TRIAGE KNOWLEDGE AND ASSOCIATED FACTORS AMONG EMERGENCY DEPARTMENT NURSES AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA

BY

TSHOGANETSO TSWAIPE

COMPUTER NO: 2023007179

A DISSERTATION SUBMITTED TO THE UNIVERSITY OF ZAMBIA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN EMERGENCY AND TRAUMA NURSING

THE UNIVERSITY OF ZAMBIA

LUSAKA

2025

NOTICE OF COPYRIGHT

DECLARATION

I, TSHOGANETSO TSWAIPE, hereby declare that this dissertation herein presented is entirely the result of my own personal effort and has not been previously submitted either wholly or in part for any diploma, degree or any other qualifications at this or any other university. It has been written according to the guidelines for Master of Science in Emergency and Trauma Nursing of the University of Zambia.

Candidate's Name: _____ Signature: _____ Date: _____

CERTIFICATE OF COMPLETION OF DISSERTATION

I, DR R. WAHILA, having supervised and read through this Dissertation, I am satisfied that this is the original work of the author under whose name it is presented. I also confirm that the work has been completed satisfactorily and approve this Dissertation for final submission

Supervisor's Name: _____ Signature: _____ Date: _____

HEAD OF DEPARTMENT

Department of Basic and Clinical Nursing Sciences, School of Nursing Sciences, University of Zambia

Name: _____ Signature: _____ Date: _____

CERTIFICATE OF APPROVAL

The University of Zambia approves this Dissertation by TSHOGANETSO TSWAIPE on "TRIAGE KNOWLEDGE AND ASSOCIATED FACTORS AMONG EMERGENCY DEPARTMENT NURSES AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA" in partial fulfilment for the requirements for the award of the Degree of Master of Science in Emergency and Trauma Nursing.

Name_____ Signature_____ Date_____

Examiner 1

Name_____ Signature_____ Date_____

Examiner 2

Name_____ Signature_____ Date_____

Examiner 3

ABSTRACT

Background: Overcrowding in emergency department (EDs) remains a global significant concern, often compromising the quality, safety, and timeliness patient care. To address this, the triage system has been implemented to prioritize patients based on the severity of their conditions and to ensure efficient utilization of limited resources. However, the effectiveness of triage system relies on the knowledge and competency of ED nurses. Adequate triage knowledge is critical for ensuring a accurate, prompt, and comprehensive patient assessments, which are vital for the delivery of safe and effective emergency care.

Aim; This study aimed to assess nurse's triage knowledge and associated factors among nurses in the ED at Princess Marina Hospital (PMH), Gaborone, Botswana.

Methods: The study employed a quantitative cross-sectional analytical design. A sampling method was utilized to include all 33 ED nurses working at PMH. Data was collected using a structured, self-administered questionnaire. Both descriptive and inferential analyses were computed using Statistical Package for Social Statistics (SPSS) version 27. Fisher's Exact and binary logistic regression tests with corresponding confidence intervals (CI) and p-values were used to test associations between independent and dependent variables. Ethical clearance was obtained from relevant authorities, and informed consent was obtained from respondents.

Results: The results showed that 79% of respondents had adequate level of triage knowledge. Respondents' age (p=0.719), gender (p=0.393), marital status (p=0.763), level of nursing qualification (p=0.320), nursing experience (p=0.203), and training in emergency care (p=0.225) were not significantly associated with nurses' triage knowledge.

Nursing Implication: The results underscore the significance of continuous triage education and training for ED nurses. Incorporating regular, structured training programs into hospital policies can assist maintain and enhance triage competence, ultimately improving patient outcomes in emergency departments.

Conclusion: The results of this study highlight the need for further research into the factors that influence triage information among emergency departments, particularly in the context of low-resource settings. Emergency department nurses should prioritize triage training to improve their knowledge in triage.

Keywords: *Triage knowledge, Emergency department, Nurses, Work experience, Training, Botswana.*

ACKNOWLEDGEMENT

This dissertation would not have been possible without the unwavering support, encouragement, and guidance from my supervisors, DR R. WAHILA and MR M. KANYANTA.

I am also grateful to my research assistants for good work during the field work. I thank my friends and course mates for their ceaseless moral support. I would equally like to thank my family for their love, care and support. They believed in me and kept me going.

Finally, I thank all the wonderful staff Princess Marina Hospital in Botswana who participated in the study.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

ED	Emergency Departments
ESI	Emergency Severity Index
ETAT	Emergency Triage Assessment and Treatment
HCP	Healthcare Providers
KFMC	King Fahad Medical City
MOH	Ministry of Health
PATS	Princess Marina Hospital Accident and Emergency Triage Scale
PMH	Princess Marina Hospital
SATS	South African Triage Score
SPO	Structure, Process and Outcome
SPSS	Statistical Package for Social Sciences
UNZA	University of Zambia

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.0 Introduction

This chapter seeks to offer a thorough introduction to the study proposal assessing triage knowledge and associated factors among emergency department nurses. It will elaborate on the background context of the research, articulate the statement of the problem, present the justification for the significance of the study, outline the applied conceptual framework, and delineate the objectives and hypothesis guiding the investigation.

Emergency departments (ED) are designed to treat emergency and urgent cases through rapid diagnosis and the delivery of medical or surgical treatment within a short timeframe (Sartini et al., 2022). Triage, a system ensuring patients receive rapid, precise, and responsive treatment according to their condition, is a crucial part of this process. Reay et al. (2020) and Goransoon et al. (2020) argue that nurses play a vital role in the initial assessment of patients through the triage process. Their triage knowledge is a key element in the decision-making process in the ED, providing the foundation for timely and accurate rapid assessment, categorisation, and patient allocation, thereby significantly impacting patient outcomes. Triage is a fundamental skill that every nurse in an emergency room must possess (Elgazzar, 2021). However, factors such as training, working experience, and qualification, can significantly influence triage knowledge (Hinson et al., 2019). Therefore, it was imperative to evaluate the triage knowledge and associated factors among nurses working in the ED.

1.1 Background

Globally, ED has been experiencing overcrowding in the last decades, which presents a significant concern as it can lead to compromised patient care (Getachew et al., 2024). Overcrowding and limited resources are a major threat to patient safety and quality care as they put the burden on already limited resources in an environment where there is increased patient load and expectations (Savioli et al., 2023; Sharma et al., 2021). The need to balance limited resources against the provision of timely patient care has led to multiple strategies to optimize processes, and one of these strategies is the use of a triage system in the ED (Ganjali et al., 2020). Triage allows for optimised utilisation of resources as they are allocated efficiently based on patient acuity levels. Bazyar et al. (2020) and Duko et al. (2019) concur that triage is an effective tool when dealing with limited resources that are critical to providing quality health

services. Triage facilitates timely access to medical care for patients, particularly those with urgent or life-threatening conditions. This contributes to improved clinical outcomes, reduced morbidity, complications, mortality rates, and patient and family satisfaction (Smith et al., 2020). Triaging has significant consequences not only on patient's survival but also on their hospital experience, care satisfaction, and psychological well-being (Morley et al., 2018).

Triage originates from the French word "trier," which describes the processes of sorting and organizing (Yancey and Rourke, 2023). In a health context, it translates to how patients are categorized based on the severity of their injuries or illnesses. (Al Marzooq., 2020; Mistry et al., 2018). Triage, a concept developed and refined on the battlefield, has been central to emergency medicine for over half a century (Hinson et al., 2018). Studies indicate that the triage system was first implemented in hospitals in the early 1960s. Though the triage process has evolved and hospitals have adopted different triage systems to cater to the changing environment, the primary goal of the triage system has remained the same (Pons et al., 2020). The primary mandate of the triage system is to effectively lower mortality, improve health outcomes, reduce waiting time for patients who need urgent care, and improve patient flow in the ED (Burgess et al., 2018).

Thus, a triage method has proven to be a necessary tool in ED because patients simultaneously arrive at the ED with conditions of varying degrees of severity (Sutriningsih et al., 2020), most of which lack a clear diagnosis, urgency, or severity. If triage is not conducted at a standardised level, the outcomes of care of patients and the efficiency of ED are likely to be compromised. Countries have developed their country-specific triage systems and commonly applied triage scales include the Australian Triage Scale (ATS), Canadian Emergency Department Triage and Acuity Scale (CTAS), Manchester Triage Scale (MTS)], Emergency Severity Index (ESI)] and South Africa Triage scale (SATS)(Hinson et al., 2018). The objective of all triage systems is to identify and prioritize patients with critical time-sensitive care needs despite having a substantial divergence in approach.

The significance of triage knowledge among emergency ED nurses is well-documented in the literature, highlighting it as a fundamental component in ensuring a comprehensive, prompt, and accurate triage process. Knowledge significantly influences the decision-making capabilities of nurses when it comes to establishing patient triage priorities, thereby impacting the overall efficiency of emergency care delivery (Chanif et al., 2023; Mitchell et al., 2021). Enhanced triage knowledge not only boosts the confidence of ED nurses but also leads to

improved patient satisfaction through the perception of enhanced service quality and care delivery (Shawah'en et al., 2024). Kerie et al. (2018) underscores a strong positive relationship between triage knowledge and emergency nursing care, suggesting that well-informed nurses are better equipped to make accurate triage decisions. Conversely, a deficit in triage knowledge among nurses remains an obstacle to an effective triage process, particularly in low-settings across Africa (Doku et al., 2019).

The disparity in triage knowledge levels is stark, with developed nations generally exhibiting higher knowledge levels compared to their developing counterparts. Studies conducted by AlSharatat et al. (2021) and Malak et al. (2022) reported that nurses in Saudi Arabia and Jordan possess superior triage knowledge when contrasted with their colleagues in Kenya, Ethiopia, and South Africa, where knowledge levels are reported to range from poor to moderate. This disparity can be attributed to the presence of effective organizational policies in developed countries that prioritize continuous education and training, including regular seminars and ongoing quality improvement initiatives through audits and evaluations (Smith et al., 2021; Patel et al., 2023). Moreover, Sabwa et al. (2023) assert that the triage system underutilization in developing countries remains a significant challenge, highlighting the need to systemic reforms to enhance triage efficacy.

Understanding factors that promote or hinder triage knowledge is crucial in developing interventional strategies in emergency settings. Research has consistently identified qualifications, working experience, and training related to the emergency setting as the factors influencing triage knowledge among ED nurses(Gkamprielle et al., 2022; Yoon and Son, 2021). It is essential for triage nurses to possess comprehensive educational backgrounds and proficiency in emergency triage practices, decision-making, and emergency nursing care, given that triage training constitutes a fundamental component of emergency nursing education (Faheim et al., 2019). Several studies have investigated the levels of triage knowledge among emergency department (ED) nurses, revealing significant gaps that impact patient care. For instance, Phukubye et al. (2019) found that nurses in the Sekhukhune District of Limpopo Province, South Africa, demonstrated only moderate triage knowledge, highlighting the need for enhanced educational initiatives. Similarly, Dulandas and Brysiewicz (2018) emphasized the importance of establishing robust support systems for continuing education, suggesting that such frameworks could substantially elevate triage knowledge among emergency nurses.

Conversely, Mamalelala et al. (2023) reported a concerning trend where poor triage practices among emergency nurses were frequently attributed to limited triage knowledge. This deficiency often leads to prolonged patient waiting times and inefficiencies within the triage system (Phukubye et al., 2019). As noted by Iversen et al. (2019) and Gligorijevic et al. (2018), triage acuity assessments rely heavily on nurses' subjective evaluations, which can result in triage category errors, ultimately jeopardizing patient safety. Enhancing nurses' triage knowledge is, therefore, critical for mitigating these risks and ensuring accurate assessments of patient urgency.

The triage decisions are classified into three outcomes: correct, under-triage, and over-triage. Correct triage occurs when a patient's condition is accurately assessed and is assigned the appropriate priority level. Under-triage occurs when a patient's condition is underestimated and is assigned a lower priority than necessary (Zwoliński et al., 2020). Over-triage occurs when a patient's condition is overestimated and is assigned a higher priority than necessary (Shabrandi et al., 2022). Improvement in emergency nurses' knowledge and minimizing the associated factors are key aspects of nurses' success in the management of emergency situations, sorting the patients, and confirming the quality of care (Mohr et al., 2020; Delnavaz et al., 2018).

In Botswana, the Princess Marina Hospital (PMH) triage system is called the Princess Marina Hospital Accident and Emergency Triage Scale (PATS) (Mullan et al., 2014). PATS is a 5-level system consisting of 5 categories: red, orange, yellow, green, and blue. Most emergent patients are coded red and are reviewed immediately; very urgent patients are coded orange and are reviewed within 10 minutes; urgent patients are coded yellow and must be seen within 1 hour, while routine patients are coded green and are to be seen within 4 hours (Siamisang et al., 2022). Moreover, the Botswana Ministry of Health (MOH) advocates for providing quality health services; hence, several strategies have been implemented to enhance triage knowledge among nurses (Ncube et al., 2023). This includes ensuring staff have the necessary knowledge to deliver services through improved training plans and the integration of information systems. Continuous education programs such as seminars, workshops, and conferences provide nurses with an opportunity to update and enhance their knowledge of the triage process, and the provision of clinical guidelines promotes a standardized and consistent triage process, thereby improving the quality of care provided (Ncube et al., 2023).

Additionally, the Botswana MOH has provided nurses with access to information technology, enabling them access to the latest knowledge and best practices (Ngcobo, 2019). Despite all

the existing strategies to enhance triage knowledge, no identified literature assessing triage knowledge and associated factors among nurses in Botswana was established. Therefore, this study has provided baseline information on nurse's triage knowledge and associated factors at PMH and make recommendations aimed at improving triage knowledge among nurses.

1.2 Statement of the Problem

The PMH ED faces overcrowding due to rising patient volumes. Despite the use of a triage system, the effectiveness of its application remains uncertain. The improper application may lead to delayed care, increase in admissions and mortalities as shown in Table 1 below. There is limited research assessing the level of triage knowledge and associated factors among ED nurses at PMH, hence creating a gap that this study seeks to address.

Table 1.1: Emergency department attendance, admissions and mortality at PMH (2021 – 2023)

Year	No. of ED attendance	ED admissions		ED mortality	
		N	%	N	%
2021	16,751	7,502	44	210	1.3
2022	17,789	8,995	51	283	1.6
2023	17,667	7,906	45	313	1.8
Total	**52,207**	**24,403**	**47**	**806**	**1.5**

Source: PMH, 2024

As shown in Table 1 above, the daily statistics from PMH between 2021 and 2023 showed an increase in ED attendance from 16,751 ED cases in 2021 to 17,789 in 2022 and a slight decrease to 17,667 in 2023. This indicates a general upward trend in ED visits, reflecting potentially increasing healthcare needs or population growth. The percentage of patient admissions increased from 44% in 2021 to 51% in 2022 and then decreased to 45% in 2023. However, the mortality rate increased from 1.3% in 2021 to 1.8% in 2023. Factors including patient population and types of emergencies treated can affect admission and mortality rates (Messelu et al., 2024; Bijani and Khaleghi, 2019). Increase in mortality rates could also signify poor triage knowledge, leading to delays in triage and, therefore, deterioration and mortalities instead of discharges because cases at ED are primarily acute and usually resolve immediately after interventions. For these reasons, the research evaluated the level of triage knowledge and associated factors among nurses at PMH in Gaborone, Botswana.

1.3 Justification

Studies evaluating triage knowledge among emergency ED nurses are critical as they provide insights into the preparedness of healthcare professionals to handle life-threatening situations effectively. Triage knowledge directly influences clinical decision-making, which determines the timeliness and accuracy of care delivery, ultimately affecting patient outcomes (Hinson et al., 2018). Furthermore, inadequate triage knowledge can result in delays, mismanagement, or inequities in care allocation, as emphasized by Roudsari et al. (2017). Such research is particularly important in countries like Botswana, where limited studies have assessed triage knowledge and its associated factors. This study aimed to address this gap, expecting to reveal the current status of triage knowledge and identify areas for targeted improvement.

The results of this study were expected to inform the Ministry of Health (MOH) and its stakeholders to accelerate the review and enhancement of existing strategies to improve triage knowledge among ED nurses. The results provide evidence-based recommendations for policy development, and targeted training programs. Furthermore, the study contributes to the growing body of knowledge in emergency nursing care by offering baseline data specific to Botswana, which can guide further research and quality improvement projects. This study also aligns with Sustainable Development Goal (SDG) 3 (WHO, 2023), which focuses on ensuring healthy lives and promoting well-being for all. By improving triage knowledge, the study addresses SDG target 3, which emphasizes achieving universal health coverage and access to quality essential health services.

