DETERMINANTS OF CLINICAL PRACTICE GUIDELINE UTILIZATION IN PATIENT MANAGEMENT FOR TRAUMATIC SPINAL CORD INJURY IN NATIONAL SPINAL INJURY REFERRAL HOSPITAL, KENYA

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DECLARATION AND APPROVAL

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I. Chukwuma Ikenna Eke. hereby certify that the work I have submitted for this degree award is original to me and has not been submitted to any other university but Mount Kenya University.

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DEDICATION

This thesis is dedicated to my beloved parents and siblings for their unconditional support in this journey

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ABSTRACT

Spinal cord injuries have major implications for public health all around the world. An additional 9.27 million new cases were reported during a 29-year period, bringing the number of people affected by spinal injuries to 20.64 million. Additionally, there were 900,000 incident cases and 6.2 million years of total spinal injury impairment. Road traffic accidents topped the list of causes of spinal cord injuries in research conducted at Kenyatta National Hospital, followed by falls from heights, industrial accidents, and animal attacks. The prevalence of acute traumatic spinal cord injuries remains unknown in Kenya. Only the National Spinal Injury Referral Hospital provides comprehensive care for those with spinal cord injuries at the level 6 hospital. This study's goal was to assess the level of utilization of the clinical practice guideline among health care workers at the National Spinal Injury Referral Hospital, as well as the factors that are related to it. Specifically, the study was designed to assess the determinants of clinical practice guideline utilization among patients with acute traumatic spinal cord injury. The research used a cross-sectional, analytical methodology. Census sampling was used to choose a sample size of 40 healthcare professionals. All participants were selected. A semi-structured research questionnaire was provided by an interviewer to acquire quantitative data. Expert evaluation and analysis were utilized to determine validity, while Cronbach's alpha was used to assess the reliability of data collection tools. This study was given ethical approval by the Mount Kenya University Institutional Ethics Review Committee, and the research permission was issued by the National Commission for Science Technology and Innovation. The relevant county departments were contacted for further approval. The Quantitative Analysis was performed using Statistical Package for the Social Sciences version 27. The chi-square test of independence was used in a bivariate analysis to gauge the statistical significance of the association between the dependent variable and the independent variables. A p-value of less than or equal to 0.05 was used as the threshold for statistical significance. In testing for additional relationships and to account for confounders, binomial logistic regression was used on the components that were statistically significant in bivariate analysis. Text, tables, and graphs were used to convey the findings. The level of utilization of the clinical practice guideline was 22.5%. Being trained to use the clinical practice guideline (OR=25, 95% C.I: 1.06-616.022) increased the level of utilization of the clinical practice guideline. The study concluded that the level of utilization was low (22.5%) and further concluded that training on clinical practice guidelines influenced its utilization by the health care providers. This study conceived the need for clinical practice guideline training programs, the development of guideline implementation tools, and feedback mechanisms for clinical practice guideline performance assessment.

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LIST OF ABBREVIATIONS AND ACRONYMS

ASIA	American spinal cord injury association
ATSCI	Acute traumatic spinal cord injury
CPG	Clinical practice guideline
DALY	Disability-adjusted life year
HCW	Health care worker
IERC	Institutional Ethics Review Committee
MOH	Ministry of Health
NACOSTI	National commission for science, technology and innovation
NCHS	National center for health statistics
NGO	Non-Governmental Organization
NICE	National institute for health and care excellence
NINDS	National institute of neurological disorders and stroke
NSIRH	National spinal injury referral hospital
OAG	Office of the Auditor-General
QALY	Quality-adjusted life year
SDG	Sustainable development goals
SPSS	Statistical package for social sciences
WHO	World Health

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CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Acute traumatic spinal cord injury (ATSCI) is a traumatic experience to the spinal cord that causes disruptions to the nervous system and may lead to devastating effects on an individual's physical, mental, and social well-being. Witiw and Fehlings (2015) have described the "primary" and "secondary" phases in the development of acute SCI. These stages include microbleeds in the brain matter, axonal damage, and disruption of cellular membranes and occur after the initial traumatic damage to the spinal cord(Witiw & Fehlings, 2015a). Edema, the release of vasoactive amines and clotting factors, and an increase in glutamate release are also present. One's functional abilities, social independence, and general well-being can all be significantly impacted by the aftereffects of acute traumatic SCI(Hejrati *et al*., 2024).

Worldwide estimates of both the prevalence and incidence of acute SCI have been made, both at the national and regional levels. Acute SCI is reported to occur 14–40 times per million worldwide each year, according to (Fehlings *et al*., 2017). Witiw & Fehlings, (2015)conducted a literature review and compiled data from multiple epidemiological research studies to determine that New Zealand had the highest disclosed national incidence (49.1 per million), while Fiji and Spain had the lowest (10.0 and 8.0 per million, respectively). The crude annual incidence of SCI was 29.4 per million in Alabama, 77 per million in Mississippi, and 83 per million in Alaska, out of all the United States and provinces in North America(Fehlings *et al*., 2017). Patients with SCI have a high male-to-female ratio and a peak reflection age of less than 30 years old. The leading cause of SCI is motor vehicle accidents, with falls in the senior citizen population coming in second(Anderson *et al*., 2015).

