impact on the outcome of the triaged and coded patients.it also explains the importance of triage in relation to the patient status. It also elaborates the triage process from a global perspective as the resource allocation in the various jurisdictions.it will also explain the major triage scale being used in Kenya and its adaptation, the relevance to the area of study as well as the parameters used to measure or score in the scales. It will also covers the statement of the problem, study objectives, justification of the study, limitation of the study, scope of the study and the study's conceptual framework.

1.2 Background of the Study

Triage is the procedure of determining which patients (or disaster victims) require treatment first based on their condition, severity, prognosis, and the available resources. The objectives of triage are to prioritize treatment by identifying which patients require rapid resuscitation, situating those patients in the appropriate patient care area, and initiating the appropriate diagnostic and therapeutic procedures (Bazyar, Farrokhi, & Khankeh, 2019).

Due to low utilization, triage is frequently an inefficient component of health systems in developing nations. Due to inadequate triage training, "gestalt" decision-making, and a lack of formally defined triage protocols, inconsistent triage assignments can place patients in critical condition at risk. Different triage methods have demonstrated acceptable reliability and validity, suggesting that patient mortality

may be reduced if triage is enhanced in resource-limited settings (Wangara *et al.,* 2019). In contrast, it is commonly reported that the validity, reliability, and outcomes of A&E triage scales devised for high-income nations vary. Given these disparities, it is difficult to determine which triage system is "optimal" in a given circumstance, particularly in low- and middle-income countries (Hansoti *et al.,* 2017).

The South African Triage Scale (SATS) was developed in resource-limited settings in South Africa (Wangara *et al.,* 2019). A number of studies of similarly low-resourced settings have demonstrated the reliability and validity of the SATS. Even though this is avoidable, poor clinical decision-making frequently results in patient injury in the prehospital setting of Kenya. Kenyatta National Hospital's (KNH) emergency care and trauma systems have instituted a mandated triage mechanism to assist the accident and emergency nurse in assessing patients. The South African Triage Scale (SATS) has been implemented by the region's largest referral hospital. This method expedites the identification and prioritization of patients at the highest risk for adverse outcomes. (Mutahi, 2019) TEWS is a component of the South African Triage Scale (SATS) that assigns patient ratings based on abnormal physiological indicators. Throughout the triage procedure, patients are assigned to one of five distinct color groups based on their injuries and conditions. Patients with a red triage status must be transported promptly to the resuscitation room. The Paediatric Triage Working Group (PTWG) of the Western Cape Government (2012) established a "orange" level for "extremely urgent management," a "yellow" level for "urgent management," and a "green" level for "non-urgent" cases. Thanks to this coding system, medical personnel can concentrate on saving the lives of patients who are genuinely in danger. This is done with the local disease burden and the hospital's

available resources, including personnel and equipment, in mind. Despite the existence of numerous validated hospital triage algorithms, each one is tailored to a specific set of patient needs. When nurses prioritize red triaged patients over orange triaged patients, the orange triaged patients' conditions may deteriorate to the point where they require emergency care. If the swiftly deteriorating patients are identified and treated promptly, adverse events can be avoided.

Triaged and classified patients at KNH's emergency room have not, to my knowledge, been the subject of a published study. This study aims to identify the variables that contribute to the successful care of triaged and coded patients at KNH's emergency department due to the paucity of research in this field. On the basis of the findings of this study, a decision support system will be devised for the treatment of patients who have been triaged as "orange" and are at risk of deterioration during treatment.

1.3 Problem Statement

Overcrowding in emergency rooms as a result of a rise in the number of people using these facilities over the past few decades is a problem all around the world. Approximately 12% of the worldwide disease burden is attributable to trauma, making it an extremely time-sensitive condition. Low- and middle-income countries are disproportionately hit by the health and economic consequences of trauma. Over six million people worldwide lose their lives every year as a direct result of catastrophic injuries. Injury causes up to 16% of all disabilities worldwide, with a death incidence that is two to three times higher in low- and middle-income countries (9–12% vs. 5.5%).

All-cause mortality during hospitalization was the most common definition of in-hospital mortality, making it the most commonly utilized mortality outcome measure across the majority of research. Several research evaluated mortality within a set time frame, ranging from immediate post-incident to large follow-up durations beyond 3 months (Brorson C *et al,* 2011). Studies of TBI and SCI frequently concentrated on neurologically focused outcomes as their primary endpoint, with mortality as a secondary outcome.

A study conducted at KNH found that patients with a score of 6 had an increased risk for unfavorable outcomes like death, cardiac arrest, or unscheduled admission to the intensive care unit. Six hundred and thirty-four cases were reviewed in a study published in 2006 using the modified early warning score (MEWS), and researchers found that seventeen percent of the population had triggered the call out algorithm for review. Five percent of these individuals required unexpected admission to a critical care unit (ICU) (Gardner-Thorpe, Love, Wrightson, Walsh, & Keeling, 2006).

According to the TEWS, there were instances of under triage for patients with scores 7 and of over triage for patients with scores >7. (Mutahi, 2019). Similar results were obtained in the United States using the MEWS, where patients admitted to the ICU scored higher than those admitted to the normal wards. Mean, maximum, and median scores were all shown to be greater in the deceased compared to the living (Liu *et al.,* 2020).

According to the results of a study on the usefulness of triage scores at KNH (Mutahi, 2019), more research is needed to determine what factors affect the outcome of triaged and coded patients, and this research should include both trauma

and medical emergencies. This supports previous allegations by the World Health Organization that research into emergency care in low- and middle-income countries is lacking. There are various factors at play, but in the end, it comes down to a lack of standardized approaches to emergency triage, a scarcity of qualified researchers, and a preference for hospital-based care for trauma patients. These countries in the middle-income range are doing research that has the potential to fill important knowledge gaps.

1.4 Study Objectives

1.4.1 Main Objective

To evaluate the management outcome of triaged and coded patients at accident and emergency department, Kenyatta national hospital.

1.4.2 Specific Objectives

i. Assess the patient related factors associated with the management outcome of triaged patients within 48 hours of follow-up at accident and emergency department, Kenyatta national hospital.
ii. Identify the institutional related factors associated with the management outcome of patients triaged during 48 hours of interventions at accident and emergency department, Kenyatta national hospital.
iii. Examine the provider related factors associated with the management outcome of triaged patients within 48 hours of care at accident and emergency department, Kenyatta national hospital.

1.5 Research Questions

i. What are the patient related factors associated with the management outcome of triaged and coded triaged patients at accident and emergency department, Kenyatta national hospital?

ii. What are the institutional related factors associated with the management outcome of patients triaged and coded patients at accident and emergency department, Kenyatta national hospital?

iii. What are the provider related factors associated with the management outcome of triaged and coded triaged patients at accident and emergency department, Kenyatta national hospital?

1.6 Justification

Traumatic injury is a global public health issue that causes around sixteen thousand deaths each day and approximately eight times as many cases of moderate or severe disability. There is also a forecast that by the year 2030, the primary causes of traumatic death and injury (vehicle accidents, homicide, and suicide) will have significantly increased, placing a greater strain on healthcare systems and communities. If nothing is done, the situation could worsen. To lower trauma mortality and morbidity, many countries with well-developed healthcare systems have implemented comprehensive trauma systems. Instead of concentrating on individual trauma centers, all-inclusive trauma systems look at the patient journey as a whole, from pre-hospital care to patient transfer to first management to ultimate management to rehabilitation. The introduction of trauma systems has been connected to marked better results.

The primary concepts of triage are the classification and priority of injured persons, as well as the speed and accuracy of the performance. The life of the injured is dependent on the speed and precision of the triage process. There is a chance that a patient who has been triaged and coded will deteriorate or perhaps die. There is a significant disadvantage for patients in other coded triage systems when nurses prioritize those in the red status. However, these results could be avoided if the individuals who are failing rapidly were identified sooner. The results of this research will be used to develop a decision support system to help with the management of triaged and coded patients who may experience deterioration while receiving treatment. Patients with abnormalities in their physiological parameters are at a higher risk for severe adverse outcomes (unplanned admission to the intensive care unit, cardiac arrest, or death), proving the necessity of constant monitoring (Klepstad, et al, 2019). A study conducted at KNH found that individuals with a score of 6 had an increased risk for mortality, cardiac arrest, or unscheduled admission to the intensive care unit.

The literature produced by this study will be useful to other scholars, and the results will contribute to scientific knowledge about the factors related with the management outcome of triaged and coded patients.

1.7 Limitations of the study

The study was limited to evaluating the management outcome of triaged and coded patients at accident and emergency department within a period of 48 hours of follow up, the study also evaluated some of the variables associated with the management outcome of triaged and patients.

Due to the impact of COVID -19, the patient presentation and approach varied from patient to patient as the admission process as well as review was not following the normal triage process. This was bound to affect the total sample of 385 that was required. A change in the period of data collection was necessary to ensure the target is attained.

The respondents were suspicious and therefore withheld vital data pertaining to this research. Re-assuring respondents of their privacy was the only way to overcome this and confidentiality of all data collected that they were able to give the information.

1.8 Scope of the Study

This is a cross-sectional study that tries to evaluate the management outcome of triaged and coded patients at accident and emergency department, Kenyatta National Hospital. The study took a period of three months. The study was only done at KNH, accident and emergency department due to limited resources and time.

1.9 Conceptual Framework

The Donabedian model was adapted since it presupposes the existence of three fundamental components in assessing quality structure, process, and outcome, as well as a possible causal relationship between them. Structure, according to the Donabedian model (2005), can refer to the aspects of the system, the service provider, or the patient, and it includes the locations where medical care is delivered and the instruments used to provide that treatment. The term "process" is used to describe the sequence of interactions between healthcare providers and between providers and their patients. Many facets, both technological and interpersonal and institutional, were taken into account. Considering that the study's outcomes include the effects on people's health and on society as a whole, this method seems

appropriate (Donabedian, 1980). Outcomes can be broken down into three categories: clinical outcomes, quality of life, and patient satisfaction.