Previous studies conducted in Botswana have largely focused on general nursing competencies and healthcare delivery challenges but have not specifically assessed triage knowledge. For instance, Molefi et al. (2020) evaluated nurses' perceptions of emergency care practices, while Tlapeng and Phiri (2019) explored the impact of training on general nursing competencies in EDs. However, these studies did not address triage-specific knowledge or its associated factors. In contrast, this study uniquely examined the factors influencing triage knowledge and provided a detailed assessment of ED nurses' preparedness to implement effective triage systems. By filling this gap, the study highlights the need for ongoing investments in triage training and policy interventions tailored to the local context.

1.4 Conceptual Framework: The Donabedian Structure, Process and Outcome (SPO) Model

This study adopted the Donabedian model developed by Avedis Donabedian in 1966. Donabedian was a physician and founder of the study of quality in health care and medical outcomes (Donabedian and Bashshur, 2023).

1.4.1 Description of the Donabedian Model

The Donabedian model is a widely recognised framework for evaluating the quality of healthcare services (Donabedian, 2005). It categorises the quality evaluation into three interconnected key components: structure, process, and outcome. This model is particularly valuable in examining the relationships between healthcare systems and the delivery of care, such as triage in emergency departments. For instance, Goenka et al. (2023) effectively evaluated a quality improvement project in a clinical settings using the Donabedian model.

Structure: refers to the attributes of the settings in which care occurs, including physical and organisational infrastructure, human resources and tools in delivering care. In this study, structure encompasses the socio-demographic characteristics of nurses of age, gender, and marital status. Understanding these characteristics is essential, as they can influence not only the quality of care provided but also the effectiveness of healthcare teams in meeting diverse patient needs.

Process focuses on the methodologies and actions involved in delivering care. This includes decision-making processes, documentation practices, adherence to clinical protocols, and the training and competency of staff (Donabedian, 2003). In triage, for example, process evaluation would assess whether nurses adhere to established triage protocols consistently and effectively. Analysing process elements can reveal areas for improvement, such as the need for ongoing training or the implementation of new technologies to enhance care delivery.

Outcomes serve as critical indicators of the effectiveness of healthcare interventions. They encompass the full range of impacts that healthcare has on patients and populations, including changes in health status, behaviours, levels of knowledge, patient satisfaction, and overall health-related quality of life. Outcomes are often viewed as the most crucial metrics of quality since they directly reflect the effectiveness of healthcare practices (Donabedian, 2003).

In conclusion, these components offer a comprehensive approach to evaluating and enhancing the quality of care in healthcare systems.

1.4.2 Application of the Donabedian Model to the study

The Donabedian model has been selected as the foundational framework for this study due to its comprehensive nature, which facilitates an in-depth understanding of triage knowledge and its associated factors among ED nurses. This model's three components SPO, enable a thorough examination of the triage knowledge level among nurses and explore the relationship and association between triage knowledge, socio-demographic characteristics, and independent variables (training, work experience, and qualification). The relevance of the Donabedian model is underscored by its successful application in healthcare research, such as in the study by Naz et al. (2021), which focused on improving obstetric triage processes on the obstetric triage improvement process.

Structure

In the current study context, structure involves socio-demographic characteristics of nurses. This include age, gender, and marital status which are essential for understanding the diversity within the ED workforce and how individual attributes may impact the triage knowledge level. Age serves as an indicator for clinical experience and maturity. For instance, younger nurses may have recently completed their training, and brought fresh knowledge and enthusiasm but possibly lacked in clinical experience (Murthy et al., 2020) . On the other hand , experienced nurses may have extensive clinical exposure, but utilising outdated triage protocols. Additionally, age might intersect with other generational attitudes toward work-life balance, professional development, and continuing education. Older nurses may prioritize stability and routine, while younger nurses might seek opportunities for career advancement and additional training. Understanding these differences can help healthcare organizations tailor educational programs and support systems that cater to the varying needs of nursing staff.

Gender distribution examines triage knowledge levels in both sexes, despite nursing being predominantly female. Assessing gender distribution can help identify whether there are variations in triage knowledge between male and female counterparts. Furthermore, analysing knowledge differences across genders can enhance collaborative practices within healthcare teams (Ramsay and Chalmers, 2021). This awareness can lead to training programs, that address specific gaps, ultimately improving patients' outcomes.

Marital status is another important factor in understanding how it influences the level of triage knowledge among nurses. Marital status can impact a nurse's availability and commitment to work. Nurses who are married may experience different support systems at home, which can

either facilitate or hinder their ability to fulfil work obligations. For example, those with supportive spouses may find it easier to pursue continuing education and additional certifications, while those facing familial responsibilities may struggle to balance home life with the demanding nature of nursing.

In summary, the socio-demographic characteristics are significant variables that influences various aspects of a nurse's professional life including triage knowledge. This would allow for a comprehensive analysis of how personal and contextual factors influence triage knowledge, supports targeted interventions, and enhances the generalizability and relevance of the study results (Ariffin et al., 2023; Chanif et al., 2023)

Process

In the current study context, process involves nurses' training on triage, work experience, qualification. Training is a pivotal element in ensuring triage accuracy, consistency, and efficiency. Butler et al. (2023) emphasise that well-structured training improves the level of triage knowledge, which in turn enhances triage accuracy and patient outcomes. Furthermore, the healthcare landscape is constantly evolving, and ongoing training is critical. Nurses who actively engage in continuing education can enhance their skills more effectively than those who rely solely on their initial qualification (Delnavaz et al., 2018). Determining nurses' training status helps in identifying knowledge gaps and target training programs, thereby improving ED performance.

Nurses' work experience significantly impacts their triage knowledge, therefore, determining how experience affects their triage knowledge is essential in closing identified gaps. Kerie et al. (2018) argue that a nurses with extensive hand-on experience tend to excel in triage settings due to the intuition developed over years of practice. This result aligns with Asgari et al. (2018) who reported that repeated exposure to the triage process produce more accurate outcomes, even under time constraints. Conversely, several studies argue that newer nurses, bring fresh perspective and updated training on the latest protocols, can possess higher triage knowledge than counterparts. While the advantages of experience are clear, the study will assess if there is a statistical association between triage knowledge and nurses work experience.

Assessing the qualification status of nurses is crucial for understanding its influence on triage knowledge. Nurses with varying qualifications- such as Diploma, Bachelor's Degree, and Master's Degree possess different levels of expertise that directly impact their triage capabilities. By examining these relationships, the researcher can predict and enhance the triage

knowledge corresponding to each qualification level This will assist in predicting the level of triage knowledge for each qualification level, ultimately improving patient outcomes.

Outcome: In this study, the outcome represents the level of triage knowledge among ED nurses, which is measured through a self-administered questionnaire. This outcome reflects the end result of the structure and process components (Naz et al., 2021). Together, these components culminate in the outcome— the level of triage knowledge possessed by the nurses. Understanding this interrelationship can help in designing effective educational interventions and optimizing the triage process to enhance overall patient care in the ED (Santry et al., 2020).

Figure 1.1: Conceptual framework on triage knowledge among nurses at PMH

1.5 Research Objectives

1.5.1 General objective

To assess nurse's knowledge and associated factors among emergency department nurses at PMH in Gaborone, Botswana.

1.5.2 Specific objectives

1. To determine the level of triage knowledge among nurses at PMH in Gaborone, Botswana.
2. To describe the socio-demographic characteristics of nurses providing triage care at PMH in Gaborone, Botswana.
3. To assess the work experience of nurses involved in triage care at PMH in Gaborone, Botswana
4. To assess if the nurses at PMH in Gaborone, Botswana received training in emergency care or not.

1.6 Hypothesis

Ho: There is no significant association between the level of triage knowledge and nurses' sociodemographic characteristics, work experience, and training on emergency care among nurses at PMH in Gaborone, Botswana.

1.7 Variables

Dependent variable

1. Triage knowledge

Independent variables

1. Socio-demographic of age, gender, and marital status, qualification
2. Work experience of nurses
3. Training on emergency care

Table 1.2: Variables and level of measurement

Variable	Conceptual definition	Operational definition	Level of measurement			Question no.
			Indicator	Cut off points	Type	
Dependent variable						
Triage knowledge	This is a state of being familiar to sort patients' conditions according to their degree of seriousness– their need for treatment– and the available resources to offer the treatment (Seda, 2020).	This refers to the nurses understanding triage activity of patient assessment, categorisation and allocation.	Adequate knowledge	>60% on knowledge score	Nominal	B1 – B18
			Inadequate knowledge	<60% on knowledge score		
Independent variables						
Work experience	This refers to the practical knowledge and skills gained by performing job-related tasks over time (Dessler, 2017)	This refers to the duration of years a nurse has practiced in the profession.	Experienced	>5years	Ordinal	A5 – A6
			Inexperienced	<5years		
Training	This refers to the organized activity aimed at imparting information and instructions to improve the recipient's	This refers to nurses who have undergone training in emergency care.	PMH triage manual	Trained	Nominal	A7
				Not trained		

	performance or to help them attain a required level of knowledge or skill (WHO, 2023)					
Socio-demographics characteristics						
Age	Age refers to the duration of time that has passed since a person's birth. (United Nations, 2019)	The refers to nurses' age nearest to his/her birthday	<25 years 25 – 35 years >35 years		Nominal	A1
Gender	This refers to the socially constructed roles, behaviours, expressions, and identities of girls, women, boys, men, and gender-diverse people. (WHO, 2023).	This refers biological sex of nurses	Male Female		Nominal	A2
Marital status	This refers to the legally defined personal status of an individual in relation to	This refers to the marital status of nurses	Single Married		Nominal	A3

	marriage laws or customs (WHO,2023).		Divorced Widowed		
Qualification	This refers to the credentials, education, and certifications that an individual has attained, which demonstrate their suitability for a particular role (Armstrong, 2021)	This refers to the highest education attained by a nurse	Diploma in Nursing Bachelors of Nursing Science Masters of Nursing Science	Ordinal	A4

Conclusion

A triage method is a quality improvement strategy used in ED settings to timely identify patients in need of urgent medical interventions (Ganjali et al., 2020). Savioli et al. (2021) and Sartini et al. (2022) concur that triage strategy is a crucial tool as EDs worldwide are faced with challenges of overcrowding, and limited resources which pose a threat to the quality of health services and patient safety. However, according to Doku et al. (2019), a lack of triage knowledge among nurses is a global problem, especially in developing countries which hinders the effective implementation of a triage system. Under or over triage is a consequence of a lack of knowledge and may lead to prolonged waiting times, patient dissatisfaction, and delayed treatment which may cause complications, increased length of stay, and mortality. Several quality improvement strategies such as seminars and clinical audits have been implemented to enhance the triage knowledge. However, there is no evidence of evaluation of those strategies hence the need to undertake the study.

The researcher's objective is to assess the level of triage knowledge among nurses working in ED and explore factors that influence triage knowledge. The Donabedian model is applied to guide the research as it the most appropriate framework for healthcare assessment that focuses on improving the quality of care (WHO, 2018). The results of this study can serve as a basis for modifying existing strategies or developing new ones that can enhance knowledge among nurses as knowledge is one of the main contributors to effective triage.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter aimed to provide an in-depth review of the literature on triage knowledge and associated factors among nurses. The review focused on global, regional, and local literature. A literature review was derived from articles, peer-reviewed journals, published dissertations, and thesis reports, which were assessed through electronic databases including Research Gate, PubMed, Google Scholar, and published and unpublished hard copies from UNZA library. The literature reviewed was searched through the utilization of Boolean search techniques and keywords such as "triage knowledge and associated factors," "knowledge of nurses on a triage system," and "effects of socio-demographic characteristics on triage knowledge." Reviewed articles consisted of quantitative, qualitative, and mixed methods that provided information related to triage. The purpose of the literature review was to critically analyse existing literature and identify deficiencies.

2.1 Overview of triage knowledge and associated Factors among ED Nurses

Assessment of triage knowledge and associated factors among nurses is paramount, as they are crucial for ensuring optimal patient care and outcomes through predicting the trajectory of emergency care. Triage knowledge is a significant contributor to adequate and accurate triage. A comprehensive understanding of associated factors guides the interventional strategies. Triage nurses are the first line of Emergency Department (ED) services, making them the first healthcare workers to come in contact with patients (Lauridsen, 2020). Triage knowledge encompasses the ability of a nurse to understand and apply triage principles and protocols to assess, categorize, and prioritize patients based on the urgency of their clinical conditions. Adequate triage knowledge equips nurses to effectively apply their expertise in their professional practice, thereby impacting the quality of patients' care and satisfying families' needs (Getachev et al., 2024; Savioli et al., 2022). This is beneficial when demand exceeds supply. Dominant associated factors from the literature review are work experience, training, qualification, work-related stress, and nurse-physician rapport. Enhancing associated factors is essential for improving triage knowledge, ultimately leading to improved care and optimized ED operations. For instance, a study by Moon and Choo (2023) reported that nurses with experience and training in emergency-related courses possess higher levels of triage knowledge than inexperienced and untrained ones.

2.2 Knowledge of triage among ED Nurses

Several studies have reported varying levels of triage knowledge among ED nurses across the globe, underscoring the relevance of the study. This often reflect disparities in healthcare systems, resources, training, and institutional policies. High levels of knowledge among nurses are often reported in EDs with adequate resources and strategies that promote the acquisition and maintenance of triage knowledge. For instance, in Saudi Arabia, AlShatarat et al. (2022) reported a high level of triage knowledge among nurses. The study used cross-sectional, descriptive, and correlational and found that knowledge was enhanced by continuous education, structured triage systems and institutional support. This demonstrates that a cross-sectional design effectively assesses the level of triage knowledge, and since the current study focuses on the same, it will adopt the same research design. Phububye et al. (2019) in South Africa found that most nurses were considered knowledgeable, although they categorized knowledge into only two levels—knowledgeable and not knowledgeable.

Conversely, studies in low-resource setting tend to report moderate to low level of triage knowledge among ED nurses. In Ghana, Kouro and Iroko (2020) reported a moderate level of triage knowledge among ED nurses, while in Ethiopia, Duko et al. (2019) and Eerie et al. (2018) found low and moderate level of knowledge respectively. Both studies used institutional-based cross-sectional designs, highlighting the feasibility of conducting triage-related research within single health facilities. Likewise, Twagirayezu et al. (2021) in Rwanda and Shawah'en et al. (2024) in Jordan found that ED nurses demonstrated substandard triage knowledge, attributed to underutilization of formal triage systems and limited ongoing training. Sartini et al. (2022) reinforced this observation by identifying overcrowding and limited resources as significant barriers to triage knowledge acquisition.

The current study will employ the same strategy by adapting self-administered questionnaires from the previous studies, ensuring methodological rigor. A similar study by Elgazzar. (2021) examined the nurses' knowledge regarding triage and its correlated factors among ED nurses in Burridah Central Hospital, Saudi Arabia; and reported a moderate level of triage knowledge among nurses. The inclusion criteria for the respondents were nurses working full-time and involved in the direct care of patients. The current study will adopt the same concept for the inclusion criteria.

In Kenya, Sabwa et al. (2023) assessed triage competency and associated factors using census sampling and reported moderate knowledge levels among ED nurses. The study employed

multiple statistical tools including descriptive analysis, binary logistic regression, and ANOVA. Similar analysis methods were used by Magnusson et al. (2020) and Kerie et al. (2018), indicating flexibility in analytical approaches depending on data size and structure. The current study, considering a relatively small sample, will apply descriptive statistics, Fisher's Exact Test, and binary logistic regression.

Pilot testing of data collection tools to ensure validity and reliability is a common practice in triage knowledge research. Asgari et al. (2018) and Goenka et al. (2023) conducted pilot studies, a methodological step that the current study will also undertake at Nyangabgwe Referral Hospital. Additionally, the use of self-administered questionnaires is consistent across studies such as those by Kouro and Iroko (2020) and Elgazzar (2021), who also adopted clear inclusion criteria focusing on nurses directly involved in patient care. These approaches will be mirrored in the current study to maintain methodological rigor.