Donabedian does not provide definitive correlations between the three elements and acknowledges explicitly that these interactions are not fully known in his seminal study, which was initially published in 1966. However, the influence of structure and procedure on outcome is assumed. In subsequent publications, this viewpoint is further developed. Good structures, according to Donabedian (1997), boost the probability of good processes, which in turn boosts the probability of good outcomes. In this way, a causal model could be constructed in which one factor serves as a precondition for the next. A simplified version of Donabedian's idea is presented in the first volume of Explorations in Quality Assessment and Monitoring as structure, process, and outcome.

Care quality may be improved or diminished, according to this concept, depending on the specific architectural features of the facilities involved. Donabedian acknowledges the existence of causal linkages between elements, such that alterations to the treatment process will have consequences for patients' health or health result.

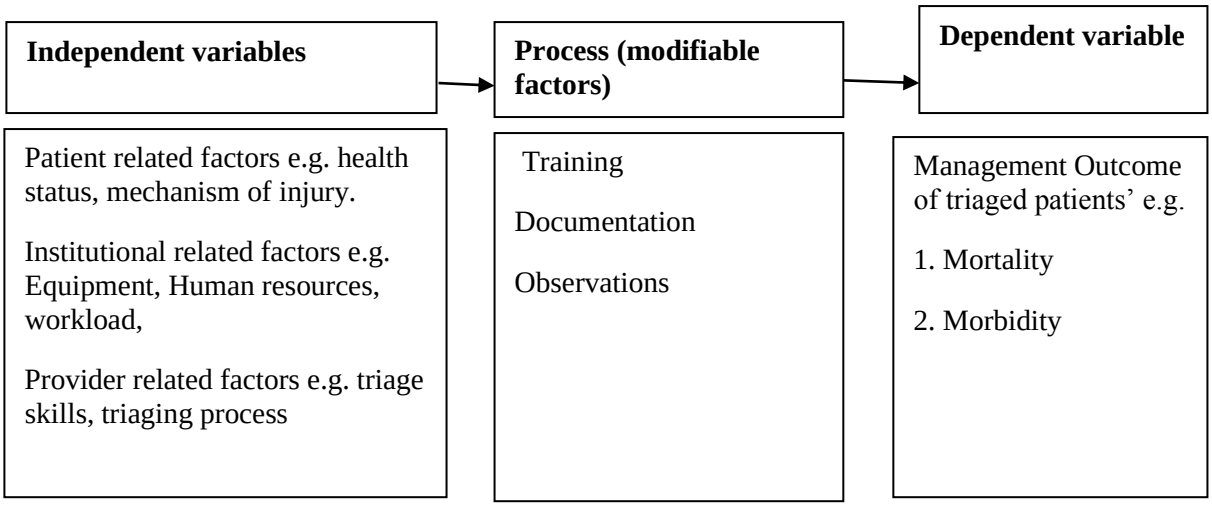

Figure 1.1: Conceptual framework of the Study

Source: Adopted from Donabedian model, 2005.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This is reviewing literature in line with the context of the study problem and research objectives formulated. The literature is reviewed starting from the global, regional and local effect of triaging on patient care as well as impact on the outcome of the patient, the areas to be covered will include the institutional factors, and provider related factors as well as the patient related factors affecting the management outcome of triaged and coded patients in the accident and emergency department.

2.2 Triage and Color Coding

Patients in dire need of rapid medical attention may first get health care at an emergency room. Death or permanent impairment may arise from failure to provide timely, appropriate care to such patients (Sunyoto *et al.*, 2014). Implementing an effective emergency triage tool is one way to relieve pressure on already overworked emergency services by ensuring that patients receive the most appropriate amount and quality of care according to their clinical status and need. Among these is the South African Triage Scale (SATS). In order to improve the efficacy of the emergency department, this was made for use by non-specialist (nursing) staff to identify patients at increased risk of mortality (Rosedale, Burton, Davies, & Wood, 2011). It has been linked to beneficial outcomes like shorter wait times, shorter lengths of stay, and lower mortality rates in the institutions where it has been assessed, including both urban and rural facilities in South Africa, where it was established, and elsewhere (Sunyoto *et al.*, 2014).

There are three parts to the SATS: the TEWS paperwork, the discriminator list, and the senior healthcare professional's final judgement. Patients are given ratings based on their vital signs. Both the subject's movement and awareness are factored into the total score. At the conclusion of the process, the scores are tallied and recorded as a whole. The discriminator list consists of conditions that place a patient in the appropriate category (emergency (red), very urgent (orange), or urgent (yellow)) regardless of the TEWS.

The SATS's third component gives control of the system to a seasoned healthcare leader. The red code indicates an emergency and requires immediate attention, the orange code requires up to 10 minutes, the yellow code requires up to 60 minutes, and the green code requires up to 240 minutes. Of those individuals, 166 (48%) were seen in the optimal amount of time (Soogun, Naidoo, & Naidoo, 2017).

The South African Triage Scale (SATS) comprises the Triage and Early Warning Score (TEWS), which is comprised of measurements of mobility, respiration rate, heart rate, systolic blood pressure, temperature, degree of awareness, and presence of injury. The other two parts of the SATS are a set of clinical differentiators and the expert verdict of a licensed medical doctor. Therefore, the SATS takes into account physical signs and symptoms in addition to injury and mobility status. Outside of South Africa, Médecins Sans Frontières has introduced the triage scale in Ghana and other locations. Although the SATS has proven beneficial in trauma contexts, it has not yet been compared to other trauma scoring systems when it comes to injuries caused by firearms (Aspelund, Patel, Kurland, McCaul, & van Hoving, 2019).

2.3 Patient related factors

2.3.1 Health status

Patients in a Swedish study had a median age of 66 and 86.4% had a history of medical conditions, the majority of which were related to the cardiovascular system (28.6%). These conditions included hypertension, stroke, myocardial infarction, and heart failure. The second most prevalent set of prior diagnoses was psychiatric, including conditions like anxiety, depression, and substance abuse (17.8%). (Magnusson, Herlitz, & Axelsson, 2020).

Patients with a history of circulatory diagnoses, such as prior stroke, myocardial infarction, or hypertension, were more likely to be determined to need hospitalization for treatment. Green triage was most often connected with no transport.

Patients who were transported to the hospital were more likely to be evaluated for abdominal/flank pain and injury/head trauma than those who were not evacuated (Magnusson *et al.,* 2020).

Factors pertaining to the patients themselves were another class of those examined, all of which influenced the triage decisions made. This study found that patients rated vital signs, type of injury, and pain as the most relevant elements in triage, whereas gender and history of disease were rated as the least important. In this regard, Anderson et al. found in a study that the position of the patient, the patient's overall condition, the patient's potential risk, the patient's discomfort, laboratory findings, and physical examinations are among the most significant and useful elements in triage decision-making (Anderson *et al,* 2006).

2.4. Mechanism of injury

According to Fry and Burr's study, patients' pre-existing conditions, mechanism of injury, and vital signs are the most influential elements in triage decision-making, whereas age and gender are the least influential (Fry M ,2006). Another study reports that a patient's vitals, chief complaint, disease history, and clinical examinations are the most influential aspects of the triage process (Patel VL,2008). Other studies have found that patient-specific clinical criteria, such as the nature of the illness or injury and the severity of its symptoms, are major contributors to triage decision making (Thompson C, 2002). Considering this, decisions in the ED are based on how the patient is feeling physically and mentally.

2.5 Provider related factors

2.5.1 Triaging process

While most promotions in South Africa were given to patients in the green group, over a third (29.4%) of patients who should have been placed in this routine category were instead placed in the yellow or above. A third of patients in the orange category (extremely urgent) were wrongly relegated to the yellow or green category.

Incorrectly prioritizing patients can have negative outcomes for both the patient and the healthcare system. When the number of patients who need to be seen urgently grows due to incorrect promotion, it places additional stress on an already under-resourced and under-staffed system, which could delay the treatment of correctly triaged and more critically ill patients. The repercussions of incorrectly downgrading a patient could be considerably more dire. As a result of this misinterpretation, 82 patients in our study were incorrectly assigned to the yellow triage group. This

means that a patient who needs to be seen in the ED immediately could have waited up to an hour for an evaluation, which could have serious consequences.

Patients in the red group have the highest priority and are most at risk of morbidity and mortality if they are under-triaged. The same research found that nearly as many patients (64.0%) were wrongly downgraded from the red to the orange triage group as had been over triaged (66.0%).

2.5.2 Triage skills

According to the results of a triage study performed in Brazil's emergency rooms, the vast majority of patients (89.7%) were assigned low priority status. The breakdown of the colors is as follows: 15.9% yellow, 56.5% green, and 17.2% blue. The opposite is true for the 10.3% of patients with a red or orange priority status out of the total demand. High-priority patients accounted for 11.8 percent of daytime consultations (6:05 a.m. to 6 p.m.) and 13.6 percent of overnight consultations (06:05 pm-06:00 am). Mortality rates were greater (3.2% higher) in the high-priority group (Becker *et al.,* 2015). The evaluated categorization procedure, which includes five levels of clinical severity, is widely regarded as the gold standard for such systems. When comparing the two groups, the high-priority group had five times as many hospitalizations and 10.6 times as many deaths. This is in keeping with the goal of the ED's triage system, which is to determine the severity of each patient's condition in a consistent and objective manner. Age-related increases in the odds ratios for high-priority patient classification, hospitalization, and mortality were seen (Becker *et al.,* 2015).

This investigation also examined clinical unit-specific characteristics outside of individuals to better understand how they influence triage decisions. Attention must be paid to the fact that unit-related factors are among those influencing personnel decisions in ED, making the study and diagnosis of these aspects crucial (Fitz G, 1998).