Duko et al. (2019) evaluated knowledge and skills of triage and associated factors among nurses in the emergency department of Hawassa University Comprehensive Specialized Hospital, South Ethiopia. The study used an institutional-based cross-sectional study design and reported a generally low level of triage knowledge among nurses. The study by Duko et al. (2019) demonstrates that research can be done at a single institution, and since the current study focuses on the same, it will adopt a single institution study. However, a similar study by Twagirayezu et al. (2021) used several Referral Hospitals in Rwanda and reported low triage knowledge among most nurses. This elaborates that a study setting can be a single or multiple sites. Furthermore, a study by Shawah'en et al. (2024) reported the level of triage knowledge among Jordanian emergency nurses as substandard. Low levels of triage knowledge may be attributed to factors such as the underutilization of triage systems, limited resources, and training opportunities in developing countries.

In Uganda, Tindinawe reported moderate levels of triage knowledge among nurses, though the categorisation differed slightly, 56% were deemed moderately knowledgeable. The gap identified is that 56% were categorized as having a moderate level of knowledge, unlike most studies where a moderate level represented 60-80%. This variation in categorization underscores the need for standardization in assessing triage knowledge. In South Africa, Phububye et al. (2019) reported that most nurses were knowledgeable about triage, but they did not specify the level of triage knowledge as the level of knowledge was classified into two categories: knowledgeable and not knowledgeable.

2.3 Socio-demographic characteristics of ED Nurses

While several studies have identified age, sex, and marital status as the key socio-demographic characteristics, there is still a need for further research in this area. Akgül and Çakır (2023) emphasized that socio-demographic characteristics are crucial in understanding workforce dynamics and their potential influence on the level of triage knowledge. Ariffin et al. (2023) and Gkamprielle et al. (2022), in studies conducted in Saudi Arabia and Greece respectively, reported no statistically significant association between triage knowledge and age, sex, or marital status, suggesting that these factors alone may not consistently predict knowledge levels.

In contrast, Chanif et al. (2023) in Indonesia reported a significant association between age and triage knowledge. The study highlighted that as nurses grow, their cognitive and interpretive capabilities improve, potentially due to accumulated clinical exposure and maturity in decision-making. This result aligns with developmental psychology literature, which supports the idea that cognitive skills and professional judgment tend to improve with age and experience (Benner, 2001). The current study will adopt age, sex, and marital status as the socio-demographic characteristics to further assess their influence on the triage knowledge among nurses.

2.3.1 Age

Several studies used different age categorizations depending on sample characteristics and research objectives. Al-Metyazidy et al. (2021), grouped participants into four brackets: 20-30 years, 31-40 years, 41-50 years, and 51-60 years, allowing detailed stratification of nurses across early, mid and late career stages. Age categorization provides a clear picture of the study population's demographic structure, thereby assisting in understanding the age-related composition, which is crucial for identifying specific age groups' needs and characteristics (Murthy et al., 2020). Kerie et al. (2018), in Addis Ababa, Ethiopia, used similar stratification but with a lower entry point: <20, 20–30, 31–40, and >40 years. This framework captures a broader range of younger respondents, which may be particularly useful in countries where a significant portion of the nursing workforce is in their early twenties. The current study adopts Kerie et al.'s (2018) model, given that most anticipated participants fall within the 20–40-year range—a typical bracket for early- to mid-career nurses in the study setting.

In contrast, Duko et al. (2019) simplified their age categorization into only two groups—under 30 and over 30—possibly for ease of analysis or due to a relatively small sample size. Similarly,

Elgazzar (2020) used three age groups: 20–29, 30–39, and 40+, offering a middle-ground approach between detail and manageability. The decision to collapse or expand age categories is typically influenced by the sample size, analytical approach, and population demographics.

2.3.2 Gender

Gender is another parameter measured under socio-demographics. It helps to identify the level of triage knowledge in both males and females and, therefore, allows for comparison. Notably, the majority of respondents in several studies are females (Phukubye et al., 2019; Duko et al., 2019; Bahlibi et al., 2022). This aligns with the global trend of nursing being a predominantly female profession. Multiple studies across diverse settings have reported no statistically significant association between gender and triage knowledge.

Hwang (2022), Aslan et la. (2021), and Pratiwi et la. (2020) concluded that gender did not influence triage knowledge levels, suggesting that triage knowledge is more likely shaped by education, experience, and training rather than inherent gender characteristics. These results are consistent with the logic that male and female nurses generally receive the same academic preparation and undergo similar clinical training. Triage training, in particular, is typically standardized within institutions or professional curricula, which further reduces the likelihood of gender-based disparities.

2.3.3 Marital status

Several studies have consistently categorised marital status using the conventional classifications of single, married, divorced, and widowed. Malak et al. (2022) and Elgazzar (2020) included all four categories to allow a more comprehensive examination of participants' social contexts. These broader categorizations provide nuanced insights, especially in contexts where extended family responsibilities or spousal support could influence access to continuing education, time for self-study, or mental well-being—all of which may indirectly affect triage knowledge.

Some studies, however, opted for simplified categorization. Kerie et al. (2018), for example, grouped respondents into just two categories: married and unmarried. While this may facilitate easier analysis, it can potentially mask important distinctions between never-married, divorced, or widowed individuals, who may experience different social or emotional dynamics. Interestingly, other relevant studies have not considered marital status at all. Twagirayezu et al. (2021), Sabwa et al. (2023), and Kouro and Iroko (2024) excluded marital status from their

analyses, possibly due to assumptions of limited impact or lack of variation within the study population. However, excluding such a variable risk overlooking subtle but potentially significant associations with triage knowledge or stress coping mechanisms. The current study will adopt marital status of single, and married.

2.4 Factors Associated with Triage Knowledge Among ED Nurses

Several studies have identified various factors associated with triage knowledge among nurses. Understanding these factors is crucial, as it guides the development of tailored strategies to improve triage knowledge among ED nurses. Elgazzar (2021) examined triage knowledge and its correlated factors among ED nurses and reported that factors affecting nurses' knowledge are qualification, years of experience, and training courses in triage. The results agree with Duko et al. (2019), Sabwa et al. (2023), and Asgari et al. (2018), who identified the same factors. According to Hwang (2022), other factors such as workload, nurse-physician rapport, and work-related stress negatively impact age knowledge among nurses. However, some studies could not find any impact of these factors on the level of triage knowledge (AlShatarat et al., 2021; Twagirayezu et al., 2021).

2.4.1 ED work experience on triage knowledge among nurses

Nurses participating in the studies have varying experience levels, ranging from less than a year to over 15 years. Several studies have consistently linked ED work experience to higher levels of triage knowledge among nurses (Asgari et al., 2018; Kerie et al., 2018; Yoo and Son, 2023; Tandinawe et al., 2023). These results underscore the crucial role of work experience in enhancing triage knowledge. The improvement in triage knowledge is attributed to repeated job exposure. This phenomenon aligns with Benner's "Novice to Expert" theory, which emphasizes that experiential learning fosters advanced clinical decision-making and expertise over time.

Despite these studies, the relationship between work experience and triage knowledge remains a topic of interest. Levis-Elmelech et al. (2022) reported that the triage experience level did not significantly affect overall triage accuracy. However, it did affect the frequencies of 'over-triage' versus 'under-triage, with less-experienced nurses having a higher tendency to over-triage and more-experienced nurses to under-triage. Less-experienced nurses were more likely to over-triage due to fear of complications, whereas more-experienced nurses tended to under-triage, relying heavily on intuition rather than strictly adhering to guidelines and protocols.

This reliance on intuition by experienced nurses reflects their ability to recognize patterns through accumulated practical experience but may also introduce subjectivity.

Similarly, studies by AlMarzooq (2020) and Twagirayezu et al. (2021) observed no significant association between the level of triage knowledge and work experience. These results suggest that while experience is often considered beneficial, it may not directly translate to improved knowledge if formal training and adherence to standardized protocols are lacking. Inexperienced nurses, on the other hand, often demonstrate hesitancy and adhere rigidly to guidelines out of caution, which may skew triage decisions.

Given these contrasting results, it is evident that work experience alone does not universally predict triage knowledge or accuracy. The current study aims to address these discrepancies by adopting work experience as an independent variable to further investigate its relationship with triage knowledge. Additionally, it will explore whether qualification, training on triage, in conjunction with work experience, enhances triage knowledge, shedding light on the intricate interplay between them.

2.4.2 Training on emergency care among nurses

Training on emergency care is another factor cited to influence the level of triage knowledge among ED nurses. Various studies have demonstrated the positive impact of structured triage training on nurses' ability to assess and prioritize patients effectively. For instance, Bahlibi et al. (2022) reported that triage training programs not only improved nurses' theoretical knowledge but also enhanced their ability to apply this knowledge in clinical practice, resulting in better triage outcomes. This improvement underscores the critical role of training in bridging the gap between knowledge acquisition and facilitating real-world application in ED.

Hussein and Hassan (2019) and Butler et al. (2022) similarly concluded that training markedly improves triage accuracy and knowledge. Their results indicate that specialized training programs enhance cognitive and psychomotor skills, enabling nurses to make prompt and precise triage decisions. By advancing these areas, training elevates nurses' competency in triage processes, which is crucial for the effective management of patients in emergency departments. Morley et al. (2018) further highlighted that training not only improves nurses' technical knowledge but also enhances their confidence in performing triage. Confidence is a critical factor, as it allows nurses to make decisions promptly and effectively in high-pressure environments. Training provides nurses with the knowledge and assurance to handle a wide range of cases, from minor injuries to life-threatening emergencies.

Shawah’en et al. (2024), who evaluated the effects of a triage educational program on knowledge and abilities among ED nurses in Jordan, further supports the beneficial effect of training on triage knowledge. Their research demonstrated the need of organized and methodical educational interventions by showing notable increases in post-test mean scores for both triage knowledge and abilities following the program. This research supports international initiatives to standardize triage instruction and training as a component of nurses' ongoing professional development.

The study by Dulandas and Brysiewicz (2018) in South Africa, highlighted the need for formal education and training in emergency nursing. The majority of nurses in this study lacked formal emergency care training, which was identified as a major contributing factor to the low levels of triage knowledge observed. The results underscore the importance of incorporating structured triage education. In contrast, studies by AlShatarat et al. (2021) and AlMarzooq (2020) reported no significant association between the level of triage knowledge and training. These results suggest that while training is valuable, its effectiveness may depend on factors such as the quality, duration, and frequency of the training programs, as well as the baseline knowledge and experience of the nurses. Additionally, the way knowledge is assessed (e.g., theoretical vs. practical application) may also influence the outcomes of such studies.

In contrast, studies by AlShatarat et al. (2021) and AlMarzooq (2020) reported no significant association between the level of triage knowledge and training. These results suggest that while training is valuable, its effectiveness may depend on factors such as the quality, duration, and frequency of the training programs, as well as the baseline knowledge and experience of the nurses. Furthermore, how knowledge is evaluated—for example, theoretical vs practical application—may also have an impact on the results of these kinds of studies. Given these diverse results, the current study will adopt training as an independent variable to further explore its relationship with triage knowledge.

2.4.3 Qualification on triage knowledge among ED nurses

The qualification status of nurses varied across studies, with the dominant ones being diplomas, followed by bachelor's degrees, and master's degrees have been analysed to assess their influence on triage knowledge. Studies consistently suggests that qualification of nurses have an impact the level of triage knowledge. For instance, Phukubye et al. (2019) indicated a positive correlation between triage knowledge and job title, with registered and specialist nurses demonstrating higher levels of knowledge compared to enrolled nurses. This difference

is attributed to the comprehensive and advanced nature of registered and specialty nurse training programs, which emphasize critical and analytical thinking, clinical decision-making, and evidence-based practices (Ariffin et al., 2023). Nurses with higher qualifications are more likely to encounter and solve complex cases, enhancing their practical and theoretical understanding of triage.

Supporting this finding, Shawah'en et al. (2024) highlighted that higher academic qualifications often equip nurses with deeper insights into clinical prioritization, enabling them to perform more accurate triage. Similarly, Delnavaz et al. (2018) observed that postgraduate nursing qualifications, which often include specialization in emergency care, are associated with improved triage knowledge. These studies collectively underscore the importance of advanced education in preparing nurses for the demands of emergency department (ED) triage.

However, not all studies reported observed a significant association between triage knowledge and the qualification. For instance, Zagalioti et al. (2023) reported no significant correlation between triage knowledge and the qualification levels of nurses. This discrepancy might be explained by differences in curriculum design, practical exposure, and the quality of education across regions and institutions. It also raises questions about whether qualification alone is sufficient to improve triage knowledge or whether additional factors such as training and experience play a more pivotal role. The current study will adopt training as an independent variable to further examine its relationship with triage knowledge among nurses.

2.5 Conclusion

This chapter highlighted the critical role of triage knowledge among nurses in the effective management of ED operations and how associated factors affect the triage knowledge level. A literature review revealed a spectrum of triage knowledge levels among nurses across different regions and healthcare settings. High levels of triage knowledge are often associated with developed countries due to the availability of resources, ongoing education, and training, while moderate to low levels are prevalent in developing countries due to limited resources such as inadequate medical equipment and facilities, and training opportunities that are often not up to date or comprehensive (Duko et al., 2019). Factors influencing triage knowledge include years of experience, educational qualifications, and participation in triage-related training programs (Phukubye et al., 2019; Hussein and Hassan (2019).

Notably, most studies highlighted a positive correlation between triage knowledge and experience working, training in EDs, and advanced educational qualifications, whereas only

some indicated a significant correlation. Deficiencies identified in existing research include biases in questionnaire construction, selection bias, and inadequate sample sizes. Addressing these gaps through well-constructed scenarios, assuring participants' confidentiality, and including a broader range of nursing professionals in studies can enhance the validity and reliability of future research. Moreover, standardized and continuous training programs are essential to ensure that nurses remain proficient in triage practices, ultimately improving patient care and safety in emergency settings.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter outlined the research design and the methods that were used to assess triage knowledge and associated factors among nurses. It covered research design, research setting, study population, sample size, sample techniques, inclusion/exclusion criteria, data collection, pilot study and plans for data analysis, and dissemination of results.

3.1 Study Design

The study employed a quantitative cross-section analytical design. The study was a cross-sectional approach since the data was collected over specific point in time. This approach allowed the researcher to assess the current level of knowledge and simultaneously measure factors such as qualification, work experience, and training, which are presumed to influence triage knowledge (Siedlecki, 2020). An analytical study design was used to focus on identifying any significant associations or relationships between variables, making it appropriate for studies investigating the factors influencing triage knowledge. This combination of cross-sectional and analytical design ensures that the research is both practical and capable of generating actionable insights to improve nurses' triage knowledge.

3.2 Study Setting

The study was conducted at Princess Marina Hospital, a government-funded tertiary facility located in the capital city-Gaborone, approximately 5 kilometres from the central business district at the corner of North Ring Road and Notwane Road in Botswana (Ngidi, 2016). It is the largest and one of the busiest hospitals in the country, with a capacity of 567 beds and an average of 750 inpatients per day (Siamisang et al., 2022). The facility offers both in-patient and out-patient services. Services that are provided at the hospital include oncology, ophthalmology, internal medicine, surgery, physiotherapy, psychiatry, accident and emergency, obstetrics and gynaecology, infectious disease control (IDCC), intensive care, pediatrics and neonatology, radiography, and pathology (Ngidi, 2016). The hospital covers critical patients from greater Gaborone and referrals from nationwide. The ED, which offers a diverse range of trauma and emergency care, has a designated triage room and 13 beds, including 4 resuscitation beds and an isolation bed. As of December 2023, one specialist physician, 13 medical officers, and 40 nurses are working in the department, with an annual

volume of approximately 19000 (PMH, 2023). The site was suitable for this study because the diversity and volume of patients seen in the ED necessitates the possession of triage knowledge to promote the ability of nurses to triage and manage various conditions effectively.

3.3 Study Population

The study population were all the registered nurses working at the PMH ED in Gaborone, Botswana who are involved in direct triage and patient care.

3.3.1 Target population

The target population for the study were all registered nurses working at the PMH ED in Gaborone, Botswana who are involved in triaging of patients. The ED consists of thirty-seven (37) nurses.

3.3.2 Accessible population

The study's accessible population were all registered nurses at the PMH ED in Gaborone, Botswana, who were available during the data collection period, and meet the inclusion criteria.

3.4 Sample Size Determination

Due to the small population, a census was used and therefore the sample size was 37. The sample size was determined based on various factors, including the study objectives, research design and statistical considerations. Choosing an appropriate sample size was crucial for ensuring the study has sufficient statistical power to detect meaningful effects (Johnson et al., 2020). It was on this premise that all nurses available during data collection constituted the sample size in order to provide sufficient statistical power.