2.6 Institutional Related Factors

2.6.1 Human resources

In the present study, personnel variables were found to play a role in the triage decision-making process. Participants in the study ranked experience, the ability to learn, and expertise as the three most important personal attributes that influenced their judgment during times of crisis. The present study's results corroborate what is known from other sources about the significance of experience and training in making triage decisions. One of the most effective criteria in triage decision-making among nurses is their level of experience, as shown by a study by Anderson et al. of Sweden (Anderson et al, 2006). It has been found in the American study by Hicks et al. that increased experience leads to more reliable decision making in a triage setting (Hicks FD et al, 2003). Cone and Murray's research in the United States found that experience and expertise are the most influential criteria in triage nurses' decision-making (Cone et al,2002). Researchers have found that nurses' intuitive knowledge and keen perception are more important to their triage decision-making than their actual clinical experiences (Goransson k, 2006). Overall, this study's results are comparable with those of past research efforts that have emphasized the importance of triage decision-making experience, expertise, insight, and acuity.

2.6.2 Workload

It was found in this study that unit crowding, the potential of patient injury, and the personnel's work volume were the most important non-personnel factors influencing triage decisions in emergency rooms. These findings were corroborated by a study conducted in Australia by Fry and Burr (Fry M et al,2001). In the same way, the results of other studies have shown that inter-unit factors like the number of patients in a unit, the physical structure of the environment, and non-personnel factors affect how triage decisions are made.

2.6.3 Equipments

Condition of equipment has a role in triage determination (Della Stritto R, 2005). Even though the same types of studies were done in other countries, it is important to keep in mind that triage decision-making and assigning triage priorities to patients should only be based on the clinical needs of the patients and that work volume and ED crowding should not affect triage decision-making (Considine et al, 2001). Crowding makes it difficult for staff to provide adequate care for all trauma patients, and a lack of resources increases the likelihood that patients will receive substandard treatment and inadequate follow-up, which negatively impacts triage results.

2.7 Research Gap in Literature

Trauma contributes significantly to the global burden of mortality, morbidity, and disability. It also causes the greatest number of Disability-Adjusted Life Years (DALYs) of any disorder or injury. A patient's injury may have lasting negative effects on their general health, quality of life, or outcome. There is no substantial research that has caught the key outcomes following decisive traumatic damage, and the available data is restricted. Understanding the total impact of trauma on a

person's health has the ability to guide therapy, rehabilitation, and social care services. Few statistics or studies exist that reflect the population's health impact, which is important for designing and implementing health services, allocating resources, and planning future research. More study is needed to determine the best ways to quantify function, disability, health, and quality of life outcomes after injury, all of which are crucial to trauma care.

Despite the availability of health outcome indicators, it is not known whether or not they capture the full spectrum of injury's effects on health and well-being. Currently, there are no internationally-recognized, reliable, and accurate trauma-specific measures available for use in evaluating a patient's prognosis after serious injury or illness. However, the extent to which these measures capture the full range of health impacts that trauma patients may experience is not yet known, and there have been no studies conducted to investigate this question. Efforts are being made to identify gaps in trauma care outcomes and care. Some research examined global-based assessment utilizing World Health Organization guidelines to identify deficiencies and highlight development areas. However, country-based evaluation studies of trauma patient outcomes are required.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter describes the specific strategies and procedures that was used in data collection and analysis in order to answer the research questions. The chapter focuses on the study design, study site, study population, sampling technique, sample size determination, data collection procedure, research instrument, reliability and validity, data management, analysis and presentation and ethical consideration.

3.2 Research Design

The study was a cross sectional study involving the management outcomes of triaged and coded patient’s flagged by scores using the Triage Early warning score (TEWS).

3.3 Study Area

The research was carried out at KNH. KNH is the largest public hospital in East and Central Africa with 1800 tertiary care beds. There are a total of 50 patient rooms, with 10 specialized for surgery patients. KNH has two emergency departments, one of which is dedicated to pediatric medical emergencies and the other to both trauma and medical emergencies; it also has three critical care units, twenty outpatient clinics, twenty-four operating rooms, and a pediatric filtration clinic. KNH's customer base extends across the country and into East Africa. In 2016 and 2017, KNH's emergency room treated between 31,978 and 61,840 patients, admitted between 20,267 and 21,731 patients, and treated an average of about 4,000 patients per month.

The A&E has a triage area run by a SATS-trained nurse and a medical officer as team leader, as well as resuscitation rooms A and B (RRA, RRB), two trauma theaters (1 & 2), acute rooms number 9, and specialized review rooms for surgical, obstetrical, and medical patients. Four separate consultation rooms are also available for use in non-emergency situations. At the triage desk, the SATS and TEWS are used to classify all patients, with the exception of pediatric medical emergencies and maternity patients, who present to A&E at KNH.

3.4 Study Population

The study involved Patients who were properly coded and triaged upon arrival at the KNH emergency room for the study were used. The research team at KNH's A&E contacted patients who satisfied the inclusion criteria, followed them while they were in A&E or the adult wards (which includes a trauma theater, resuscitation rooms (acute medical and surgical holding sections), and specialist review rooms for surgical patients).

Staff at the KNH A&E were well-versed in the SATS/TEWS charts and used them to triage every patient who came in. Patients who met the criteria were triaged and then observed for 48 hours. Patients were tracked based on the interventions they received, the intervals between those interventions, and the final triage and coding status of the patient.

3.5 Sampling Procedure

To obtain the requisite sample from the target demographic, a systematic random sampling technique was adopted. After adding 10% to get the total up to 395, the total was divided by the total number of days in the two months, which was 56,

yielding a sample size goal of 7. The average number of patients triaged and coded per month is 3,900, split the figure by 28 (representing four weeks) to obtain 139, and then divided that number by 48 (representing the maximum amount of time allowed for reviewing the outcome), which resulted in 3. After triaging 395 patients, the researcher randomly picked 395 more patients to be coded by putting the numbers 1-3 on pieces of paper, folding them, and selecting a number at random. The researcher also completed a daily checklist for a total of two months.

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

a) All triaged and coded patients presenting at the accident and emergency department.

b) Consenting triaged and coded patients

3.6.2 Exclusion Criteria

a) Any triaged and coded patient who was referred to other facilities on arrival thus unable to continue with follow up.

b) Patients brought in death or certified as death upon arrival to accident and emergency.

3.7 Sample Size Determination

Sample size was calculated using the Fishers formula;

$$n = \frac{Z^2(1-P)}{d^2}$$

Where n= desired sample size (if the population is greater than 10,000).

Z=Standard normal deviation at the required confidence interval. In this case it was 1.96

P=the % of the proportion in the target population estimated to have characteristics being measured, since its unknown 50% is used

q = (1-p)

Hence q = (1-0.5)

d = the level of statistical significance is 0.05 =95% ci

Hence n = (1.96)2 * (0.5) (0.5)/ (0.05)2

= 3.8416*(0.25)/ (0.0025)

= 0.9604/ 0.0025 = 385

n = 385"

3.8 Data Collection Procedure

The research assistants were trained on data collection, how to identify the respondents and also filled the questionnaires accurately. Two research assistants were recruited in the whole process. Piloting of the research instruments were done at Kakamega county referral hospital as they were using the triage process similar to KNH 10% of the total sample was used to test the reliability of the research instrument.

The first step in the triage procedure is to ask the patient, their family, or a legal guardian why they are at the emergency room. The triage practitioner has already begun quickly screening the patient for any Emergency clinical indications as this question is being asked and answered. For children, medical personnel followed the ABC-c-c-DO (airway, breathing, circulation, coma, convulsions, dehydration, other)

algorithm. The patient was given a Red priority level and rushed to the resuscitation area if critical clinical indications were detected.

If no critical symptoms were observed during the examination, look for Very Urgent (orange) or Urgent (yellow) indicators instead. Vitals were taken, TEWS was computed, essential further investigations were checked, and the patient's triage priority was revised regardless of their presence. At triage, a TEWS is not required if the patient is exhibiting any emergency indications. As soon as possible, the patient must be transferred to the resuscitation bay. Finally, the clinical nurse practitioner or senior doctor has the ability to override the final triage priority assigned.

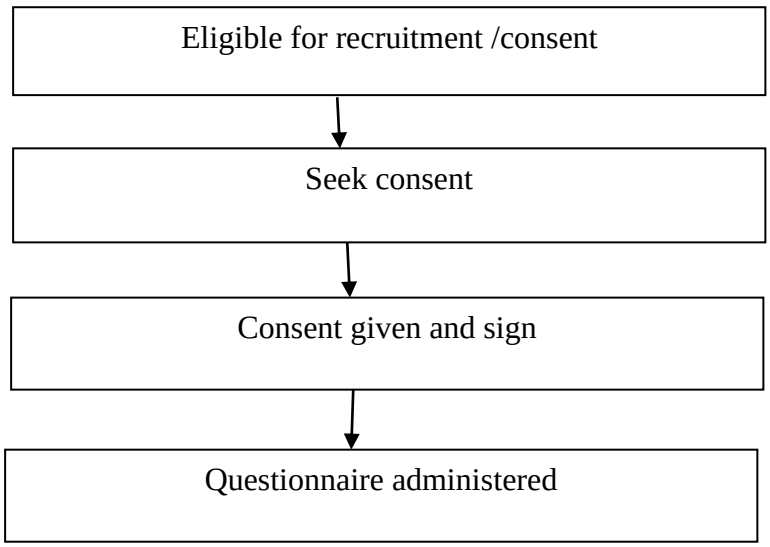

Figure 3:1: Flow chart on patient recruitment

3.9 Development of research instruments

The research instruments to be used were structured and serialized questionnaires which were used to capture the demographic data of the respondents as well as the variables identified, this was filled by the research assistants after getting consent from the respondents. A checklist was also used in order to identify the institutional

and provider variables, the checklist included identify whether there were enough oxygen points at the particular day of data collection, the adequacy of monitoring equipments such as sphygmomanometer, pulse oximeter as well as thermometer. On drugs the checklist was filled to indicate whether the emergency drugs were available. On space within the triage area the assessment done through observation to check if their triage area has enough space, adequate stretchers, monitoring area as well as the resuscitation rooms. On human resource availability the checklist was filled to check on number of clinical staff available on duty, number of porters, laboratory as well as radiology staff. The research assistant filled the criterion by indicating yes or no in the spaces provided then write comments on the findings to support the statistics obtained or not observed.