3.5 Sampling Technique

The census technique method was used to derive a total population for the study due to a smaller population size. Additionally, the data collected represented true results, and all the ED nurses' opinions were represented since the census method involved everyone in the population.

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

The study will include all nurses who have been working at the PMH ED for a minimum of six months and registered with the Nursing and Midwifery Council of Botswana will be included in the study. Additionally, only those nurses who provide informed consent to participate in the study will be considered.

3.6.2 Exclusion Criteria

Nurses who are absent from duty during the period of data collection for reasons such as leaves (annual, maternity, academic) will be excluded from the study.

3.7 Data Collection Tool and Technique

3.7.1 Data collection tool

For the purposes of data collection, a self-administered questionnaire tool based on the work of ALShatarat et al.(2022) was adapted. The initial aim of the tool was to assess triage knowledge and practices among emergency department (ED) nurses at King Fahad Medical City in Saudi Arabia. The tool consists of three main sections; socio-demographic characteristics, triage knowledge, and triage practice questions. Section 2 included 18 items evaluating triage knowledge while section 3 included 14 items assessing triage practice. The questionnaire featured multiple-choice and true/false questions, and the tool demonstrated strong internal consistency, with Cronbach's alpha values of 0.75 for knowledge and 0.74 for practice(ALShatarat et al.,2022).

Section A collected data on the socio-demographic characteristics of the respondents, such as age, gender, years of experience in nursing, years of experience in the ED, and prior triage training. This information was crucial for understanding the background of the participants and its potential influence on their triage knowledge and practices. Section B included questions designed to assess respondents' theoretical understanding of triage principles, patient assessment, triage category levels, and decision-making processes for assigning appropriate care and prioritization. The questions aimed to evaluate the nurses' ability to apply evidence-based triage knowledge in emergency situations. Section C focused on evaluating the practical application of triage knowledge in real-world scenarios. It included questions on the steps and processes involved in patient assessment, the allocation of patients to appropriate care levels, and the prioritization of care based on the urgency and severity of the patient's condition.

An adapted version included socio-demographic characteristics(section A) and triage knowledge related questions(section B). Regarding point scoring, every correct response earns one point, while every incorrect response earns zero points. A percentage score was computed from the knowledge total score. Less than 60% on the triage knowledge scale indicated inadequate knowledge, and 60 and above indicated adequate triage knowledge. This tool was ideal for the current study because it covered triage principles, patient assessment, trajectory levels, and decision-making processes for assigning appropriate care and prioritization. Furthermore, the tool provided details on the socio-demographic characteristics of the respondents. Several studies, including Bam et al. (2022),and Elgazzar. (2021) adapted this tool to evaluate ED nurses' triage knowledge in similar settings like PMH, Botswana which demonstrate the widespread adaptation of this tool.

Lastly, permission was not obtained since the adapted tool was available in an article distributed under the terms of the Creative Commons Attribution Non-Commercial 4.0 License which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access page((https://creativecommons.org/licenses/by-nc/4.0/)

3.7.2 Validity

To ensure construct and internal validity, an extensive literature review was conducted, which provided a guide when designing a data collection tool thus ensuring that only relevant questions pertaining to the study variables are included in the questionnaire. Content and face validity was ensured through subjecting data collection tool to research supervisors and experts. They assessed the clarity, relevance, and appropriateness of the questions in eliciting the intended responses. The questions were constructed using simple, clear, and concise language to minimize ambiguity and facilitate accurate responses. External validity was ensured through the use of census method which provided all the ED nurses with an opportunity to participate in the study. This approach increased the representativeness of the sample and enhanced the generalizability of the findings within that context.

3.7.3 Reliability

To ensure reliability of the questionnaire, the formatting was the same for all questionnaires and were presented to the respondents in the same order. In order to increase the reliability of the tool, the piloting of the tool was done to enhance the accuracy, completeness, correctness,

consistency, uniformity and maintain relevance. Further, a reliability test for consistency was performed and a Cronbach Alpha score of 0.78 was calculated; and acceptable based on a reliability coefficient of not less than 0.7 (Desta et al., 2022).

3.7.4 Data collection technique

Prior to the distribution of questionnaires, the researcher obtained permission from the hospital ethics committee at PMH for the study's purpose. The respondents were recruited using a total population sampling approach, where all nurses working in the (ED) were approached to participate in the study. The researcher introduced himself to the respondents and explained the purpose, benefits and risks for conducting the study. The respondents were assured of confidentiality and informed that participation was voluntary and they were free to withdraw during the process. Subsequent to all the explanations, the respondents were asked to voice any questions and the willingness to consent to participate. Respondents were then asked to sign the consent form if they agreed to take participate in the study. The data collection process involved distributing self-administered questionnaires to all eligible nurses in the ED. Nurses were given approximately 20 minutes to complete the questionnaire in a staff rest room to promote focus. After collecting the completed questionnaires, the researcher immediately checked each for completeness and legibility to minimize missing or unclear data. Respondents were then thanked for their time and contribution to the study. The questionnaires and consented forms were kept in a sealed envelope and kept in a locked drawer once the participants returned the answers.

3.8 Data Management and Storage

After collecting the data, the researcher processed and analysed the data. The researcher examined the raw data to detect errors and omissions and correct them when necessary and possible. Once the examination of the raw data was finished, the step of encoding followed to clean and classify the raw data into the usable and purposeful category of Excel. For closed-ended questions, data was coded numerically by assigning specific numerical values to each response option (e.g., 1 = "Agree and 2 = "Disagree," ; Gender: Male = 1, Female = 2; Triage training: Yes = 1, No = 0; knowledge categories: Adequate = 1, Inadequate = 0.This allowed for easy tabulation and statistical analysis using Excel. Post data collection, the completed questionnaires were kept under lock and key for security and to keep away from unauthorized access to the information gathered in the researcher's cabinet and on a personal password protected computer. During data analysis, encoded data files were stored on a secure,

password-protected computer to prevent unauthorized access, and backup copies were created and stored in a secure cloud service or external hard drive to prevent data loss.

The researcher did not in any circumstance falsify data or make claims that were not adequately supported by the results of the research study. All secondary data sources were properly cited and acknowledged as prescribed by the Harvard referencing style.

3.9 Data analysis

Data verification and validation was performed by rechecking all data entries with the original data forms to achieve a clean dataset that was exported into a Statistical Package for social sciences (SPSS) version 27.0. Data analysis involved descriptive and inferential statistics. The results have been presented according to the sequence of questions and sections of the questionnaires. Numerical data was presented as raw figures and percentages, and in form of bar charts, pie charts and frequency and cross tabulation tables for easy understanding. The variables under study were assessed on how each independent variable associated with the outcome variable and how these were important in determining triage knowledge among the nurses. The Fishers statistical test was applied to assess whether the distribution of triage knowledge is significantly associated with independent factors. The Fishers' Exact test was more suitable due to a smaller sample size as it provides an exact probability of associations (Kim, 2017). Multiple logistic regression was also employed to examine the association between triage knowledge (binary dependent variable: adequate/ not adequate) and various predictor variables, including socio-demographic characteristics, years of experience, and training in emergency care. The corresponding confidence intervals (CI) and p-values for associations between independent and dependent variables were also considered for data analysis. This type of regression is ideal for the study as it indicates how the odds of having adequate triage knowledge change based on the predictor variables while controlling for other factors.

3.10 Pilot study

A pilot study was conducted at Nyangabgwe Referral Hospital ED in Francistown, which is also a tertiary hospital and the second largest government hospital in Botswana. The rule of thumb (10% of the total population) was used to determine the sample size. This rule allowed the researcher to use four nurses in the pilot study in order to pre-test the questionnaire tool to identify and mitigate potential problems before the main study, thereby ensuring reliability and

suitability of the questionnaire. The consent forms were appended to the questions, leading respondents to perceive them as synonymous with signing their names on the questionnaires. When addressing this shortcoming, the questionnaires were not attached to consent forms.

3.11 Ethical Considerations

Ethical clearance and approval were obtained from the University of Zambia Biomedical Research Ethics Committee (UNZABREC) (Reference No: 5815/2024) and Ministry of Health Research Office and Institute Review Board (IRB) in Botswana. permission was obtained from the National Health Research Authority (NHRA) in Zambia, Health Research Development Committee (HRDC), University of Zambia School of Nursing Sciences. Thereafter, respondents were provided with information on the nature, process, benefits and possible risks of the study; after which informed consent were obtained from all respondents before the administration of questionnaires. In furtherance of observing ethics, the researcher did not force any respondent to participate in this study, all respondents voluntarily participated and no form of payment or incentives was provided. Study respondents were told that they were free to withdraw from the study at any time without affecting or jeopardizing their employment. Confidentiality and anonymity were ensured through omission of identifying features such as names from the questionnaire.

3.12 Conclusion

This chapter highlighted the research design and methods used to assess triage knowledge and associated factors among nurses at PMH in Gaborone, Botswana. The study employed a quantitative cross-sectional analytical design to assess current knowledge and measure factors influencing triage knowledge. The study was conducted at the hospital, which offers a diverse range of services and the target population consisted of all nurses. The sample size was determined using a census method, ensuring sufficient statistical power to detect meaningful effects. The study included all nurses working at the PMH ED for more than six months and registered with the Nursing and Midwifery Council of Botswana. Nurses who were absent from duty during data collection for reasons such as leaves or probation were excluded from the study.

The study used a self-administered questionnaire tool based on two adapted tools from Dulandas and Brysiewich, (2018), and AlShatarat et al. (2022). Data collection technique involved obtaining permission from the hospital ethics committee at PMH, recruiting eligible

nurses and distributing self-administered questionnaires to all eligible nurses in the ED. Data management and storage involved examining raw data, encoding it into usable categories of Excel, and maintaining confidentiality. Data analysis involved descriptive and inferential statistics, presenting results according to the sequence of questions and sections of the questionnaires. Fisher's Exact and binary logistic regression tests were employed to determine any association between dependent and independent variables.

A pilot study was conducted to pre-test the questionnaire tool, ensuring reliability and suitability. Ethical considerations included ethical clearance from the University of Zambia Biomedical Research Ethics Committee, Ministry of Health Research Office, and Institute Review Board. Informed consent was obtained from all respondents, and no payment or incentives were provided. Confidentiality and anonymity were ensured through omission of identifying features from the questionnaire.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents research results based on the analysis of data collected from nurses at PMH in Gaborone, Botswana. A total of 33 from 35 respondents answered the questionnaires, thereby achieving a response rate of 94%. The analysed data was summarized and presented in line with the study's specific objectives which were to (1) determine the level of triage knowledge, (2) To determine if work experience influence acquisition of triage knowledge, (3) To describe the association between the level of triage knowledge among nurses and training, and (4) To describe the socio-demographic characteristics associated with triage knowledge at PMH in Gaborone, Botswana. The chapter first describes how data has been presented, then outlines the descriptive statistics and ends with presenting cross-tabulations and regression odds ratios with corresponding confidence intervals and p-values for associations between independent and dependent variables considered.

4.1. Presentation of results

The results of the study were presented using frequency tables, charts, and contingency tables in accordance with the order of questions and sections in the questionnaire. These methods are useful for presenting results in statistical analysis as they provide clarity and simplicity, enable comparisons between groups, and provide detailed insights. They are accessible to a broad audience and align with the questionnaire structure, ensuring data flow aligns with study objectives.

4.1.1 Socio-demographic characteristics of respondents

Table 4.1 below displays the distribution of the respondents' socio-demographic characteristics which were considered in the study. These include age, sex, and marital status, and education This information was collected because socio-demographic were considered as a variable that could influence triage knowledge among nurses at PMH in Gaborone, Botswana.

Table 4.1: Respondent's socio-demographic characteristics (N=33)

Variable	Frequency	Percentage
Age (years)		
≤25	6	18.2
26 – 35	21	63.6
≥36	6	18.2
Total	33	100
Gender		
Male	20	60.6
Female	13	39.4
Total	33	100
Marital status		
Married	6	18.2
Single	27	81.8
Total	33	100
Nursing qualification		
Nursing diploma	25	75.8
Nursing bachelor's degree	8	24.2
Total	33	100

Table 4.1 shows that 63.6% (21) respondents were aged 26 – 35 years; 60.6% (20) respondents were males; 81.8% (27) were single; and 75.8% (25) had attained a diploma in nursing qualification.

4.1.2 Triage knowledge among respondents

The table 4.2 below presents the aggregates and percentages scored by the 33 respondents on the 20 questions on triage knowledge scored as agree or disagree for each question. The aggregated scoring from the scores on these questions was categorised as adequate knowledge level, and inadequate knowledge level, following the categorisation prescribed for the variable. The summary of these categories is shown in figure 4.1 below.

Table 4.2: Distribution of respondents' knowledge-related characteristics (N=33)

Triage Knowledge Scale	Frequency (%)	
	Agree	Disagree
Triage is the sorting of patients into priority of injuries or illness	33 (100)	0
The purpose of triage is to prevent deterioration or death of a patient while waiting on the queue for their turn	33 (100)	0
Triage Early Warning Signs is short for TEWS	32 (97)	1 (3)
TEWS score of 6 indicate triage orange code	29 (87.9)	4 (12.1)
A 2-month-old baby with TEWS of 4 and not feeding well is coded yellow.	6 (18.2)	27 (81.8)
PATS and Acuity Scale priority level yellow should be referred to designated area for non-urgent	23 (69.7)	10 (30.3)
Patient triaged colour BLUE should wait for 10 min before being attended	4 (12.1)	29 (87.9)
Patient arrival time is the most critical aspect to consider when triaging.	14 (42.4)	19 (57.6)
Paediatric discriminator list covers age range of 0-14 years	15 (45.5)	18 (54.5)
Adult Triage Early Warning Score consists of the following parameters: Mobility, Respiratory rate, Heart rate, Diastolic blood pressure, Temperature and AVPU	31 (93.9)	2 (6.1)
Pain score of 4-6 out of 10 indicate moderate pain	31 (93.9)	2 (6.1)
During triage, patient age should be prioritized over symptoms and vital signs.	12 (36.4)	21 (63.6)
SATS/PATS and Acuity Scale has 5 colour coding or priorities	27 (81.8)	6 (18.2)
Respiratory rate is a less critical factor to consider in triage compared to blood pressure.	3 (9.1)	30 (90.9)
Patients with high social status e.g., town mayor, school principals, politicians etc. should be treated as very urgent even if triaged as colour green	5 (15.2)	28 (84.8)
Discriminator list is not important for triage purpose	2 (6.1)	31 (93.9)
Diabetic- glucose over 17mmol/L (no ketonuria) is coded yellow	12 (36.4)	21 (63.6)
A patient with severe chest pain would typically be categorized as yellow	3 (9.1)	30 (90.9)
If an emergency sign is identified in the first step the patient is taken to vital signs first	24 (72.7)	9 (27.3)

If no emergency signs are identified in step 1, but an urgent sign is identified in step 2, the patient is immediately triaged yellow and asked to wait	8 (24.2)	25 (75.8)

Table 4.2 above shows that 100% (33) respondents were in agreement that triage is the sorting of patients into priority of injuries/illness and that the purpose of triage is to prevent deterioration or death of a patient while waiting on the queue. Most respondents demonstrated adequate knowledge of prioritizing patients with severe symptoms, such as chest pain 90.1% (30), and correctly applying SATS/PATS colour coding systems 81.8% (27). Over half, 57.6% (19) of the respondents correctly answered that patient arrival time is not the most critical aspect in triage, and 63.6% (21) incorrectly prioritized patient age over symptoms and vital signs. A low percentage (12.1%) of respondents correctly answered that patients triaged as blue should not wait more than 10 minutes. Similarly, only 36.4% (12) correctly identified that a diabetic patient with glucose over 17 mmol/L (without ketonuria) should be coded yellow.

Overall, 79% (26) respondents had adequate level of triage knowledge as shown in the figure 4.1 below.