3.9.1 Validity of the Instruments

The validity of an instrument was determined by the extent to which the study instruments accurately measured what was intended according to the research questions and hypothesis. An additional survey, the pilot tests, were used to establish the questionnaire's validity in this study by assessing the reliability of a given variable's relationship to one or more external criteria based on empirical constructions.

The research instruments were checked for completeness to ensure that all data was captured and that all the required parts were complete. The questionnaires and checklist were coded for easy follow up and also follow up so that no questionnaire was left out.

The summary on validity test is as shown in Table 3.1.

Table 3. 1: Test for validity

Factors	KMO test	Barlett's test of sphericity		
		Chi-Square	Df	Sig.
Management outcome of triaged patients'	0.996	311.67	3	0.034
Patient related factors	0.813	302.87	3	0.022
Institutional related factors	0.845	327.48	3	0.002
Provider related factors	0.916	318.41	3	0.001

Extraction Method: Principal Component Analysis.

Source: (Researcher, 2022)

Table 3.1 shows that the Kaiser-Meyer-Olkin (KMO) sampling statistic indicates a KMO value greater than 0.5, indicating that the sample size is large enough to assume a normal distribution. Bartlett's sphericity test, which examined whether or not the "item to item correlation matrix based on the replies obtained from respondents for all the effective variables was an identity matrix," was statistically significant.

3.9.2 Reliability of the Instruments

Reliability is the extent to which a research instrument consistently has the same results if it's used in the same situation on repeated occasions. After pilot study the researcher will perform a reliability test on the questionnaires administered. Here the researcher administered the questionnaires at the beginning of the month when the sample for the pilot study shall be done at Kakamega county hospital and then note the responses from the respondents and countercheck against the responses yielded at the same questionnaires at the end of the pilot study. A regression analysis was done so as to identify the reliability of the instrument used.

First, an internal constancy method was taken, and then a pilot study was conducted, to prove that the instrument was consistent in measuring its target variables. If a questionnaire has a Cronbach's Alpha of 0.70 or higher, it can be trusted (Bujang M.A *et al.,* 2018). Using SPSS, a reliability test was conducted on the independent variables (factors related to patients, institutions, and providers) and the dependent variable (management outcomes for triaged patients). The findings are displayed in Table 3.2

Table 3.2: Reliability test

"**Variable**	**Cronbach alpha**
Management outcome of triaged patients'	0.861
Patient related factors	0.799
Institutional related factors	0.884
Provider related factors	0.817

Source: (Researcher, 2022)

The pilot study used 10% of the total sample size, or 39 people. Due of its similarities to KNH, the pilot study was conducted in the referral hospital serving Kakamega County. All of the retrieved variables had Cronbach's Alpha values over 0.7, meeting the minimum threshold for reliable data (Mugenda & Mugenda, 2008).

3.10 Data Analysis

Professionally trained research assistants who followed up with patients for 48 hours filled out the surveys. When all of the surveys were returned, the information was loaded into IBM SPSS version 25.0 and evaluated. There was a test for correlation between socioeconomic status and triage outcome using bivariate analysis. Continuous data were used to build and illustrate normal distributions and

interquartile ranges. The studied data was classified, and then frequencies and percentages were computed and reported. Logistic regression and chi-square tests were used to examine the relationship between the triage early warning score and patient outcomes within 48 hours. To determine patient-related factors associated with the result, we used descriptive statistics, cross tabulations, and chi-square tests of independence. Logistic regression was used to obtain the odds ratio and the degree of correlation for objectives two and three, which evaluate the institutional and provider related characteristics linked with the outcome.

Table 3. 3: Objectives, data collection, source of data and analysis plan

Study objective	Data to be collected	Source of data	Data analysis plan
Patient related factors	Demographic data, triage and outcomes data	Questionnaire	Descriptive statistics, cross tabulations and chi-square to test association.
Institutional related factors	No. of equipments, supplies and number of staff and triage area.	Observation check list	Logistical regression and odds ratios
Provider related factors	Number of staff, drugs, rooms,	Observation checklist	Logistical regression used to calculate odds ratio

3.11 Data Storage

Soft copies of acquired data were saved in a computer with password-protected folders, while hard copies were maintained in a locked cabinet.

3.12 Ethical Consideration

Prior to the initiation of data collection, the researcher sought ethical approval from the Ethics and Research Committee at Masinde Muliro University, as well as the KNH-UON ERC. The application for a permit from the National Commission for Science, Technology, and Innovation (NACOSTI) was completed prior to the commencement of data collecting. The researchers obtained authorization from the administration of KNH to conduct the study in several healthcare settings, including the accident and emergency department, as well as the wards, critical care unit, and high dependency unit. The study adhered to principles of privacy and confidentiality, with participation being voluntary. The goal of the study was elucidated during the data collection procedure, and informed consent was obtained through the utilization of a written consent form.

CHAPTER FOUR

RESULTS

4.1 Overview

The chapter presents the research findings and discussions of the study. Data analysis was done based on the objectives; to assess the patient related factors associated with the management outcome of triaged patients within 48 hours of follow-up at accident and emergency department, KNH, to explore the institutional related factors associated with the management outcome of patients triaged during 48 hours of interventions at accident and emergency department, KNH, and to examine the provider related factors associated with the management outcome of triaged patients within 48 hours of care at accident and emergency department, KNH. Descriptive statistical analysis was employed in presentation of the findings. The chapter also presents inferences drawn from the analysis.

4.2 Response Rate

During the assessment period, a total of 376 were enrolled in the study out of a sample of 385 giving a response rate of 97.7% which is acceptable. The remaining nine (9) were excluded because of incomplete records.

4.3 Patient Characteristics

Table 4.1 presents patient characteristics. Overall, the nearly one-third (31.9%) were aged between 36 – 60 years with less than one-fifth (15.7%) being younger than 18 years. Majority (60.9%) were females and married (55.1%). Based on the level of education and religion, 56.1% and 73.5% had attained secondary/high school education and majority (73.9%) were Christians, respectively.

Table 4.1: Patient characteristics (n = 376)

Variable	Categories	n	%
Age group in years	< 18	59	15.7
	19 – 35	114	30.3
	36 – 60	120	31.9
	> 60	83	22.1
Gender	Male	147	39.1
	Female	229	60.9
Marital status	Married	207	55.1
	Single	169	44.9
Level of education	Secondary/High	211	56.1
	College/University	165	43.9
Religion	Christian	278	73.9
	Muslim	76	20.2
	Hindu	22	5.9

4.4 Patient health-related characteristics

Table 4.2 shows results on patient health-related characteristics. Most of the patients who accessed AED reported for gynecological emergencies (46.5%) distantly followed by cases of fall (20.2%) and assault (16.5%). Majority (77.1%) were very sick but not on oxygen on arrival with 20.5% being considered as severe using Glasgow Coma Scale. TEWS values of patients were calculated after 24 hours using patients' data included in the study forms. TEWS is a validated composite triage score, based on judgment of the patient's vital parameters (respiratory rate, heart rate, temperature, and systolic blood pressure), level of consciousness, mobility and whether the condition is caused by a trauma. Possible sum scores range from 0 to 16. TEWS scores of 8.8% of the patients who took part in the study were above 7 points and met the emergency criteria compared to 51.3% who were classified as very urgent with a score of 5 – 6.

Table 4.2: Patient health-related characteristics

Variable	Categories	n	%
Cause of illness	Fall	76	20.2
	Assault	62	16.5
	Medical emergency	50	13.3
	Gynecological emergency	175	46.5
	Oncology emergency	13	3.5
Status of patient on arrival	Very sick and on oxygen	86	22.9
	Very sick but not on oxygen	290	77.1
Glasgow coma scale	Severe (3 – 8)	77	20.5
	Moderate (9 – 12)	214	56.9
	Mild (13 – 15)	85	22.6
Patients TEWS score after 24 hours	Emergency (> 7)	33	8.8
	Very urgent (5 -6)	193	51.3
	Urgent (3 -4)	126	33.5
	Routine	24	6.4

4.4.1 Patient Outcomes

Table 4.3 shows results on triaged patients' outcome. More than two-thirds (69.7%) of the patients were admitted to the general ward following intervention compared to 17.6% who were admitted in CCU with no discharge nor death being reported. Outcomes after 24 hours of interventions, 80.9% were admitted to the general ward followed by a reduction in the proportion admitted in CCU (10.6%). A small proportion, 3.2% were discharged. No referrals nor deaths were reported. Follow-up after 48 hours of intervention revealed a reduction in the proportion admitted in CCU (6.9% from 10.6%), an increase in the proportion of admission in HDU (from 5.3% to 12.2%) and an equal proportion of referrals and deaths (1.9%).

Table 4.3: Patient Outcomes

Variable	Categories	n	%
Immediate outcome after intervention	Discharge	0	0.0
	Admission to CCU	66	17.6
	Admission to HDU	29	7.7
	Admission to General Ward	262	69.7
	Referral	19	5.0
	Died	0	0.0
Outcomes after 24 hours of interventions	Discharge	12	3.2
	Admission to CCU	40	10.6
	Admission to HDU	20	5.3
	Admission to General Ward	304	80.9
	Referral	0	0.0
	Died	0	0.0
Follow up after 48 hours	Resuscitation	0	0.0
	Admission to CCU	26	6.9
	Admission to HDU	46	12.2
	Admission to General Ward	290	77.1
	Referral	7	1.9
	Died	7	1.9

4.4.2 Association between patient-related factors and outcome of patients triaged and coded patients at AED

Table 4.4 shows the study findings on the association between patient-related factors and 48-hour outcome of triaged and coded patients at AED. Poor outcome was operationalized as patients who were resuscitated, admitted to CCU or died. From the results, there was statistically significant association between marital status, cause of illness, patients TWES score after 24 hours and poor outcome with results indicating higher odds. Patients who were married were four times more likely to have had poor outcome compared to their counterparts who were single (OR: 4.1; 95%CI: 1.6 – 10.1; p = 0.001). Similarly, those who had falls were three times more likely to have had poor outcome (OR: 2.9; 95%CI: 1.4 – 6.1; p = 0.004). Patients with TEWS score after 24 hours of more than 7 and categorized as ‘emergency’ were 2.7-fold chance of having poor outcome (OR: 2.7; 95%CI: 1.1 – 6.3; p = 0.02).