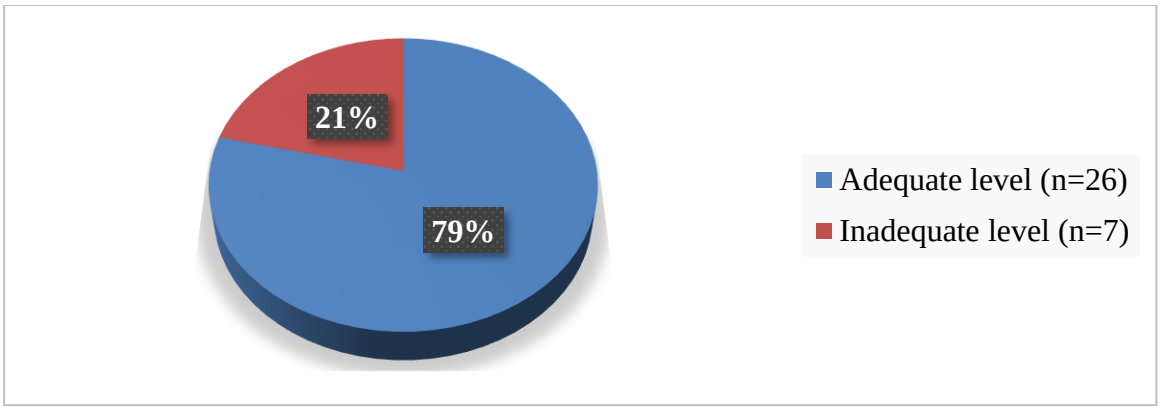

Figure 4.1: Overall level of triage knowledge among study respondents

4.1.3 Work experience among respondents

This section presents results for respondents' work experience. The results were derived from two questions that depicts how long respondents' have been working in nursing and how long they were working in the ED. The aggregated scoring from the two questions was then dichotomized as experienced and not experienced.

Table 4.3: Respondent's work experience characteristics (N=33)

Variable	Frequency	Percentage
Nursing work experience		
≤5 years	18	54.5
>5 years	15	45.5
Total	33	100
ED experience		
≤5 years	27	81.8
>5 years	6	18.2
Total	33	100

Table 4.2 shows that 54.5% (18) respondents had been working for less than five years with a mean work experience of 6.8 (±6.5) years ranging from 1 to 28 years; and 81.8% (27) respondents had work in the ED for less than five years with an average ED experience of 3.3 (±1.9) years ranging from 1 to 8 years.

Overall, less than half, 45.5% (15) respondents were experienced nurses as shown in figure 4.2 on the next page.

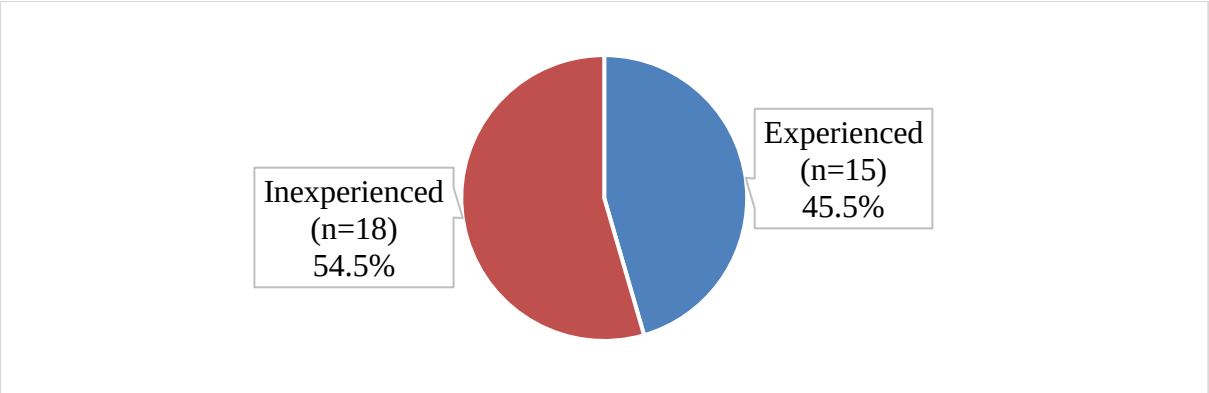

Figure 4.2: Overall work experience level of study respondents (N=33)

4.1.4 Training on emergency care among respondents

This section presents results on triage training among respondents. The results were derived from three questions which depicts whether respondents have been trained in any training related to emergency care. The aggregated scoring from the questions was then dichotomized as trained and not trained.

Table 4.4: Emergency care training among respondents (N=33)

Variable	Frequency	Percentage
Emergency care		
Yes	31	93.9
No	2	6.1
Total	33	100
BLS training		
Yes	27	87.1
No	4	12.9
Total	31	100
ATLS training		
Yes	5	16.1
No	26	83.9
Total	31	100

Table 4.4 shows that 93.9% (31) of the respondents indicated that they had some training on emergency care; of which, 87.1% (31) were trained on BLS while 16.1% (5) received training on ATLS.

Figure 4.3 below illustrate the summary of the respondents who received training on emergency care and those who did not.

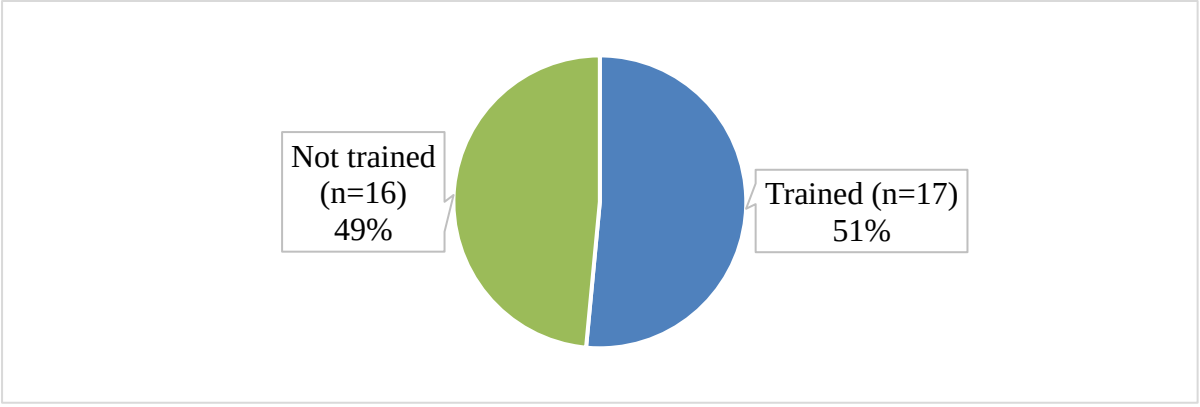

Figure 4.3: Emergency care training among study respondents (N=33)

Figure 4.3 above indicate that slightly more than half, 51% of the respondents had received formal training in emergency care.

4.1 Fisher's Exact Test Results of Associations Between Variables

This section presents results of association between each independent variable and the dependent variable, triage knowledge, using Fisher's exact test at 5% level of significance. The corresponding p-values to indicate whether there is any statistical significance of the associations or not have been indicated in the table below.

Table 4.5: Fishers' exact test results of factors associated with triage knowledge (N=33)

Variable	**Triage knowledge level (%)**		**P-value**
	Adequate	**Inadequate**	
Age (years)			0.719
≤25	5 (83.3)	1 (16.7)	
26 – 35	17 (81)	4 (19)	
≥36	4 (66.7)	2 (33.3)	
Gender			0.393* FE
Male	17 (85)	3 (15)	
Female	9 (69.2)	4 (30.8)	
Marital status			0.763
Married	5 (83.3)	1 (16.7)	
Single	21 (77.8)	6 (22.2)	
Nursing Education			0.320* FE
Diploma	21 (84)	4 (16)	
Bachelor's degree	5 (62.5)	3 (37.5)	
Nursing experience			0.203* FE
Experienced	10 (66.7)	5 (33.3)	
Not experienced	16 (88.9)	2 (11.1)	
Training in emergency care			0.225* FE
Trained	15 (88.2)	2 (11.8)	
Not trained	11 (68.8)	5 (31.3)	

*=Fisher's exact test

Table 4.5 reveals that age group (p = 0.919), gender (p = 0.393), marital status (p = 0.763), level of nursing education (p = 0.320), nursing experience (p = 0.203), and training in emergency care (p = 0.225), were all not statistically significantly associated with nurses' triage knowledge level.

4.1.2 Binary Logistic Regression Results: Factors Associated with Triage knowledge

This section presents results of association between each independent variable and the dependent variable, triage knowledge, using binary logistic regression. The results are presented in the table below, which shows the Crude Odds Ratios (COR) and Adjusted Odds Ratios (AOR) with their corresponding 95% confidence intervals (CI) and p-values for each variable indicating whether there is any statistical significance of the association or not.

Table 4.6: Logistics regression results of factors associated with triage knowledge (N=33)

Variable	**COR (95% CI)**	**P-value**	**AOR (95% CI)**	**P-value**
Age (years)				
≤25	1			
26 – 35	0.85 (0.08 – 9.44)	0.895	1.12 (0.04-32.68)	0.950
≥36	0.40 (0.03 – 6.18)	0.512	1.32 (0.02-84.0)	0.897
Gender				
Male	2.52 (0.46 – 13.80)	0.287	9.60 (0.44-207.38)	0.149
Female	1			
Marital status				
Married	1.43 (0.14 – 14.70)	0.764	2.83 (0.16-49.10)	0.475
Single	1			
Nursing Education				
Diploma	3.15 (0.53 – 18.80)	0.208	3.36 (0.15-75.71)	0.445
Bachelor's degree	1			
Nursing experience				
Experienced	1			
Not experienced	4.0 (0.65 – 24.69)	0.136	16.93 (0.57-502.17)	0.102
Training on emergency care				
Trained	3.41 (0.56 – 20.94)	0.185	1.12 (0.06-22.41)	0.940

Not trained	1			

Table 4.6 reveals that there was no factor that significantly influenced nurses' triage knowledge. Respondents' age groups (AOR: 1.12; 95% CI: 0.04 – 32.68; p = 0.950 vs. AOR: 1.32; 95% CI: 0.02 – 84.0; p = 0.897), gender (AOR: 9.60; 95% CI: 0.44 – 207.38; p = 0.149), marital status (AOR: 2.83; 95% CI: 0.16 – 49.10; p = 0.475), level of nursing education (AOR: 3.36; 95% CI: 0.15 – 75.71; p = 0.445), nursing experience (AOR: 16.93; 95% CI: 0.57 – 502.17; p = 0.102), and training in emergency care ((AOR: 1.12; 95% CI: 0.06 – 22.41; p = 0.940).

4.3 Conclusion

This chapter presented research results based on the analysis of data collected from ED nurses at PMH in Gaborone, Botswana. The chapter first described how data were presented, then outlined the descriptive statistics and ended with presenting cross-tabulations, Fishers' exact test, and binary logistic regression with corresponding confidence intervals (CI) and p-values for associations between independent and dependent variables considered. The results of this study were presented using frequency tables, charts, and contingency tables in line with the study's specific objectives.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.0 Introduction

This chapter presents an interpretation of the study results on triage knowledge and associated factors among ED nurses at Princess Marina Hospital, Gaborone, Botswana. The discussion contextualizes the results in relation to existing literature, highlighting the similarities and differences with previous studies. The results are examined in relation to sociodemographic characteristics, professional experience and training in emergency care. The discussion also considers the implications of these results to emergency nursing. Additionally, the strengths and limitations of the study are acknowledged, along with recommendations for improving triage knowledge and enhancing patient outcomes in emergency care settings.

5.1 Sociodemographic characteristics of respondents

This section discusses the distribution of respondents' sociodemographic characteristics in view of similar studies. Understanding these characteristics is crucial role, as they often influences' nurses triage knowledge, competencies, and decision-making abilities (Osei et al., 2021). Factors such as age, gender, and marital status have been variably reported to affect clinical reasoning and patient prioritization. In this study, the distribution of sociodemographic characteristics among ED nurses at Princess Marina Hospital which answers specific objective number two provides insight into the workforce composition and its impact on triage knowledge. The study revealed that there was no statistically significant association between respondents' sociodemographic characteristics and their level of triage knowledge (Table 4.5). Respondents' age groups (AOR: 1.12; 95% CI: 0.04 – 32.68; p = 0.950 vs. AOR: 1.32; 95% CI: 0.02 – 84.0; p = 0.897), gender (AOR: 9.60; 95% CI: 0.44 – 207.38; p = 0.149), marital status (AOR: 2.83; 95% CI: 0.16 – 49.10; p = 0.475)

This result is consistent with earlier studies conducted in similar settings. For instance, Bahre et al.(2024) in Ethiopia and ALShatarat et al.(2022) in Saudi Arabia also reported that socio-demographic characteristics had no significant impact on the triage knowledge among ED nurses. This consistency across studies strengthens the argument these characteristics may not independently predict the level of triage knowledge, suggesting that other factors may play more influential roles.

Regarding age, the majority of respondents (63.6%) fell within the age range of 26-35 years (Table 4.1), which is consistent with the results by Suamchaiyaphum et al. (2024) in India. This age bracket is associated with nurses who possess a balance in theoretical knowledge and clinical experience, therefore enhancing triage skills Wolf et al., 2018). Contradictory results do exist: Lee and Kim (2018) observed that older nurses had higher triage knowledge, attributed to cumulative clinical exposure, suggesting that experience and exposure to triage situations may play a role in developing triage knowledge. Conversely, Phukubye et al. (2019) in South Africa indicated that younger nurses demonstrated superior triage knowledge. These discrepancies suggests that while age may not be a significant factor in some settings, it could play a role in others, possibly due to differences in training and experience.

On gender distribution, it was notable that 60.6% of respondents were male, is unexpected, given that nursing is a traditionally female-dominated profession. However, this trend is consistent with reports of increasing male representation in ED settings in Tanzania (Masibo et al., 2024) and supported by Mao et al.(2020), who suggested that emergency care's fast paced environment attracts more male nurses. Nevertheless, the current study found no significant association between gender and triage knowledge, echoing results from Widyani et al. (2020) in Indonesia. Some contradictory evidence (Chang et al., 2017), suggests that female nurses may outperform male counterparts in triage decision-making possibly due to differences in communication styles or empathy levels, which are critical in-patient assessment.

Marital status distribution revealed that majority of respondents (81.8%) were single, which is consistent with Suleiman et al. (2019) in Jordann and Doku et al. (2019). Moreover, no significant association was found between marital status and triage knowledge (AOR: 2.83; 95% CI: 0.16 – 49.10; p = 0.475) . Although Phukubye et al. (2019) suggested that married nurses might possess better triage knowledge, possibly due to greater life experience and emotional stability, the current study result support a growing body of evidence indicating that marital status is likely not a critical determinant of triage knowledge among ED nurses

Furthermore, the result of the current study that 75.8% of respondents held a nursing diploma is consistent with the educational requirements for nursing practice in Botswana by the Nursing and Midwifery Council of Botswana. However, this result contrasts with a study by Nelson et al. (2018) that reported a higher proportion of baccalaureate-educated nurses working in emergency departments in the United States. This difference can be attributed to the varying educational requirements for nursing practice across countries. The current study's result that

the level of nursing education (AOR: 3.36; 95% CI: 0.15 – 75.71; p = 0.445) did not significantly affect triage knowledge is consistent with a study in Indonesia revealed no significant association between the level of nursing education and triage knowledge among emergency department nurses (Widyani et al., 2020). The lack of association between demographic factors and triage knowledge in this study suggests that triage knowledge may be influenced by other factors, such as training, experience, and institutional factors. The results of this study highlight the need for further research into the factors that influence triage knowledge among emergency department nurses, particularly in the context of low-resource settings.

5.2 Level of triage knowledge among respondents

This section discusses the results on the level of triage knowledge among nurses in relation to similar studies. The level of triage knowledge among ED nurses is a critical determinant of effective prioritization and overall emergency care quality. In this study, assessment of triage knowledge among nurses at Princess Marina Hospital which addresses specific objective number one provides an important acumen into their ability to apply standardised triage protocols in clinical decision-making. The study revealed that majority (79%) respondents had adequate level of triage knowledge, highlighting a positive trend in emergency nursing care. For instance, a study in Jordan reported that 88.8% of ED nurses demonstrated sufficient knowledge of triage. This is also supported by Elgazzar (2021) in Saudi Arabia.

Contrastingly, Shabrandi et al. (20122) in Iran reported that 82.6% of nurses had a high level of triage knowledge while Doku et al. (2019) in Ethiopia revealed that 51.5% of nurses had low triage knowledge scores. Studies have consistently shown that triage knowledge is a critical component of emergency care, and nurses with higher levels of triage knowledge are more likely to make accurate triage decisions (Wolf et al., 2018). For instance, a study by Chanif et al. (2023) reported that nurses with higher levels of triage knowledge were more likely to identify high-acuity patients and prioritize them accordingly.