On the contrary, male (OR: 0.4; 95%CI: 0.2 – 0.9; p = 0.03) and Christian patients (OR: 0.4; 95%CI: 0.2 – 0.9; p = 0.02) were 60% less likely to have had poor outcome. Equally, patients with a Glasgow Score of 3 – 12 categorized as moderate or severe 60% had lower odds of having poor outcome (OR: 0.4; 95%CI: 0.2 – 0.9; p = 0.016).

Table 4.4: Association between patient-related factors and outcome of patients triaged and coded patients at AED

Variable	**Categories**	**n**	**48 hour outcome after triage and coding**		**OR**	**95% CI**	**P value**
			Poor	**Good**			
Age group in years	< 36	173	7.5	92.5	0.7	0.4 – 1.5	0.42
	≥ 36	203	9.9	90.1			
Gender	Male	147	4.8	95.2	0.4	0.2 – 0.9	**0.03**
	Female	229	11.3	88.7			
Marital status	Married	207	13.0	87.0	4.1	1.6 – 10.1	**0.001**
	Single	169	3.6	96.4			
Religion	Christians	278	6.8	93.2	0.4	0.2 – 0.9	**0.02**
	Muslims / Hindu	98	14.3	85.7			
Cause of illness	Fall	76	17.1	82.9	2.9	1.4 – 6.1	**0.004**
	Other causes	300	6.7	93.3			
Patient status	Very sick and on oxygen	86	7.0	93.0	0.7	0.3 – 1.8	0.50
	Very sick but not on oxygen	290	9.3	90.7			
Glasgow Score	Severe or Moderate (3 – 12)	291	6.9	93.1	0.4	0.2 – 0.9	**0.016**
	Mild (13 – 15)	85	15.3	84.7			
Patients TEWS score after 24 hours	Emergency (> 7)	226	11.5	88.5	2.7	1.1 – 6.3	**0.02**
	Very urgent (5 -6)	150	4.7	95.3			

***Poor outcome = Resuscitation, Admission to CCU or Died**

4.5 Institution-related characteristics

Table 4.5 presents study findings on institution-related factors considered in the study. Triage is a very brief intervention that should occur within 15 minutes of arrival or registration, and aims to sort patients' priority for treatment based on their clinical need. During the assessment, 31.9% of the patients took less than 1 hour (time of arrival to accident and emergency and time triaged). More than a third (36.2%) were triaged for between 1 – 2 hours. The two leading reasons for delay included further laboratory and radiological tests (68.1%) and increased workload (21.3%).

Table 4.5: Institution-related characteristics

Variable	Categories	n	%
Time of arrival to accident and emergency and time triaged	< 1 hr.	120	31.9
	1 – 2 hrs.	136	36.2
	2 – 3 hrs.	69	18.3
	> 3 hrs.	51	13.6
Reason for delay during intervention process	CCU full	34	9.0
	Theatre busy	6	1.6
	Increased workload	80	21.3
	Further laboratory and radiological tests	256	68.1

4.5.1 Institutional-related factors associated with the outcome of patients triaged and coded at AED

Table 4.6 shows bivariate analysis findings on institutional factors influencing outcome of patients triaged and coded 48 hours after intervention at AED. Two independent variables were examined, namely time of arrival to accident and emergency and time triaged and reason for delay during intervention process. Results indicate significant association between reason for delay during the intervention process and poor outcome. Patients who experienced delays due to full CCU were about 12 times more likely to have had poor outcome (OR: 11.9; 95%CI: 5.2 – 27.1;

p < 0.0001), the results being highly statistically significant. Notably, a smaller proportion of patients seen in less than one hour from the time of arrival to accident and emergency and time triaged (5.0%) compared to those seen one or more hours later (10.6%) experienced poor outcome though the association was not statistically significant (p = 0.08).

Table 4.6: Institutional factors influencing outcome of patients triaged 48 hours after intervention at accident and emergency department

Variable	Categories	n	48-hour outcome after triage and coding		OR	95% CI	P value
			Poor	Good			
Time of arrival to accident and emergency and time triaged	< 1 hr.	120	5.0	95.0	0.4	0.2 – 1.1	0.08
	≥ 1 hr.	256	10.6	89.4			
Reason for delay during intervention process	CCU full	34	41.2	58.8	11.9	5.2 – 27.1	<0.0001
	theatre busy, increased workload, Further lab and radiological tests	342	5.6	94.4			

4.6 Provider related factors associated with the outcome of patients triaged and triaged patients at AED

Table 4.7 presents bivariate analysis results on provider-related factors influencing outcome of patients triaged and coded 48-hours after intervention in AED. A borderline statistical association was found between total number of reviews done during interventions and poor outcome. Patients who had four or more reviews were twice as likely to have had poor outcome compared to those with less than two

reviews (OR: 2.0; 95%CI: 1.0 – 4.2; p = 0.06). Although not statistically significant, patients whose immediate intervention included resuscitation, intubation then ventilation and oxygen supplementation were up to 3.4 times likely to have had a poor outcome (OR: 1.6; 95%CI: 0.8 – 3.4; p = 0.18). Triaging and early warning signs did not yield and statistically significant association with patient outcome 48-hours after the intervention.

Table 4.7: Provider-related factors influencing outcome of patients triaged and coded 48 hours after intervention at accident and emergency department

Variable	**Categories**	**n**	**48-hour outcome after triage and coding**		**OR**	**95% CI**	**P value**
			Poor	**Good**			
Triage and early warning signs	4 or 5	329	8.2	91.8	0.6	0.2 – 1.6	0.27
	3	47	12.8	87.2			
Immediate interventions	Resuscitation, Intubation then ventilation, Oxygen supplementation	110	11.8	88.2	1.6	0.8 – 3.4	0.18
	Emergency surgery, Fluid and blood resuscitation, Pain control	266	7.5	92.5			
Total number of reviews done during interventions	≥ 4	97	13.4	86.6	2.0	1.0 – 4.2	0.06
	< 4	279	7.2	92.8			

4.6.1 Provider-related interventions

Table 4.8 presents health provider-related interventions during the care of the patients. A 5-level triage scale was used as decision-support system to guide the triage health provider in AED to a correct decision. Three levels which were used were urgency (fast care, level 3), (non-urgent, level 4) and non-urgent (level 5). More than three-quarters (87.5%) fell under level 4 and 5 and were non-urgent. In terms of the interventions provided, 40.4% received fluid and blood resuscitation, 24.5% received pain control therapy while 16.5% had intubation then ventilation. About half (47.1%) had a total of two reviews done during interventions.

Table 4.8: Provider-related interventions

Variable	Categories	n	%
Triage and early warning signs	3	47	12.5
	4	248	66.0
	5	81	21.5
Interventions	Resuscitation	7	1.9
	Intubation then ventilation	62	16.5
	Oxygen supplementation	41	10.9
	Emergency surgery	22	5.9
	Fluid and blood resuscitation	152	40.4
	Pain control	92	24.5
Total number of reviews done during interventions	1	16	4.3
	2	177	47.1
	3	86	22.9
	4	97	25.8

CHAPTER FIVE

DISCUSSION

5.1 Overview

This chapter sought to highlight the discussion from the research findings which were based on patient management outcomes of triaged and coded patients at accident and emergency department, KNH.

5.2 Socio-Demographic Characteristics of the respondents

From the demographic characteristics, it is evident that majority (31.9%) of the respondents were between the ages of 36-60 years. This shows that the most affected group of individuals in accident and emergency are those in the working group (36-60 years) as they engage themselves in the daily hustles. With reference to gender, 39.1% of the patients were males, which shows that accidents and emergencies is biased towards the males. On the other hand, most of the respondents (55.1%) were married and 73.9% were Christians. With reference to level of education, 56.1% of the respondents had attained A- level education.

This jibes with data from a Swedish study showing that the median age was 66 and that 86.4% of patients had a history of medical problems, the majority of which were cardiovascular in nature (28.5%), including hypertension, stroke, myocardial infarction, and heart failure. The second most prevalent set of prior diagnoses was psychiatric, including conditions like anxiety, depression, and substance abuse (17.8%). (Magnusson, Herlitz, & Axelsson, 2020).

5.3 Patient related factors associated with the management outcome of triaged patients within 48 hours of follow-up at accident and emergency department, Kenyatta national hospital

5.3.1 Patient characteristics

Majority of the patients triaged (66.0%) had a score of 4, 21.5% had a score of 5 and 12.5% with a score of 3. On the status of the patient on arrival majority were very sick and not on oxygen at 77.1% while 22.9% were on oxygen supplementation.

On causes of illness majority (46.5%) was as a result of gynecological emergency, fall was 20.2% and the least cause of illness was oncology emergency 3.5%. On interventions after review majority of the patients (40.4%) required blood or fluid resuscitation, 24.5% pain control while 16.5% needed intubation then ventilation.

This corresponded with the findings of a study by Anderson et al. that demonstrated patient-related factors represent a distinct class of influences on triage decisions. This study found that patients rated vital signs, type of injury, and pain as the most relevant elements in triage, whereas gender and history of disease were rated as the least important. In this regard, Anderson et al. found in a study that the position of the patient, the patient's overall condition, the patient's potential risk, the patient's discomfort, laboratory findings, and physical examinations are among the most significant and useful elements in triage decision-making (Anderson et al, 2006).

5.3.2 Patient management outcome

After interventions 69.7% required admission to general ward and 17.6% needed admission to CCU. After 24 hours of care the TEWS score 51.3% the majority were

5-6 (very urgent) and 33.5% urgent (3-4), also majority of the patients 80.9% required admission to general ward and 10.6% to critical care unit.

The study concludes that patient related factors had significant influence on management outcome of triaged patients' (t-statistic=.210, p-value = 0.039 < 0.05).

With a positive correlation of 0.143 for patient-related characteristics, the study finds that these variables have a beneficial impact on the outcome of patients' management after being triaged and coded in the emergency room at KNH. As a result, the management outcome of triaged and coded patients at the emergency room increased by 0.143 for every unit increase in patient-related parameters.

This was in line with the findings of a study by Fry and colleagues, who found that the preexisting conditions, method of injury, and vital signs of patients were the most important, while age and gender were the least (Fry M ,2006). Another study reports that a patient's vitals, chief complaint, disease history, and clinical examinations are the most influential aspects of the triage process (Patel VL,2008). Other studies have found that patient-specific clinical criteria, such as the nature of the illness or injury and the severity of its symptoms, are major contributors to triage decision making (Thompson C, 2002). The state of the patient's body and mind must be taken into account when making decisions in the ED.

5.4 Institution related factors associated with the management outcome of patients triaged during 48 hours of interventions at accident and emergency department, Kenyatta national hospital

Majority of the patients 36.2% were seen between 1-2 hours of their arrival in accident and emergency while 31.9% were seen in less than an hour, 65.9% of the patients were given good attention while 34.1% were not attended to adequately.

The study findings revealed that provider related factors had significant influence on management outcomes of patients' triaged (t-statistic=13.055, p-value=0.002< 0.05). The coefficient to provider factors is 0.693, which is positive. Hence, provider related factors positively affect the management outcomes of patients' triaged. Thus, for every unit increase in provider related factors there was a corresponding increase management outcome of patients' triaged by 0.693.

Although the majority of promoted patients were assigned to the "green" group, over a third (29.4%) of those who should have been assigned to this "routine" category were assigned to the "yellow" or "above" category instead. This finding is consistent with a research conducted in South Africa. As much as a third of patients in the orange category (extremely urgent) were wrongly relegated to the yellow or green category. Incorrectly prioritizing patients can have negative outcomes for both the patient and the healthcare system. When the number of patients who need to be seen urgently grows due to incorrect promotion, it places additional stress on an already under-resourced and under-staffed system, which could delay the treatment of correctly triaged and more critically ill patients. The repercussions of incorrectly downgrading a patient could be considerably direr. According to the results, 82 patients who should have been triaged as orange were instead triaged as yellow. This

means that a patient who needs to be seen in the ED immediately could have waited up to an hour for an evaluation, which could have serious consequences.

This study's findings are consistent with those of an Australian study that found that factors other than staffing levels had the greatest impact on triage decisions. These factors included patient crowding, injury risk, and staff workload. It has also been observed that the patient's age, the severity of injuries, and the risk to medical staff are the most influential demographic criteria in triage decision-making (Fry M *et al.,* 2001). Other research has found that factors outside of the unit itself, such as the number of patients in the facility and the layout of the available space, can have an impact on the quality of the triage decisions that are made.

5.5 Provider related factors associated with the management outcome of triaged patients within 48 hours of care at accident and emergency department, KNH

The findings showed a favorable and statistically significant correlation between provider characteristics and the final outcome of patients' management after being triaged. The $r=0.452$ $p=0.008<0.05$ Pearson correlation coefficient indicates this. This suggests that enhanced provider-related characteristics lead to enhanced management outcomes for triaged patients.

This matched the findings of a study that proved that tools play a role in triage decisions (Della Stritto R, 2005). Although personnel decisions in this area were based on evidence from international research, it is worth noting that another study found it crucial that triage decisions and patient priority be made solely on the basis of clinical need, and that neither work volume nor ED crowding play a role in this process (Considine et al, 2001). With crowding it makes it impossible for the

personnel to attend to all trauma cases effectively, few equipments will lead to compromised care as follow up will be poor this affecting the outcome of triage on the patient.

Research that found personnel considerations to be a significant influence in triage decision making corroborates these findings. Participants in the study ranked experience, the ability to learn, and expertise as the three most important personal attributes that influenced their judgment during times of crisis. The present study's results corroborate what is known from other sources about the significance of experience and training in making triage decisions. One of the most effective criteria in triage decision-making among nurses is their level of experience, as shown by a study by Anderson et al. of Sweden (Anderson et al, 2006). It has been found in the American study by Hicks et al. that increased experience leads to more reliable decision making in a triage setting (Hicks FD et al, 2003). Cone and Murray's research in the United States found that experience and expertise are the most influential criteria in triage nurses' decision-making (Cone et al, 2002). Researchers have found that nurses' intuitive knowledge and keen perception are more important to their triage decision-making than their actual clinical experiences (Goransson k, 2006). Overall, the present study's results were consistent with those of other studies like it and emphasized the importance of experience, expertise, insight, and sharpness in triage decision-making.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The purpose of this research was to evaluate the management outcome of triaged and coded patients at accident and emergency department, KNH.

On patient related factors associated with the outcome of triaged and coded patients in accident and emergency department at KNH, Majority of the patients triaged (70%) had a score of 3,4and 5 scores were 19.4% while 2 were 10.5%. on the status of the patient on arrival majority were sick at 77.2% while 22.8% were on oxygen supplementation. This means that most of the patients received at KNH were sick and required adequate trauma care, this means that the resources available may not be adequate to meet the demands at all times. Those in need of oxygen supplementation were 22.8% which means that there's must be reduction in waiting time and reduced crowdedness of patients in order to ensure the sick patients get adequate care. On causes of illness majority (35.75%) was as a result of medical emergency, road traffic accidents were 31.99%. On interventions after review majority of the patients (40.6%) required blood or fluid resuscitation, 24.7% pain control while 16.4% needed intubation then ventilation. Medical emergency cases and accident victims carry the biggest burden of the services needed in the department, this calls for more collaborative approach to ensure effective and quality care is given.

The study concludes that patient related factors had significant influence on management outcome of triaged patients' (t-statistic=.210, p-value = 0.039 < 0.05). This means that the patient related factors like cause of injury and status of the

patient on arrival will influence the outcome positively, this means that triaging process should be seamless so as to adequately improve the patient outcome.

On provider related factors associated with the management outcome of patients triaged during 48 hours of interventions at accident and emergency department, KNH, in the study it showed that majority of the patients 50.5% were seen within 10 minutes of their arrival in accident and emergency while 30% were seen between 10-30 minutes, 65.9% of the patients were given good attention while 34.1% were not attended to adequately. This needs to improve in order to achieve the expected standards of care, every minute lost is key on the outcome of the patient. 34.1% were not attended to adequately which is a third of the population, this will mean more improvement on the care and triaging process is needed.

The study findings revealed that provider related factors had significant influence on management outcomes of patients' triaged (t-statistic=13.055, p-value=0.002< 0.05). The coefficient to provider factors is 0.693, which is positive. Hence, provider related factors positively affect the management outcomes of patients' triaged. Thus, for every unit increase in provider related factors there was a corresponding increase management outcome of patients' triaged by 0.693. The provider related factors which include triaging process and waiting time needs further review in order to identify corrective measures that will lead to improved quality of care.

On the third objective on institutional related factors associated with the management outcome of triaged patients within 48 hours of care at accident and emergency department, KNH, Statistical analysis revealed a statistically significant correlation between various institutional characteristics and the final outcome of a patient's management following triage. The r=0.452 p=0.008<0.05 Pearson correlation

coefficient shows this to be the case. This suggests that enhanced institutional-related characteristics lead to enhanced management outcomes for triaged patients. Inadequate staffing ratios was the major issue identified, the ratio of the doctors, nurses as well as laboratory staff were inadequate to meet the patient demands thus this had an impact on the patients outcome, most of the patients couldn't get faster reviews because of staff shortage as well as delays in diagnosis, the critical care unit was identified as having effect on patient outcome because when its full then it will delay treatment and interventions. Theatre was an area that affected the outcome as there was delay in getting services for some of the patients as it was busy. Also most patients were sent for further examinations in most cases including radiology and laboratory and the inadequate staffing it will lead to crowding and delay in the interventions required.

6.2 Recommendations

The recommendations that have been identified as key to improving the patient management outcomes include;

- KNH management to review the triage process and policy so as to ensure that the patients can be followed up easily, use of online queue system which guided to monitor patient system and subsequent follow up this reducing waiting time.

- KNH and ministry of health to ensure that adequate equipments e.g. oxygen points and monitors are available and stocking adequate drugs which are important in resuscitation and other management. There's need to increase infrastructure and space so as to reduce overcrowding which may be risk to the patients as well as staff

- In order to improve patient more skilled personnel need to be employed by KNH including, doctors, laboratory staff as well as nurses, the staff will also require more training on skills on triaging and trauma management.
- Further research to be done to determine the patient satisfaction levels as well as the staff training needs assessment.

REFERENCES

Andersson A, Omberg M, Svedlund M. Triage in the emergency department–a qualitative study of the factors which nurses consider when making decisions. Nurs Crit Care. 2006;11(3):136-45

Adhikari NKJ, Fowler RA, Bhagwanjee S, Rubenfeld GD. Critical care and the global burden of critical illness in adults. Lancet (London, England). 2010; 376(9749):1339-1346. Doi: 10.1016/S0140-6736(10)60446-1.

Angus DC, Linde-Zwirble WT, Lidicker J, Clermont G, Carcillo J, Pinsky MR. Epidemiology of severe sepsis in the United States: analysis of incidence, outcome, and associated costs of care. Crit Care Med. 2001;29(7):1303-1310. http://www.ncbi.nlm.nih.gov/pubmed/11445675. Accessed may 2020.

Aspelund, A. L., Patel, M. Q., Kurland, L., McCaul, M., & van Hoving, D. J. (2019). Evaluating trauma scoring systems for patients presenting with gunshot injuries to a district-level urban public hospital in Cape Town, South Africa. *African Journal of Emergency Medicine : Revue Africaine de La Medecine d'urgence*, *9*(4), 193–196. https://doi.org/10.1016/j.afjem.2019.07.004

Bazyar, J., Farrokhi, M., & Khankeh, H. (2019). Triage Systems in Mass Casualty Incidents and Disasters: A Review Study with A Worldwide Approach. *Open Access Macedonian Journal of Medical Sciences*, *7*(3), 482–494. https://doi.org/10.3889/oamjms.2019.119

Becker, J. B., Lopes, M. C. B. T., Pinto, M. F., Campanharo, C. R. V., Barbosa, D. A., & Batista, R. E. A. (2015). Triage at the Emergency Department: Association between triage levels and patient outcome. *Revista Da Escola de Enfermagem*, *49*(5), 783–789.https://doi.org/10.1590/S0080-623420150000500011

Bleyer AJ, Vidya S, Russell GB, et al. Longitudinal analysis of one million vital signs in patients in an academic medical center. Resuscitation. 2011; 82(11):1387-1392. doi:10.1016/j.resuscitation.2011.06.033.