All respondents (100%) agreed that triage involves sorting patients based on the priority of injuries/illness and aims to prevent deterioration or death while waiting. This consensus is supported by literature emphasizing the critical role of triage in emergency care. However, some studies have noted discrepancies in the application of triage principles. For instance, research in Eritrea indicated that while training improved knowledge, it did not significantly enhance triage performance (Bahlibi et al., 2022).

The study reported high levels of agreement on specific triage knowledge, such as the TEWS score indicating triage orange code (87.9%), the components of adult TEWS (93.9%), and the five-colour coding system of SATS/PATS and Acuity Scale (81.8%). These results are consistent with other studies that have demonstrated the importance of standardized triage systems. For example, a study in South Korea emphasized the need for proficiency in triage scales like the Korean Triage and Acuity Scale (KTAS) to improve emergency nursing competency (Oh and Jung, 2024). However, there were areas of disagreement, such as the categorization of patients with severe chest pain and the prioritization of respiratory rate over blood pressure. These discrepancies highlight the need for continuous training and standardization of triage protocols.

The study observed that only 45.5% of respondents always used triage guidelines, and 21.2% sometimes used them. This is concerning, as triage algorithms are designed to facilitate accurate and consistent triage decisions. Studies have consistently shown that the use of triage algorithms improves triage accuracy and reduces errors (Wolf et al., 2018). For instance, a study by Wolf et al. (2018) reported that the use of a triage algorithm improved triage accuracy and reduced errors. However, this variability is reflected in other studies as well. For instance, research in Indonesia observed that a significant proportion of nurses did not consistently use triage guidelines (Widyani et al., 2020). Similarly, a study in Saudi Arabia recommended regular training sessions to ensure consistent application of triage guidelines (Elgazzar, 2021). The study reported that respondents indicated that triage should take a mean duration of 22.4 minutes, ranging from 5 to 120 minutes. This is consistent with the literature, which suggests that triage should be a rapid process, ideally taking no more than 5-10 minutes (Duko et al., 2019). For example, a study by Chanif et al. (2023) reported that longer triage times were associated with higher levels of triage accuracy. The authors suggested that longer triage times may allow for more thorough assessments and more accurate triage decisions. However, other studies have reported conflicting results. For example, a study by Seo et al. (2024) indicated that the use of triage algorithms did not improve triage accuracy. The authors suggested that other factors, such as nurse experience and clinical judgment, may play a more significant role in triage decision-making.

5.3 Work experience and triage knowledge

Work experience is often considered a key factor in enhancing triage knowledge among emergency department nurses. Experienced nurses are expected to have better judgment and

decision-making skills due to their exposure to various clinical scenarios (Elgazzar, 2021). In this study, the distribution of work experience among ED nurses at Princess Marina Hospital which answers specific objective number two provides insight into the workforce composition and its potential impact on triage knowledge. The results of this study indicate that the majority of ED nurses at Princess Marina Hospital, Gaborone, Botswana, have limited work experience in both nursing and ED settings. Specifically, 54.5% of respondents had less than five years of work experience in nursing, and 81.8% had less than five years of work experience in the ED. This is concerning, as previous studies have consistently shown that experience is a crucial factor in developing triage knowledge (AlShatarat et al., 2022). However, this distribution of work experience is consistent with results from other studies. For instance, a study in Ethiopia reported that 79.2% of respondents had less than three years of work experience in the ED (Duko et al., 2019). However, the result is lower than study conducted in South Africa (Naidoo, 2017). This variation might be due to regular duty rotation is practiced in the study setting which made nurses not to stay in emergency department for a longer period.

The study indicated that respondents with less than five years of work experience in nursing (88.9%) were associated with an average level of triage knowledge more than respondents with over five years of work experience (66.7%). Additionally, respondents with over five years of ED experience (83.3%) were associated with an average level of triage knowledge more than their counterparts with less than five years of ED experience (77.8%) (Table 4.6). However, there was no statistically significant association between respondents' work experience and their level of triage knowledge (AOR: 16.93; 95% CI: 0.57 – 502.17; $p = 0.102$). This result aligns with other studies that have shown mixed results regarding the impact of work experience on triage knowledge. A study in Rwanda reported no significant association between work experience ($p = 0.129$) and triage knowledge (Twagirayezu et al., 2021). Similarly, a study in Eritrea revealed that while work experience improved knowledge, it did not significantly enhance triage performance (Bahlibi et al., 2022). Similarly, the study by AlShatarat et al. (2022) reported that ED experience was not a significant predictor of triage knowledge ($p = 0.44$), but rather that it was the interaction between ED experience and education that was significant.

However, contrasting views highlight the importance of work experience in enhancing triage knowledge. For instance, a study in South Africa revealed that work experience was a significant factor in improving triage knowledge (Naidoo, 2017). Similarly, studies in Saudi Arabia and Ethiopia indicated that work experience ($p < 0.001$) was significantly associated

with triage knowledge (Elgazzar, 2021; Duko et al., 2019). This may be attributed to the fact that work experience alone may not be sufficient to develop triage knowledge, and that other factors such as education, training, and continuous professional development may also play a role (Wolf et al., 2018).

5.4 Training in emergency care and triage knowledge

Emergency care training programmes are essential for equipping nurses with the necessary skills and knowledge to perform accurate triage assessments (Bahlibi et al., 2022). These programs aim to standardize triage practices and improve patient outcomes. In this study, the distribution of training on emergency care among ED nurses at Princess Marina Hospital which answers specific objective number three provides insight into the workforce composition and its potential impact on triage knowledge. The study revealed majority (93.9%) respondents had some form of emergency training, with 87.1% had completed BLS training, 16.1% had completed ATLS training, and 51.5% had completed triage training (Table 4.4). This high level of training is consistent with results from other studies. A similar study in Saudi Arabia reported that 72.9% of emergency nurses had attended workshops or in-service training on triage (Elgazzar, 2021). Similarly, research in Ethiopia indicated that 79.2% of emergency nurses had received some form of triage training (Duko et al., 2019).

However, the current study also reported that there was no significant association triage training and the level of triage knowledge (AOR: 1.12; 95% CI: 0.06 – 22.41; p = 0.940). This result is supported by other studies that have shown mixed results regarding the impact of specific types of training on triage knowledge. A study in Tanzania observed no significant association between BLS training and triage knowledge (Widyani et al., 2020). In contrast, research in Saudi Arabia indicated that ATLS training (AOR: 0.275; 95% CI: 0.137–0.550; p <0.001) significantly improved triage knowledge (Bahre et al., 2024). This suggests that other factors, such as continuous education and practical experience, may be necessary to improve triage knowledge and performance. One possible explanation for this inconsistency is that the specific type of emergency training may not be as important as the overall level of emergency training received. A study by Harley et al. (2019) reported that the duration and frequency of emergency training, rather than the specific type of training, were more important predictors of nurses' knowledge in emergency care. Another possible explanation is that the quality of emergency training may be more important than the type of training received. A study by

Zagalioti et al. (2023) reported that high-quality emergency training programs that included simulation-based training and feedback improved nurses' knowledge in emergency care

5.5 Discussion of results within the context of the Donabedian Model

The Donabedian model (1980) adapted in this study offers a valuable framework for assessing the quality of triage knowledge among nurses in the ED based on three of its interrelated components: structure, process, and outcomes. Using the model as a framework, this study examined the relationship between structural, process, and outcome factors and triage knowledge. However, the results revealed that the assessed factors were not significantly associated with triage knowledge ($p>0.05$), suggesting that the hypothesized relationships may be influenced by other unmeasured variables. The sociodemographic characteristics of age, marital status, professional qualification, and sex fall within the structural component, which includes workforce attributes that influence healthcare delivery (Donabedian, 1988). However, the study results revealed no statistically significant association between these variables and triage knowledge, suggesting that individual demographic characteristics alone may not be strong determinants of triage knowledge and consequently competency.

While age, marital status, professional qualification, and sex are considered structural components within the Donabedian model, their lack of statistical significance in this study suggests that structural factors alone may not be sufficient in determining triage knowledge. Instead, process-related factors, such as continuous practical training, clinical exposure, and standardized triage assessments, may be more influential in ensuring that nurses develop the necessary competences for effective triage decision-making (Carter et al., 2018; Gerdtz and Bucknall, 2019). Additionally, Liaw et al. (2021) observed that simulation training enhances critical thinking, confidence, and accuracy in triage classifications. For instance, Ebben et al. (2020) reported that nurses who participated in regular training sessions demonstrated significantly better assessment skills compared to those who relied solely on clinical experience.

However, the lack of a significant association between triage knowledge and training in this study suggests that nurses may not have received ongoing or structured triage education beyond initial training. Several studies have emphasized that one-time training sessions are often insufficient in maintaining competency over time (Liaw et al., 2021). Panchal et al. (2020) contend that knowledge retention wanes without regular refresher courses, especially in critical

settings like emergency departments. Bosch et al. (2019) discovered that triage accuracy markedly improved when nurses engaged in ongoing training compared to those who underwent a solitary training session. Moreover, Schroeder et al. (2018) highlight that repeated exposure to triage scenarios via simulation training enhances clinical judgment and decision-making abilities, thereby ensuring sustained competency over time. These results underscore the complex interplay of factors influencing triage knowledge and suggest the need to further research using a mixed-methods approach to explore qualitative aspects such as staff perceptions, institutional support, and real-world application of triage protocols. Future studies should consider assessing quality and effectiveness of training programmes rather than just participation rates, as well as examining broader system-level factors that impact triage knowledge and practice.

5.6 Conclusion

This study aimed to establish triage knowledge and associated factors among emergency department nurses at Princess Marina Hospital, Gaborone, Botswana. The results showed that 79% of respondents had adequate level of triage knowledge. To test the study hypothesis, Fishers Exact test and binary logistic regression analyses were employed. The results revealed no statistically significance association between respondents' socio-demographic characteristics, work experience, qualification, training on emergency care with their level of triage knowledge. The outcome provide support to the study's null hypothesis.

The results of the study highlight the need for further research into the factors that influence triage knowledge among emergency department nurses, particularly in the context of low-resource settings. The study results challenge traditional assumptions about the relationship between triage knowledge and experience, qualification, and training, prompting the need for a shift in emergency nursing practice, education, administration, and research. Rather than relying on experience or academic credentials as proxies for triage competency, hospitals and nursing schools must prioritize competency-based training, regular assessments, and practical skill-building exercises to ensure that emergency nurses are adequately prepared to perform triage effectively. Additionally, further research is needed to explore other potential factors influencing triage knowledge, ensuring that future interventions are evidenced-based and targeted towards improving emergency outcomes.

5.7 Implication of the study results to Emergency Nursing

Despite no significant associations between respondents' characteristics and triage knowledge, the results of this study have significant implications for emergency and trauma nursing practice, administration, and research. These results challenge the traditional assumptions about the relationship between triage knowledge and experience, qualification, and training, prompting the need for a shift. Rather than relying on experience or academic credentials as proxies for triage competency, hospitals and nursing schools must prioritize competency-based training, regular assessments, and practical skill-building exercises to ensure nurses are adequately prepared to perform triage effectively. Additionally, further research is needed to explore other potential factors influencing triage knowledge, ensuring that future interventions are evidence-based and targeted towards improving emergency care outcomes.

5.7.1 Emergency and trauma nursing practice

The lack of a significant association between triage knowledge and work experience suggests that clinical exposure alone may not be sufficient to enhance nurses' triage competency. This result calls for the need for structured and standardized triage training programmes rather than relying on experience-based learning to keep ED nurses continuously updated with triage knowledge. Additionally, emergency nurses may require continuous refresher training, hands-on simulation exercises, and periodic assessments to ensure their knowledge remains updated and aligned with international best practices.

Moreover, the absence of a link between triage knowledge and qualifications implies that simply holding a diploma, degree, or certification does not guarantee competency in triage. This highlights the need for competency-based assessments rather than relying on academic credentials as indicators of triage proficiency. Emergency nurses must be regularly evaluated using practical skill tests to ensure they can apply triage principles effectively in high-pressure situations such as the ED.

5.7.2 Emergency and trauma nursing administration

For emergency nurse administrators, these results call for a re-evaluation of training and staff development policies in EDs. Since neither experience nor qualifications were significantly associated with triage knowledge, administrators must reconsider how they assess triage competency during performance appraisals. Hospitals should implement practical triage assessments as part of the competency verification process. Furthermore, the results highlight

the need for continuous professional development (CPD) programmes that go beyond one-time training sessions because knowledge retention and skill proficiency require ongoing reinforcement and practical application. Administrators should integrate ongoing triage drills, mentorship programmes, and periodic refresher courses into routine emergency care training.

5.7.3 Research in Emergency Practice

The unexpected finding that training, work experience, and qualification were not significantly associated with triage knowledge highlights the need for further research to explore alternative factors that influence triage competency. Additionally, qualitative research involving in-depth interviews or focus group discussions with emergency nurses could provide insights into the barriers they face in applying triage knowledge, despite their experience or training.

The results of this study have significant implications for emergency nursing, practice, administrators, education, and research, despite they were observed not to be statistically significant. The study highlights the importance of continuous skills reinforcement and competency-based triage training in emergency and trauma nursing practice, administration, education, and research. It suggests hospital leadership should integrate mentorship programs and refresher courses to enhance triage proficiency. Further research is needed to explore the effectiveness of different triage training models.

5.8 Recommendations

5.8.1 For Practice

1. Emergency department nurses at Princess Marina Hospital should be provided with ongoing training in order to improve their knowledge in triage since single (once-off) alone do not guarantee triage competency. By providing ED nurses with systematic and updated training, these ensures that nurses are well-versed in the latest protocols, technologies, and best practices in triage. Continuous training allows nurses to refine their assessment knowledge. Regular exposure to new scenarios and challenges helps them become more adept at evaluating patient needs quickly and accurately, which is essential in a fast-paced environment.

5.8.2 For Policy

2. The Botswana Ministry of Health and Wellness should develop policies and guidelines that emphasize formal and standardised triage training for ED nurses to keep everyone updated with triage knowledge.

3. The ministry should also consider making continuous triage training a requirement for all emergency department nurses.
4. Furthermore, the ministry should provide resources and support for hospitals to implement triage training programs. The lack of significance does not necessarily imply that training is ineffective but may instead suggest limitations in the frequency, consistency, or methodology of existing training programs. If nurses receive inadequate or infrequent training, its impact on triage knowledge may not be apparent in statistical analyses

5.8.3 For Future Research

5. Future research should consider conducting longitudinal studies to assess the long-term impact of triage training on nurses' competency and patient outcomes. This would help determine whether continuous training programs lead to sustained improvements in triage accuracy over time.

5.9 Plan for Dissemination and Utilization of Results

The results of the study will be disseminated to relevant stakeholders to promote the implementation of recommendations. Bound copies of the research will be distributed to the Ministry of Health-Botswana, University of Zambia - School of Nursing Sciences, UNZA Medical Library, and Princess Marina Hospital management for staff review. The results will be published in the respective peer-reviewed journals such as the Journal of Emergency Nursing well as conferences proceedings such as African Emergency Medicine Symposium. This will ensure that the results of the study are widely available to healthcare professionals and policymakers who can use them to improve on triage systems in the future.

The researcher hopes that the study results will contribute to development and implementation of strategies that will improve the level of triage knowledge among nurses hence improving triage accuracy. Additionally, associated factors that enhance acquisition of triage knowledge will be promoted and advocated for. The results will also assist policy makers in the formulation of policies that support effective triage. Furthermore, the results will be used by unit managers to appreciate the level of triage knowledge and associated factors to come up with interventional strategies at the operational level.

5.10 Strengths and Limitations

5.10.1 Strengths

This study had several strengths that enhance the reliability, validity, and applicability of its results. These strengths contribute to the overall quality of the research and its potential impact on emergency practice in Botswana and beyond.

a. The study is novel as it was the first known research to establish triage knowledge among ED nurses in Botswana. Therefore, apart from providing critical information needed to improve patient management through triage as it provides baseline data, the study create an opportunity for further research and interventions to improve triage training and implementation in Botswana
b. The study used a reliable and valid instrument to measure triage knowledge and associated factors, ensuring that the data collected accurately reflected the nurses' competences. A reliable measurement tool minimizes bias and enhances the reliability of the results. Thus, the study results could be compared with results from other settings, allowing for broader applicability in global emergency nursing research.
c. The study also highlights the importance of continuous training in emergency care for nurses, which can inform policy and practice changes. The results provide evidence to support the integration of structured emergency care training programs into nursing education and continuing professional development in Botswana. Policymakers and administrators can use these results to advocate for capacity-building initiatives that enhance emergency care efficiency and patient outcomes.