Bonafide CP, Localio AR, Roberts KE, Nadkarni VM, Weirich CM, Keren R. Impact of Rapid Response System Implementation on Critical Deterioration Events in Children. JAMA Pediatr. 2014; 168(1):25. doi:10.1001/jamapediatrics.2013.3266.

Considine J, LeVasseur S, Charles A. Consistency of triage in Victoria's emergency departments: guidelines for triage education and practice. Monash Institute of Health Services Research Report to the Victorian Department of Health Services. 2001

Chalfin DB, Rizzo JA. Economics of Critical Care. Saunders; 2012. https://books.google.co.ke/books?id=wKlh5gRmJVwC&pg=PA52&lpg=PA52&

Cheng EY. The cost of sedating and paralyzing the critically ill patient. Crit Care Clin. 1995;11(4):1005-1019.http://www.ncbi.nlm.nih.gov/pubmed/8535978. Accessed jan12, 2021.

Churpek MM, Yuen TC, Edelson DP. Risk stratification of hospitalized patients on the wards. Chest. 2013;143(6):1758-1765. doi:10.1378/chest.12-1605.

Dello Stritto R. The experiences of the emergency triage nurse: A phenomenological study. College of Nursing, Texas Woman's University, Denton. 2005.

Delgado-Hurtado JJ, Berger A, Bansal AB. Emergency department Modified Early Warning Score association with admission, admission disposition, mortality, and length of stay. J Community Hosp Intern Med Perspect. 2016;6(2):31456. doi:10.3402/jchimp.v6.31456.

Fitz Gerald G. Triage revisited. Emerg Med. 1998;10(4):291-3

Gardner-Thorpe, J., Love, N., Wrightson, J., Walsh, S., & Keeling, N. (2006). The value of Modified Early Warning Score (MEWS) in surgical in-patients: a prospective observational study. *Annals of the Royal College of Surgeons of England*, *88*(6), 571–575. https://doi.org/10.1308/003588406X130615

Gardner-Thorpe J, Love N, Wrightson J, Walsh S, Keeling N. The value of Modified Early Warning Score (MEWS) in surgical in-patients: a prospective observational study. Ann R Coll Surg Engl. 2006;88(6):571-575. doi:10.1308/003588406X130615.

Ghosh E, Eshelman L, Yang L, Carlson E, Lord B. Early Deterioration Indicator: Data- driven approach to detecting deterioration in general ward. Resuscitation. 2018;122:99-105. doi:10.1016/j.resuscitation.2017.10.026.

Goldhill DR, McNarry AF, Mandersloot G, McGinley A. A physiologically-based early warning score for ward patients: the association between score and outcome. Anaesthesia. 2005;60(6):547-553. doi:10.1111/j.1365-2044.2005.04186.x.

Goldhill DR, McNarry AF. Physiological abnormalities in early warning scores are related to mortality in adult inpatients. Br J Anaesth. 2004;92(6):882-884. doi:10.1093/bja/aeh113.

Groarke JD, Gallagher J, Stack J, et al. Use of an admission early warning score to predict patient morbidity and mortality and treatment success. Emerg Med J. 2008;25(12):803-806. doi:10.1136/emj.2007.051425.

Gunnarsson BM, Warrén Stomberg M. Factors influencing decision making among ambulance nurses in emergency care situations. Inter Emerg Nurs. 2009;17(2):83-9

Hansoti, B., Jenson, A., Keefe, D., Ramirez, S., Anest, T., Twomey, M., … Wallis, L. (2017). Reliability and validity of pediatric triage tools evaluated in Low resource settings: A systematic review. *BMC Pediatrics, 17*. https://doi.org/10.1186/s12887-017-0796-x

Halpern NA, Pastores SM, Greenstein RJ. Critical care medicine in the United States 1985–2000: An analysis of bed numbers, use, and costs*. Crit Care Med. 2004;32(6):1254-1259. doi:10.1097/01.CCM.0000128577.31689.4C.

Hariharan S, Pillai G, Chen D, et al. Utilization pattern and cost of sedation, analgesia and neuromuscular blockade in a multidisciplinary intensive care unit. West Indian Med J. 2008;57(2):112-117. http://www.ncbi.nlm.nih.gov/pubmed/19565952. Accessed september 11, 2020.

Hartman M, Martin AB, Espinosa N, Catlin A, The National Health Expenditure Acc. National Health Care Spending In 2016: Spending And Enrollment Growth Slow After Initial Coverage Expansions. Health Aff. 2018;37(1):150-160. doi:10.1377/hlthaff.2017.1299.

Hicks FD, Merritt SL, Elstein S. Critical thinking and clinical decision making in critical care nursing: a pilot study. Heart & lung. J Crit Care. 2003;32(3): 169.

Hillman KM, Bristow PJ, Chey T, et al. Antecedents to hospital deaths. Intern Med J. 2001;31(6):343-348. doi:10.1046/j.1445-5994.2001.00077.x.

ID, Davis LL, Krowchuk H. Prevention of Unplanned Intensive Care Unit Admissions and Hospital Mortality by Early Warning Systems. Dimens Crit Care Nurs. 2013;32(6):300-309. doi:10.1097/dcc.0000000000000004.

Klepstad, P. K., Nordseth, T., Sikora, N., & Klepstad, P. (2019). Use of National Early Warning Score for observation for increased risk for clinical deterioration during post-ICU care at a surgical ward. *Therapeutics and Clinical Risk Management, 15*, 315–322. https://doi.org/10.2147/TCRM.S192630

Liu, V. X., Lu, Y., Carey, K. A., Gilbert, E. R., Afshar, M., Akel, M., … Churpek, M. M. (2020). Comparison of Early Warning Scoring Systems for Hospitalized Patients With and Without Infection at Risk for In-Hospital Mortality and Transfer to the Intensive Care Unit. *JAMA Network Open, 3*(5), e205191–e205191. https://doi.org/10.1001/jamanetworkopen.2020.5191

Magnusson, C., Herlitz, J., & Axelsson, C. (2020). Pre-hospital triage performance and emergency medical services nurse's field assessment in an unselected patient population attended to by the emergency medical services: A prospective observational study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, *28*(1), 1–19. https://doi.org/10.1186/s13049-020-00766-1

Mutahi, S. W. (2019). Utility Of Triage Early Warning Scores In The Care Of Critically Ill Surgical.

Paediatric Triage Working Group (PTWG) of the Western Cape Government. (2012). The South African Triage Scale Training Manual 2012. *South African Triage Scale Training Manual 2012*, 1–34. Retrieved from https://emssa.org.za/sats/

Patel AR, Zadravecz FJ, Young RS, Williams M V., Churpek MM, Edelson DP. The Value of Clinical Judgment in the Detection of Clinical Deterioration. JAMA Intern Med. 2015;175(3):456. doi:10.1001/jamainternmed.2014.7119.

Patel VL. Calibrating urgency: triage decision making in a pediatric emergency department. Advances in health sciences education. 2008;13(4): 503-20

Potgieter PD, Hammill L, Gough A, et al. Cost of critical care in South Africa. SAMJ. 85(5). https://www.ajol.info/index.php/samj/article/viewFile/155778/145413. Accessed december 20, 2020.

Quinten VM, van Meurs M, Olgers TJ, Vonk JM, Ligtenberg JJM, ter Maaten JC. Repeated vital sign measurements in the emergency department predict patient deterioration within 72 hours: aprospective observational study. Scand J Trauma Resusc Emerg Med. 2018;26(1):57. doi:10.1186/s13049-018-0525-y.

Rosedale, K., Burton, Z., Davies, H., & Wood, D. (2011). The effectiveness of the South African Triage Score (SATS) in a rural emergency department. *South African Medical Journal = Suid-Afrikaanse Tydskrif Vir Geneeskunde*, *101*, 537–540.

Stenhouse C, Coates S, Tivey M, Allsop P, Parker T. Prospective evaluation of a modified Early Warning Score to aid earlier detection of patients developing critical illness on a general surgical ward. 2000. doi:10.1093/bja/84.5.663.31. Groarke JD, Gallagher J, Stack J, et al. Use of an admission early warning score to predict patient morbidity and mortality and treatment success. Emerg Med J. 2008;25(12):803-806. doi:10.1136/emj.2007.051425.

Soogun, S., Naidoo, M., & Naidoo, K. (2017). An evaluation of the use of the South African triage scale in an urban district hospital in Durban, South Africa. *South African Family Practice*, *59*(4), 133–137. https://doi.org/10.1080/20786190.2017.1307908

Subbe CP, Kruger M, Rutherford P, Gemmel L. Validation of a modified Early Warning Score in medical admissions. QJM. 2001;94(10):521-526. doi:10.1093/qjmed/94.10.521.37. Subbe CP, Slater A, Menon D, Gemmell L. Validation of physiological scoring systems in the accident and emergency department. Emerg Med J. 2006;23(11):841-845.

Sunyoto, T., Van den Bergh, R., Valles, P., Gutierrez, R., Ayada, L., Zachariah, R., … Harries, A. D. (2014). Providing emergency care and assessing a patient triage system in a referral hospital in Somaliland: a cross-sectional study. *BMC Health Services Research*, *14*(1), 531. https://doi.org/10.1186/s12913-014-0531-3

Thompson C. Dowding, Clinical decision making and judgement in nursing. Churchill Livingstone Edinburgh. 2002

Van LS, G, Struik PW, et al. Delayed Recognition of Deterioration of Patients in General Wards Is Mostly Caused by Human Related Monitoring Failures: A Root Cause Analysis of Unplanned ICU Admissions. doi:10.1371/journal.pone.0161393.

Vincent J-L, Marshall JC, Ñamendys-Silva SA, et al. Assessment of the worldwide burden of critical illness: the Intensive Care Over Nations (ICON) audit. Lancet Respir Med. 2014;2(5):380-386. doi:10.1016/S2213-2600(14)70061-X.

Wachira BW, Tyler MD. Characterization of in-hospital cardiac arrest in adult patients at a tertiary hospital in Kenya. African J Emerg Med. 2015;5(2):70-74. doi:10.1016/J.AFJEM.2014.10.006.

Wangara, A. A., Hunold, K. M., Leeper, S., Ndiawo, F., Mweu, J., Harty, S., … Myers, J. G. (2019). Implementation and performance of the South African Triage Scale at Kenyatta National Hospital in Nairobi, Kenya. *International Journal of Emergency Medicine*, *12*(1), 5. https://doi.org/10.1186/s12245-019-0221-3

APPENDIX I: Informed consent

TITLE: patient management outcome of triaged and coded patients in accident and emergency department, KNH, Kenya.

Introduction

I am Daniel Kimutai Chelal, a student pursuing a master's of science in advanced nursing practice at Masinde Muliro University of science and technology.my research is focusing on patient management outcome of triaged and coded patients in accident and emergency department, KNH, Kenya.

Purpose of the study

The purpose of this study is part of my academic requirements to qualify for masters in advanced nursing practice, (trauma and emergency).it will also form part of recommendation that will help improve patient outcome as well as influence policy change.

Participant role

The participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you agree to take part in this study, you will be asked to sign a consent form. After you voluntarily sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not have any issue on the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

Confidentiality

All the information collected will be coded and high level of confidentiality will be observed, no identifying names or data will be disclosed during the study.

Benefits

There are no direct benefits to the participant but the study findings shall form part of future reference in the academic field as an integration from field to practice. The findings will also help the managers and policy makers to develop better policies that will improve patient outcomes.

Risks

There's no risk expected for participating in this study, though if there's potential risks then it will be gathered for according to the risk or injury.

Right to withdraw

You have the right to withdraw or refuse to participate from the study without any harm or penalty. It wouldn't affect the care being given too.

CONTACT INFORMATION

If you have questions at any time about this study, or you experience adverse effects as the result of participating in this study, you may contact the researcher whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the Primary Investigator, please contact me, Daniel kimutai chelal on 0720421284 or email dchelal@gmail.com

Or my supervisors;

Dr.Tecla sum 0723308025 email tsum@mmust.ac.ke

Dr .Morema 0721262748 email emoema@mmust.ac.ke

CONSENT

I have read and I understand the provided information and have got the opportunity to ask questions. I do understand that my participation is voluntary and that I am allowed to withdraw at any time, without giving any reason and without cost. I understand that I will be given a copy of this consent form to keep. I voluntarily agree to take part in this study.

Participants/guardians signature _____ Date _____

Investigator's signature _____ Date _____

APPENDIX II: Questionnaire

A. **DERMOGRAPHIC DATA**

1. Age ☐

2. Sex Male ☐
Female ☐

3. Marital status
Married ☐

Single ☐

4. Level of education
University education ☐

College education ☐

A level ☐

O level ☐

None ☐

5. Religion
Christian ☐
Muslim ☐
Hindu ☐
Catholic ☐
None ☐

B. **TRIAGE**

5. Time of arrival to accident and emergency.....

6. Time triaged ……

7. The cause of illness.
Road traffic accident

Fall

Assault

Medical emergency, specify……

Gynecological emergency

8. Status of the patient on arrival
   Very sick on oxygen
   Sick not requiring oxygen supplementation
9. Triage early warning scores (initial)
   a) 5
   b) 6

10. Glasgow coma scale

   a) Severe (3-8)
   b) Moderate(9-12)
   c) Mild(13-15)

11. Diagnosis …….

12. Investigations done and time, list them
…….
.

13. Interventions done after review
   a) Resuscitation
   b) Intubation then ventilation
   c) Oxygen supplementation
   d) Emergency surgery
   e) Fluid or blood resuscitation
   f) Pain control

C. OUTCOMES

14. Outcomes after interventions
   a) Discharge
   b) Admission to CCU
   c) Admission to HDU
   d) Admission to general ward
   e) Referral
   f) Died
15. Patients TEWS score after 24 hours
   a) Emergency (above 7)
   b) Very urgent (5-6)
   c) Urgent (3-4)
   d) Routine
16. Outcomes after 24 hours of interventions
   a) Discharge
   b) Admission to CCU
   c) Admission to HDU
   d) Admission to general ward

e) Referral
f) Died

17. Follow up after 48 hours
    a) Resuscitation
    b) CCU admission
    c) HDU admission
    d) General ward
    e) Discharge
    f) Died
18. Total number of reviews done during interventions
……..

19. Was there a delay during the intervention process and possible reasons?
    a) CCU was full
    b) Theatre was busy
    c) Increased workload
    d) Further laboratory and radiological tests

APPENDIX III: Checklist

Name of the research topic: evaluation on the outcomes of orange coded patients in accident and emergency department, KNH, Kenya

Main objective: To evaluate the outcome of orange coded triaged patients at accident and emergency department, Kenyatta national hospital.

NO.	CRITERION	YES	NO	COMMENTS
1	Are there adequate oxygen points?			
	Are observation and monitoring equipment's adequate? BP machine, pulse oximeter, thermometer.			
2	Are there adequate resuscitation drugs?			
3	Is the triage area adequate?			
4	Are there enough stretcher to receive patients?			
5	Is the monitoring area crowded?			
6	Are the consultation rooms adequate?			
7	Are there adequate resuscitation rooms?			
8	Is the nurse patient ratio adequate?			
9	Is the doctor –patient ratio appropriate?			
10	Are the laboratory staff adequate?			
11	Are there enough porters in the unit?			
12	Are the radiology staff ratio adequate?			

APPENDIX IV: Directorate of Post Graduate Studies

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870
Fax: 056-30153
E-mail: directordps@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190
Kakamega – 50100
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099

2nd February 2022

Daniel Kimutai Chelal,
HNR/G/01-53744/2019,
P.O. Box 190-50100,
KAKAMEGA.

Dear Mr. Chelal,

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Masters Proposal entitled: ***"Patient's Management Outcome in Triaged and Coded Patients at Accident and Emergency Department, Kenyatta National Hospital, Kenya"*** and appointed the following as supervisors:

1. Dr. Tecla Sum - MMUST
2. Dr. Everlyne Morema - MMUST

You are required to submit through your supervisor(s) progress reports every three months to the Director of Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Nursing & Midwifery Graduate Studies Committee and Chairman, Department of Nursing Research, Education and Management and Graduate Studies Committee. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your Masters thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY DIRECTORATE OF POSTGRADUATE STUDIES P.O. Box 190 – 50100, KAKAMEGA (K)

Sign:.....
Date:.....

Dr.Consolata Ngala
DEPUTY DIRECTOR DIRECTORATE OF POSTGRADUATE STUDIES

APPENDIX V: Institutional Ethics Review Committee

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY
Tel: 056-31375
Fax: 056-30153
E-mail: ierc@mmust.ac.ke
Website: www.mmust.ac.ke
P. O. Box 190,
50100.
Kakamega,
KENYA

Institutional Ethics and Review Committee (IERC)

REF: MMU/COR: 403012 Vol 6 (01) Date: February 17th, 2022

To: Daniel Chelal Kimutai

Dear Sir.,

RE: PATIENT'S MANAGEMENT OUTCOME IN TRIAGED AND CODED PATIENTS AT ACCIDENT AND EMERGENCY DEPARTMENT, KENYATTA NATIONAL HOSPITAL, KENYA

This is to inform you that ***Masinde Muliro University of Science and Technology Institutional Ethics and Review Committee (MMUST-IERC)*** has reviewed and approved your above research proposal. Your application approval number is **MMUST/IERC/014/2022.** The approval period is ***February 17th, 2022-February 17th, 2023.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including informed consents, study instruments, MTA will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MMUST-IERC.***
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MMUST-IERC*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MMUST-IERC*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MMUST-IERC.***

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours Sincerely,

Prof. Gordon Nguka
Chairperson, Institutional Ethics and Review Committee

Copy to:
- The Secretary, National Bio-Ethics Committee
- Vice Chancellor
- DVC (PR&I)

APPENDIX VI: Approval Letter From NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **778263**

Date of Issue: **10/March/2022**

RESEARCH LICENSE

This is to Certify that Mr.. Daniel kimutai Chelal of Masinde Muliro University of Science and Technology, has been licensed to conduct research in Nairobi on the topic: PATIENTS" MANAGEMENT OUTCOME IN TRIAGED AND CODED PATIENTS AT ACCIDENT AND EMERGENCY DEPARTMENT,KENYATTA NATIONAL HOSPITAL,KENYA. for the period ending : 10/March/2023.

License No: **NACOSTI/P/22/16033**

778263

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearence from relevant Government Agencies
5. The License does not give authority to tranfer research materials
6. NACOSTI may monitor and evaluate the licensed research project
7. The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one year of completion of the research
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and Innovation
off Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA
Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077
Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

APPENDIX VII: Approval Letter to Collect Data From KNH

UNIVERSITY OF NAIROBI
FACULTY OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/293

28th July, 2022

KENYATTA NATIONAL HOSPITAL APPROVED 28 JUL 2022

Daniel Kimutai Chelal
Reg. No HNR/G/01-53744/2019
Dept. of Nursing Midwifery & Paramedical Sciences
Masinde Muliro University of Science & Technology (MMUST)

Dear Daniel,

RESEARCH PROPOSAL: PATIENTS' MANAGEMENT OUTCOME OF TRIAGED AND CODED PATIENTS AT ACCIDENT AND EMERGENCY DEPARTMENT, KENYATTA NATIONAL HOSPITAL, KENYA (P206/03/2022)

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P206/03/2022.** The approval period is 28th July 2022 – 27th July 2023.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by KNH-UoN ERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KNH-UoN ERC 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to KNH-UoN ERC.