5.10.2 Limitations

a. A small sample size (N=33) may reduce the statistical power of the study, making it difficult to detect significant associations. To address the limitations imposed by a small sample size in the current study, binary logistic regression was employed as an analytical method instead of ordinal logistic regression. This statistical approach is valuable because it is designed to work effectively with smaller data sets while still providing meaningful insights into the relationships between categorical outcome variables and predictor variables. By accommodating smaller sample sizes, binary logistic regression enables the exploration of significant predictors while mitigating some of the statistical power issues that can arise.
b. The study respondents were selected from a single hospital, which may limit the generalizability of the results to other healthcare settings in Botswana. However, this limitation was mitigated by the novel nature of the study, which fills a significant gap in

the existing literature on triage knowledge among ED nurses in Botswana. Future studies should use a multi-center approach by including multiple hospitals across different regions to enhance external validity.

REFERENCES

Akgül, Ş. and Çakır, N., 2023. The Role of Socio-Demographic Factors in Understanding Population Diversity and Dynamics. *Journal of Social Sciences and Humanities Research*, 15(2), pp.112-129.

AlMarzooq, A.M., 2020. Emergency department nurses' knowledge regarding triage. *International Journal of Nursing*, 7(2), pp.29-44.

AlShatarat, M., Rayan, A., Eshah, N.F., Baqeas, M.H., Jaber, M.J. and ALBashtawy, M., 2022. Triage knowledge and practice and associated factors among emergency department nurses. *SAGE Open Nursing*, 8, p.23779608221130588.

Ariffin, N.A.B., Mat, S.B. and Yahya, F., 2023. Knowledge and Skills in Triage Assessment among Nurses in Emergency Department Hospital Saudi Arabia. *The Malaysian Journal of Nursing (MJN)*, 14(3), pp.132-142.

Armstrong, M. (2021) Armstrong's handbook of human resource management practice. 15th edn. London.

Asgari, H., Omidi, M.R. and Omidi, N., 2018. Evaluating the disaster triage knowledge of nurse's personnel in public hospitals of Ilam. *Health in Emergencies and Disasters Quarterly*, 4(1), pp.37-42.

Aslan, R., Şahinöz, S., and Şahinöz, T. (2021). Determination of START triage skill and knowledge levels of Prehospital Emergency Medical Staff: A cross-sectional study. *International Emergency Nursing*, *56*, 101004. https://doi.org/10.1016/j.ienj.2021.101004

Bahlibi, T.T., Tesfamariam, E.H., Andemeskel, Y.M. and Weldegiorgis, G.G., 2022. Effect of triage training on the knowledge application and practice improvement among the practicing nurses of the emergency departments of the National Referral Hospitals, 2018; a pre-post study in Asmara, Eritrea. *BMC Emergency Medicine*, 22(1), p.190.

Bahre, W., Mengist, B., Bitsa, Y., Woldemariam, G.T., Kebede, S., Wubete, A., Halefom, M.A. and Bantie, A.T., 2024. Triage knowledge, perceived skills, and associated factors among nurses working in adult emergency departments of selected public hospitals in Addis-Ababa, Ethiopia, 2023: multicenter cross-sectional study. *Annals of Medicine and Surgery*, *86*(12), pp.7029-7036.

Bazyar, J., Farrokhi, M., Salari, A. and Khankeh, H.R., 2020. The principles of triage in emergencies and disasters: a systematic review. *Prehospital and disaster medicine*, 35(3), pp.305-313.

Burgess, L., Hines, S. and Kynoch, K., 2018. Association between emergency department length of stay and patient outcomes: a systematic review protocol. *JBI Evidence Synthesis*, 16(6), pp.1361-1366.

Butler, K., Anderson, N. and Jull, A., 2023. Evaluating the effects of triage education on triage accuracy within the emergency department: An integrative review. *International Emergency Nursing*, 70, p.101322.

Carter, E. J., Pouch, S. M., and Larson, E. L. (2018). The relationship between emergency department crowding and patient outcomes: A systematic review. Journal of Nursing Scholarship, 50(6), 606-615.

Chang, W., Liu, H.E., Goopy, S., Chen, L.C., Chen, H.J. and Han, C.Y., 2017. Using the five-level taiwan triage and acuity scale computerized system: factors in decision making by emergency department triage nurses. *Clinical nursing research*, *26*(5), pp.651-666.

Chanif, C., Nursalam, N., Sriyono, S., Yuniasari, L., Pranata, S. and Armiyati, Y., 2023. The correlation between nurses' knowledge of triage and the accuracy of triage level interpretation in the emergency department. *Scripta Medica*, *54*(4), pp.385-388.

Delnavaz, S., Hassankhani, H., Roshangar, F., Dadashzadeh, A., Sarbakhsh, P., Ghafourifard, M. and Fathiazar, E., 2018. Comparison of scenario-based triage education by lecture and role playing on knowledge and practice of nursing students. *Nurse education today*, 70, pp.54-59.

Dippenaar, E., 2019. Triage systems around the world: a historical evolution. *International Paramedic Practice*, 9(3), pp.61-66.

Donabedian, A., 2005. Evaluating the quality of medical care. *The Milbank Quarterly*, 83(4), p.691.

Duko, B., Geja, E., Oltaye, Z., Belayneh, F., Kedir, A. and Gebire, M., 2019. Triage knowledge and skills among nurses in emergency units of Specialized Hospital in Hawassa, Ethiopia: cross sectional study. *BMC research notes,* 12, pp.1-4.

Dulandas, R. and Brysiewicz, P., 2018. A description of the self-perceived educational needs of emergency nurses in Durban, KwaZulu-Natal, South Africa. *African Journal of Emergency Medicine*, 8(3), pp.84-88.

Eaid Elgazzar, S., 2021. Knowledge of triage and its correlated factors among Emergency Department Nurses. *Egyptian Journal of Health Care*, 12(4), pp.1772-1780.

Ebben, R. H., Vloet, L. C., Speijers, R. F., Tönjes, N. W., Loef, J., Pelgrim, T., and Hoogeveen, M. (2020). A systematic review of triage-related education in emergency medicine. International Journal of Emergency Medicine, 13(1), 15

Faheim, S.S., Ahmed, S.S., Aly, E.F. and Hegazy, S.M., 2019. Effect of triage education on nurses' performance in diverse emergency departments. *Evidence-Based Nursing Research*, 1(2), pp.11-11.

Fitriani, R., Buka, S.P.Y., Niva, M., Maharjan, K. and Xavier, E., 2024. The Effect of Emergency Management Skills Training for Nurses. *Journal of World Future Medicine, Health and Nursing*, *2*(3), pp.456-467.

Ganjali, R., Golmakani, R., Ebrahimi, M., Eslami, S. and Bolvardi, E., 2020. Accuracy of the emergency department triage system using the emergency severity index for predicting patient outcome; a single center experience. *Bulletin of Emergency and Trauma*, 8(2), p.115.

Gerdtz, M. F., and Bucknall, T. K. (2019). Triage nurses' clinical decision making: An observational study of urgency assessment. Journal of Advanced Nursing, 63(5), 491-499

Getachew, M., Musa, I., Degefu, N., Beza, L., Hawlte, B. and Asefa, F., 2024. Emergency department overcrowding and its associated factors at HARME medical emergency center in Eastern Ethiopia. *African Journal of Emergency Medicine*, 14(1), pp.26-32.

Gkamprielle, H., Voutsinou, R.N., Ekmektzoglou, K., Gkiokas, G. and Iakovidou, N., 2023. Knowledge and Skills of the Medical and Nursing Staff of Emergency Department in Triage Comparative Study between Public and Private Hospitals in Athens. *Health Science Journal*, 17(2), pp.1-6.

Gligorijevic, D., Stojanovic, J., Satz, W., Stojkovic, I., Schreyer, K., Del Portal, D. and Obradovic, Z., 2018, May. Deep attention model for triage of emergency department patients. In *Proceedings of the 2018 SIAM International Conference on Data Mining* (pp. 297-305). Society for Industrial and Applied Mathematics.

Goenka, A., Mundkur, S., Nayak, S.S., Shetty, A., Thomas, J., Balakrishnan, J.M., Sekaran, V.C. and Dsouza, B., 2024. Improving the emergency services using quality improvement project and Donabedian model in a quaternary teaching hospital in South India. *BMJ Open Quality*, *13*(1), p.e002246.

Göransson, M., Persson, A.C. and Abelsson, A., 2020. Triage in primary healthcare. *Nordic Journal of Nursing Research*, 40(4), pp.213-220.

Haghigh, S., Ashrafizadeh, H., Mojaddami, F. and Kord, B., 2017. A survey on knowledge level of the nurses about hospital Triage. *J Nurs Educ*, 5(6), pp.46-52.

Harley, A., Johnston, A.N.B., Denny, K.J., Keijzers, G., Crilly, J. and Massey, D., 2019. Emergency nurses' knowledge and understanding of their role in recognising and responding to patients with sepsis: A qualitative study. *International emergency nursing*, *43*, pp.106-112.

Hinson, J.S., Martinez, D.A., Cabral, S., George, K., Whalen, M., Hansoti, B. and Levin, S., 2019. Triage performance in emergency medicine: a systematic review. *Annals of emergency medicine*, 74(1), pp.140-152.

Hussein, H.A. and Hassan, H.S., 2019. Effectiveness of an Education Program on Nurses' Knowledge about the Triage System in Emergency Department of Qalat Salih Hospital. *Prof. RK Sharma*, 13(1), p.218.

Hwang, S. and Shin, S, 2022. Factors affecting triage competence among emergency room nurses: A cross-sectional study. Journal of Clinical Nursing 32(13), p.3589-3598.

Iversen, A.K.S., Kristensen, M., Østervig, R.M., Køber, L., Sölétormos, G., Forberg, J.L., Eugen-Olsen, J., Rasmussen, L.S., Schou, M. and Iversen, K.K., 2019. A simple clinical assessment is superior to systematic triage in prediction of mortality in the emergency department. *Emergency Medicine Journal*, 36(2), pp.66-71.

Kerie, S., Tilahun, A. and Mandesh, A., 2018. Triage skill and associated factors among emergency nurses in Addis Ababa, Ethiopia 2017: a cross-sectional study. *BMC research notes*, 11, pp.1-6.

Kouro, G.M. and Iroko, D., 2024. Knowledge, Practice and Perception of Triage By Staff of the Emergency Department of Ho Teaching Hospital: KPP of Triage by ED Doctors and Nurses. *Postgraduate Medical Journal of Ghana*, *13*(1), pp.13-19.

Kumar, A., Lakshminarayanan, D., Joshi, N., Vaid, S., Bhoi, S. and Deorari, A., 2019. Triaging the triage: reducing waiting time to triage in the emergency department at a tertiary care hospital in New Delhi, India. *Emergency Medicine Journal*, 36(9), pp.558-563.

Lauridsen, S., 2020. Emergency care, triage, and fairness. *Bioethics*, *34*(5), pp.450–458.

Lea, A.I., Febriyanti, E. and Odja, N., 2022. Emergency nurses' knowledge and practices regarding triage. *KnE Life Sciences*, pp.872-881.

Lee, E.K. and Kim, J.S., 2018. Factors influencing triage nurses' the Korean triage and acuity scale performance ability. *Journal of Korean Clinical Nursing Research*, *24*(1), pp.94-102.

Levis-Elmelech, T., Schwartz, D. and Bitan, Y., 2022. The effect of emergency department nurse experience on triage decision making. *Human Factors in Healthcare*, 2, p.100015.

Liaw, S. Y., Wu, L. T., and Wong, L. F. (2021). Simulation-based education for emergency department triage training: A meta-analysis. Nurse Education Today, 99, 104748

Magnusson, C., Herlitz, J. and Axelsson, C., 2020. Patient characteristics, triage utilisation, level of care, and outcomes in an unselected adult patient population seen by the emergency medical services: a prospective observational study. *BMC Emergency Medicine*, *20*, pp.1-19.

Malak, M.Z., Al-Faqeer, N.M. and Yehia, D.B., 2022. Knowledge, skills, and practices of triage among emergency nurses in Jordan. *International Emergency Nursing*, 65, p.101219.

Mamalelala, T.T., Dithole, K.S. and Maripe-Perera, D.B., 2023. Nurses and emergency nursing care in Botswana. *African Journal of Emergency Medicine*, 13(2), pp.68-71.

Mao, A., Wang, J., Zhang, Y., Cheong, P.L., Van, I.K. and Tam, H.L., 2020. Factors influencing recruitment and retention of male nurses in Macau and mainland China: a collaborative, qualitative study. *BMC nursing*, *19*, pp.1-10.

Martínez-Segura, E., Lleixà-Fortuño, M., Salvadó-Usach, T., Solà-Miravete, E., Adell-Lleixà, M., Chanovas-Borrás, M.R., March-Pallarés, G. and Mora-López, G., 2017. Competence of triage nurses in hospital emergency. *Emergencias*, 29, pp.173-177.

Masibo, R.M., Kibusi, S.M. and Masika, G.M., 2024. Nurses, non-nurse healthcare providers, and clients' perspectives, encounters, and choices of nursing gender in Tanzania: a qualitative descriptive study. *BMC nursing*, *23*(1), p.353.

Mirhaghi, A. and Shafaee, H., 2019. Poorly developed scenarios may interface with reliability of triage scales. *Eurasian Journal of Emergency Medicine*, 18(3), pp.171-173.

Mistry, B., De Ramirez, S.S., Kelen, G., Schmitz, P.S., Balhara, K.S., Levin, S., Martinez, D., Psoter, K., Anton, X. and Hinson, J.S., 2018. Accuracy and reliability of emergency department triage using the emergency severity index: an international multicenter assessment. *Annals of emergency medicine*, 71(5), pp.581-587.

Mohr, N.M., Wessman, B.T., Bassin, B., Elie-Turenne, M.C., Ellender, T., Emlet, L.L., Ginsberg, Z., Gunnerson, K., Jones, K.M., Kram, B. and Marcolini, E., 2020. Boarding of critically ill patients in the emergency department. *Critical care medicine*, 48(8), pp.1180-1187.

Moon, S.-H. and Cho, I.Y., 2024. Development of a Competency-Based Triage Education Application and Usability Testing for Triage Training Based on the Korean Triage and Acuity Scale. *The Journal of Continuing Education in Nursing*, *55*(1), pp.33–41.

Morley, C., Unwin, M., Peterson, G.M., Stankovich, J. and Kinsman, L., 2018. Emergency department crowding: a systematic review of causes, consequences and solutions. *PloS one*, 13(8), p.e0203316.

Mthimunye, K. D. T., Daniels, F. M., and Pedro, A. (2022). The impact of triage training on emergency nurses' knowledge and skills in South Africa. International Emergency Nursing, 60, 101080.

Mukhtar, H.M.E. and Fadlallah, F.A., 2018, January. Nurse's knowledge regarding triage system at emergency departments in Public Hospital at Khartoum State. In *Proceedings of Researchfora 33rd International Conference, Jeddah, Saudi Arabia* (pp. 15-17).

Mullan, P.C., Torrey, S.B., Chandra, A., Caruso, N. and Kestler, A., 2014. Reduced overtriage and a cohort study. *Emergency Medicine Journal*, 31(5), pp.356-360.F

Murray, M., Bullard, M., and Grafstein, E. (2021). Revisions to the Canadian Emergency Department Triage and Acuity Scale implementation guidelines. CJEM, 6(6), 421-427

Naidoo, M., 2017. An evaluation of the emergency care training workshops in the province of KwaZulu-Natal, South Africa. *African Journal of Primary Health Care and Family Medicine*, *9*(1), pp.1-6.

Ncube, B., Mars, M. and Scott, R.E., 2023. Recommendations for Developing a Telemedicine Strategy for Botswana: A Meta-Synthesis. *International Journal of Environmental Research and Public Health*, 20(18), p.6718.

Nelson, D., Hearld, L.R. and Wein, D., 2018. The impact of emergency department RN staffing on ED patient experience. *Journal of emergency nursing*, *44*(4), pp.394-401.

Ngcobo, K., 2019. *Knowledge, attitudes and practice of healthcare workers on the use of Health Information Technology: A mixed method descriptive survey among healthcare workers in Princess Marina Hospital, Gaborone, Botswana* (Doctoral dissertation, Stellenbosch: Stellenbosch University).

Oh, W.O. and Jung, M.J., 2024. Triage—clinical reasoning on emergency nursing competency: a multiple linear mediation effect. *BMC nursing*, *23*(1), p.274.

Osei, E., Mashamba-Thompson, T. P., and Kofi, M. (2020). The effect of triage training on nurses' knowledge, practice, and patient outcomes in the emergency department: A systematic review. Journal of Emergency Nursing, 46(6), 814-825.

Phukubye, T.A., Mbombi, M.O. and Mothiba, T.M., 2019. Knowledge and practices of triage amongst nurses working in the emergency departments of rural hospitals in Limpopo Province. *The Open Public Health Journal*, 12(1).

Pons, P. et al. (2018). Triage systems in emergency care: The case for measuring outcomes. Annals of Emergency Medicine, 72(4), 409-420.

Pratiwi, R.T., Puspita, R.R., Indah, F.P.S., Indahsari, D.N., Hassan, H.C., Hoon, L.S. and Poddar, S, 2020. Determinant Factors of Accuracy of Triage Implementation in Emergency Department X Hospital, Indonesia. Malaysian Journal of Nursing

Princess Marina Hospital. *Emergency Department Statistic Register*. Gaborone, Botswana: Princess Marina Hospital (unpublished internal document)

Pwavra, J.B., Donkor, E.S., Ani-Amponsah, M. and Konlan, K.D., 2023. Practice of paediatric triage among nurses in human-resource constrained setting: A cross-sectional study in the Tamale metropolis of Ghana. *International Journal of Africa Nursing Sciences*, 18, p.100516.

Reay, G., Rankin, J.A., Then, K.L., Fung, T. and Smith-MacDonald, L., 2024. Emergency department triage decision-making by registered nurses: An instrument development study. *Journal of Advanced Nursing*.

Sabwa, F.A., 2023. Frontline Health Providers Competence in Triaging at Emergency Departments of Health Facilities in Kakamega County, Kenya.

Santry, H.P., Strassels, S.A., Ingraham, A.M., Oslock, W.M., Ricci, K.B., Paredes, A.Z., Heh, V.K., Baselice, H.E., Rushing, A.P., Diaz, A. and Daniel, V.T., 2020. Identifying the fundamental structures and processes of care contributing to emergency general surgery quality using a mixed-methods Donabedian approach. *BMC medical research methodology*, *20*, pp.1-19.

Sartini, M., Carbone, A., Demartini, A., Giribone, L., Oliva, M., Spagnolo, A.M., Cremonesi, P., Canale, F. and Cristina, M.L., 2022, August. Overcrowding in emergency department: causes, consequences, and solutions—a narrative review. In *Healthcare* (Vol. 10, No. 9, p. 1625). MDPI.

Savioli, G., Ceresa, I.F., Bressan, M.A., Piccini, G.B., Varesi, A., Novelli, V., Muzzi, A., Cutti, S., Ricevuti, G., Esposito, C. and Voza, A., 2023. Five Level Triage vs. Four Level Triage in a Quaternary Emergency Department: National Analysis on Waiting Time, Validity, and Crowding—The CREONTE (Crowding and RE-Organization National TriagE) Study Group. *Medicina*, 59(4), p.781.

Seda, A.W., 2020. *Nurse's knowledge, perception regarding the implementation of triage system in pediatric emergency department at Gaza Strip* [thesis]. Jerussalem-Palestina: Al-Quds University.

Seo, Y.H., Lee, K. and Jang, K., 2024. Factors influencing the classification accuracy of triage nurses in emergency department: analysis of triage nurses' characteristics. *BMC nursing*, *23*(1), pp.1-6.

Shabrandi, N., Bagheri-Saweh, M.I., Nouri, B. and Valiee, S., 2022. Accuracy of nurses' performance in triage using the emergency severity index and its relationship with clinical outcome measures. *Emergency Care Journal*, 18(4).

Sharma, R., Prakash, A., Chauhan, R. and Dhibar, D.P., 2021. Overcrowding an encumbrance for an emergency health-care system: A perspective of Health-care providers from tertiary care center in Northern India. *Journal of Education and Health Promotion*, 10.

Shawah'en, AA., Al-Akash, H.Y., Massadeh, R., Shajrawi, A., Maabreh, R., Assaf, E. and Alrabab'a, M.H., 2024. Triage knowledge level and skills among emergency nurses in Jordan: A Quasi-experimental study.

Shen, J., Guo, Y., Chen, X., Tong, L., Lei, G., and Zhang, X. (2022). Male nurses' work performance: A cross sectional study. Medicine, 101(31), e29977. https://doi.org/10.1097/MD.0000000000029977

Siamisang, K., Mokute, K., Mhaladi, B.B. and Tlhakanelo, J.T., 2022. Waiting Times and Length of Stay of Trauma Patients in a Botswana Referral Hospital Emergency Department. *Open Journal of Emergency Medicine*, 10(1), pp.54-65.

Siedlecki, S.L., 2020. Understanding descriptive research designs and methods. *Clinical Nurse Specialist*, 34(1), pp.8-12.

Suamchaiyaphum, K., Jones, A.R. and Markaki, A., 2024. Triage accuracy of emergency nurses: an evidence-based review. *Journal of Emergency Nursing*, *50*(1), pp.44-54.

Suleiman, K., Hijazi, Z., Al Kalaldeh, M. and Abu Sharour, L., 2019. Quality of nursing work life and related factors among emergency nurses in Jordan. *Journal of occupational health*, *61*(5), pp.398-406.

Sutriningsih, A., Wahyuni, C.U. and Haksama, S., 2020. Factors affecting emergency nurses' perceptions of the triage systems. *Journal of Public Health Research*, 9(2), pp. jphr-2020.

Tindinawe, R.T., 2023. Triage Knowledge, Practices and Associated factors among nurses at Mulago Accident and Emergency Units Kampala, Uganda.

Twagirayezu, I., Busisiwe, B. and Cishahayo, E.U., 2021. Knowledge and skills on triage among nurses working in emergency departments in Referral Hospitals in Rwanda. *Rwanda Journal of Medicine and Health Sciences*, 4(3), pp.398-405.

White, K.M., Dulko, D. and DiPietro, B., 2022. The effect of burnout on quality of care using Donabedian's framework. *Nursing Clinics*, *57*(1), pp.115-130.

World Health Organization (2023). World health statistics 2023: monitoring health for the SDGs, sustainable development goals. Geneva: WHO. Available at: https://www.who.int/publications.

Widyani, F. N. A., Basuki, A. P., and Nuswantoro, D. (2020). Triage Knowledge of Emergency Rooms Nurses at Dr Soetomo Regional General Hospital. *Indonesian Journal of Anesthesiology and Reanimation*, *2*(1), 13. https://doi.org/10.20473/ijar.V2I12020.13-19

Wolf, L.A., Delao, A.M., Perhats, C., Moon, M.D. and Zavotsky, K.E., 2018. Triaging the emergency department, not the patient: United States emergency nurses' experience of the triage process. *Journal of emergency nursing*, 44(3), pp.258-266.

Yancey, C.C. and O'Rourke, M.C., 2023. Emergency Department Triage. In *StatPearls* [Internet]. StatPearls Publishing.

Zagalioti, S.C., Fyntanidou, B., Exadaktylos, A., Lallas, K. and Ziaka, M., 2023. The first positive evidence that training improves triage decisions in Greece: evidence from emergency nurses at an Academic Tertiary Care Emergency Department. *BMC emergency medicine*, *23*(1), p.60.

Zwoliński, P., Szemień, M. and Żaba, Z., 2020. emergency severity Index–triage system Description and Literature review. *Emergency Medical Service*, 7(1), pp.51-58.

APPENDICES

Appendix I: Gantt Chart

Activity	May 24	Jun 24	Jul 24	Aug 24	Sept 24	Oct 24	Nov 24	Dec 24	Jan 25	Feb 25
Proposal development										
Ethical Clearance										
Data collection										
Data entry and Cleaning										
Data analysis and write up										
Submission of Dissertation										
Publication of manuscript										

Appendix II: Budget

Item	Estimated cost in BWP
Stationery and printing	1,200
Research assistants	2000
Dissertation preparation cost	1,500
Transport	1,500
Contingency	3,000
Ethical/NHRA clearance	2,000
Total	**11,200**

Budget Justification

Stationary: Bond paper will be used for proposals and questionnaires; the pens and pencils will be used to complete questionnaires and the erasers will be needed to erase mistakes made during filling in of forms. There will be need for funds to cater for printing and reprinting and also photocopying services during the whole period of research process. The flash drive will be required for data storage. Money will also be required for binding the research proposal and reports.

Research assistant: A research assistant will assist in collecting data, and processing information and will be used for a period not exceeding 4 weeks.

Personnel: A-bag will be needed to carry the questionnaires; airtime will be needed to communicate with researcher and respondents. Lunch allowance will be needed during data collection and analysis periods.

Transport: The researcher **e**stimated the distance to be travelled during data collection period and the fuel efficiency of the vehicle including the cost for the pilot study.

Contingency: Contingency funds are needed to meet for unforeseen costs or circumstances that may arise during the Study period.

NHRA/UNZABREC: The amount will allow the researcher to be registered and recognised as researcher by the NHRA and to sort ethical clearance from UNZABREC.

Appendix III: Participant Information Sheet

Title: **TRIAGE KNOWLEDGE AND ASSOCIATED FACTORS AMONG EMERGENCY DEPARTMENT NURSES AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA**

Researcher: Tshoganetso Tswaipe

Introduction:

I am a Master of Science in Emergency and Trauma Nursing student from the University of Zambia, Ridgeway Campus. As part of my program and academic exercise, I am conducting research on triage knowledge and associated factors among emergency department nurses at Princess Marina Hospital, Gaborone, Botswana. You are being invited to take part in a research study. Please take the time to read the following information carefully to help you decide whether you would like to take part.

Purpose of the Study:

This study aims to assess triage knowledge and associated factors among emergency department nurses at Princess Marina Hospital in Gaborone, Botswana.

Procedure:

Participation in this study involves completing a brief questionnaire that assesses your knowledge related to patient triage. Your participation will require approximately 20 minutes of your time.

Voluntary Participation:

Participation in this study is entirely voluntary, and you have the right to decline to participate or withdraw from the study at any time without penalty. Your decision to participate or not will not affect your employment or any other benefits to which you are entitled.

Risks and Benefits:

There are minimal risks associated with participation in this study. Some participants may experience discomfort or emotional distress when answering questions related to personal experiences. However, every effort will be made to ensure your comfort throughout the process. The benefits of participating include contributing to research aimed at improving triage knowledge and practices among nurses in the emergency department and potentially lower the overall mortality rate associated with under-triaging or over-triaging of patients.

Confidentiality:

Your privacy and confidentiality are of utmost importance. All information collected during the study will be kept strictly confidential and will only be accessible to the research team. Your responses will be of anonymity to ensure that individual participants cannot be identified in any reports or publications resulting from the study.

Right to Withdraw:

You have the right to withdraw from the study at any time, for any reason, without providing an explanation. If you choose to withdraw, any data collected up to that point will be excluded from analysis, and your decision will be respected without question.

Dissemination of study results:

The results of the study will be disseminated to relevant stakeholders to promote the implementation of recommendations. Bound copies of the research will be distributed to the Ministry of Health-Botswana, University of Zambia - School of Nursing Sciences, UNZA Medical Library, and Princess Marina Hospital management for staff review. The results will be published in the respective peer-reviewed journals. This will ensure that the results of the study are widely available to healthcare professionals and policymakers who can use them to improve on triage systems in the future.

Contact Information

If you have any questions or concerns about the study, please feel free to contact the researcher using the contact information provided below.

Principal Researcher	The Chairperson
Cell: +250975210659/+26777623021	Phone 0211-256067
Email: tshoganetsotswaipe@gmail.com	UNZA Biomedical Research Ethics Committee
Nyangabgwe Referral Hospital	P.O.BOX 50110
Private bag 127	Ridgeway Campus
Francistown, Botswana	Lusaka, Zambia

Appendix IV: Informed Consent Form

Title: **TRIAGE KNOWLEDGE AND ASSOCIATED FACTORS AMONG EMERGENCY DEPARTMENT NURSES AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA**

Participant Statement of Consent

I, ...hereby confirm that the nature of this study has been explained to me, I am aware that my personnel details will be kept confidential and I understand that I may voluntary at any point withdraw my participation without suffering any consequence.

I have been given sufficient time to ask questions and seek clarifications, and have agreed the participation in this study.

Signature: _____ Date: _____

Appendix V: Data Collection Tool

UNIVERSITY OF ZAMBIA

DATA COLLECTION INSTRUMENT

TRIAGE KNOWLEDGE AND ASSOCIATED FACTORS AMONG EMERGENCY DEPARTMENT NURSES AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA

Date: _____ Place: _____

Name of researcher (s): _____ Serial number: _____

Respondent Instructions

1. Ensure that you don't have your name written anywhere on this questionnaire
2. To respond, simply put a tick in the boxes given where applicable
3. For those open questions simply write your response in the provided spaces
4. You are required to provide answers to all questions unless otherwise instructed

Section A: Socio-demographic data

1. Age _____years
2. Gender: ☐ Male ☐ Female
3. Marital status:_____
4. Educational level;

☐ Diploma in Nursing ☐ Bachelors in Nursing

☐ Specialty courses- Emergency and Trauma 4 Others specify_____

5. Working experience as nursing profession _____Years
6. How long have you been working as a nurse in ED? _____Years
7. Training and continuing education
8. Did you attend any training related to triage?

☐ Yes No ☐

Types of training in emergency care attended

No	Training	Yes	NO
1	Basic Life Support (BLS)		
2	Advanced Trauma Life Support (ATLS)		
3	Triage Course		

Section B: Nurses knowledge regarding triage

No.	Question	Response category
1	Triage is the sorting of patients into priority of injuries or illness	a. Agree b. Disagree
2	The purpose of triage is to prevent deterioration or death of a patient while waiting on the queue for their turn	a. Agree b. Disagree
3	Triage Early Warning Signs is short for TEWS	a. Agree b. Disagree
4	TEWS score of 6 indicate triage orange code	a. Agree b. Disagree
5	A 2-month-old baby with TEWS of 4 and not feeding well is coded yellow.	a. Agree b. Disagree
6	PATS and Acuity Scale priority level yellow should be referred to designated area for non-urgent	a. Agree b. Disagree
7	Patient triaged colour BLUE should wait for 10 min before being attended	a. Agree b. Disagree
8	Patient arrival time is the most critical aspect to consider when triaging.	a. Agree b. Disagree
9	Paediatric discriminator list covers age range of 0-14 years	a. Agree b. Disagree
10	Adult Triage Early Warning Score consists of the following parameters: Mobility, Respiratory rate, Heart rate, Diastolic blood pressure, Temperature and AVPU	a. Agree b. Disagree
11	Pain score of 4-6 out of 10 indicate moderate pain	a. Agree b. Disagree
12	During triage, patient age should be prioritized over symptoms and vital signs.	a. Agree b. Disagree
13	SATS/PATS and Acuity Scale has 5 colour coding or priorities	a. Agree b. Disagree

14	Respiratory rate is a less critical factor to consider in triage compared to blood pressure.	a. Agree b. Disagree
15	Patients with high social status e.g., town mayor, school principals, politicians etc. should be treated as very urgent even if triaged as colour green	a. Agree b. Disagree
16	Discriminator list is not important for triage purpose	a. Agree b. Disagree
17	Diabetic- glucose over 17mmol/L (no ketonuria) is coded yellow	a. Agree b. Disagree
18	A patient with severe chest pain would typically be categorized as yellow	a. Agree b. Disagree
19	If an emergency sign is identified in the first step the patient is taken to vital signs first	a. Agree b. Disagree
20	If no emergency signs are identified in step 1, but an urgent sign is identified in step 2, the patient is immediately triaged yellow and asked to wait	a. Agree b. Disagree

Section C

Short answer questions

1. How would you rate your level of triage knowledge on the scale of 1 to 10. _____

2. How long should a patient triage take? _____

3. How frequently do you use triage algorithms or guidelines? _____

4. What factors contributed to your current level of triage knowledge?

_____

_____

_____

Thank you for your participation and time!!