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Estimating the prevalence of ATSCI has been a global endeavor for researchers and statisticians. According to Hejrati *et al*., (2024), the annual incidence rate of acute SCI is thought to be from 14 to 40 per million people. Approximately 20.64 million people worldwide are living with the effects of a spinal cord injury this year. According to the 2019 Global Burden of Disease Study, the number of individuals affected by spinal cord injuries has increased to 13.2 million from 11.37 million in 1990. A literature study conducted by Singh *et al*. (2014) found that New Zealand reported the highest national incidence (49.1 per million), followed by Fiji (10.0 per million) and Spain (8.0 per million). The crude annual incidence of SCI was highest in Alaska (83 per 1,000,000 residents) and Mississippi (77 per 1,000,000 residents), while the lowest incidence was in Alabama (29.4 per 1,000,000 residents). Men experience SCI at a higher rate than women, and the peak occurrence age is under 30. Automobile accidents are the main cause of SCI, seconded by falls from heights among older individuals.

Acute SCI treatment is expensive for patients, their loved ones, and the community as a whole and necessitates a large investment in medical facilities. These expenses are related to the requirement for both long-term complication management and short-term, high-level acute care. The projected lifetime financial cost of SCI in Canada, according to(Evaniew *et al*., 2015), ranges from CAD$1.47 million for insufficient paraplegia to $3.03 million for patients with complete tetraplegia. Moreover, it is estimated that SCI costs Canada $2.67 billion a year overall ($1.57 billion in upfront expenditures and $1.10 billion in inadvertent costs). Finding efficient ways to treat these injuries and lessen the degree of future disability is imperative given the detrimental impact of SCI on both individuals and society(Øderud, 2014).

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Sub-Saharan Africa has no known acute traumatic spinal cord injury epidemiology at this time. In contrast, yearly occurrences in South Africa and Botswana were 75.6 and 13 per million persons respectively, according to two prospective investigations (Joseph C. *et al*., 2015). In South Africa, between 61% and 62% of all ATSCIs are caused by violence (Barbiellini *et al*., 2022). Acute traumatic spinal cord injuries in Kenya are not tracked in a national database since there is no national registration. Kenyatta National Hospital study from 2016 (J. W. Kinyanjui *et al*., 2016) indicated that vehicular accidents were the most notable cause of acute traumatic SCI (55%), seconded by falls from a great height (37%), industrial accidents (8%), and animal attacks (8%). Patient, family, and societal costs associated with acute traumatic SCI care may add up quickly. It also places a substantial burden on healthcare funding. These expenses are related to the need for both immediate high-level acute treatment and long-term problem management. Research from Canada indicates that the lifetime cost of traumatic SCI ranges from C$3.03 million for a patient with complete quadriplegia to C$1.47 million for a patient with partial paraplegia(Fehlings *et al*., 2017). Given the rising incidence of acute traumatic spinal cord injuries, it is critical to assess the factors influencing how the clinical practice guideline is applied to acute care management of these injuries.

1.2 Problem statement

A systematic source of information, clinical practice guidelines help healthcare professionals make timely and systematic clinical decisions for specific conditions and diseases(Hawryluk *et al*., 2015). Acute traumatic spinal cord injuries account for a disproportionate share of trauma-related injuries and contribute significantly to morbidity and mortality (Kinyanjui *et al*., 2016). Research demonstrates that in-hospital death rates with ATSCI vary widely, from 18% in low- and middle-income countries to 4% in high-income nations (Victor F. Leite *et al*., 2018).

With the ultimate goal of improving outcomes and reducing morbidity among individuals with spinal cord injury through enhanced standards of care and evidence-based choices on types of treatment offered, Clinical Practice Guidelines offers scientifically supported recommendations for the ideal type and timing of reintegration in individuals with acute spinal cord injury once they are medically eligible for intensive rehabilitation(Dakson *et al*., 2017).

Improved patient outcomes, standardized care across healthcare institutions, and decreased wastage of resources may all be attributed to the widespread adoption and consistent use of clinical practice guidelines. The implementation of guidelines is not automatic. Guideline recommendations' adherence and use in everyday practice may not occur despite making the clinical practice guideline available to health care practitioners (Fehlings *et al*., 2017), according to the evidence. Globally, recommendations are still not being followed at all levels of care, even when clinical practice guidelines are used in conjunction with professional judgment and patient selection(Strohm *et al*., 2018).

Despite the rising incidence of spinal cord injuries due to automobile collisions and falls from heights, no research has been conducted in Kenya on the use of CPG in the acute care of patients with ATSCI (Kinyanjui *et al*., 2016). In addition, Kenya does not have a specific, nationally recognized clinical practice guideline (CPG) exclusively dedicated to the management of acute traumatic spinal cord injury (SCI). However, healthcare providers in Kenya may use internationally recognized guidelines, such as those from the American Spinal Injury Association (ASIA), the International Spinal Cord Society (ISCoS), or the World Health Organization (WHO), to guide the management of SCI. Timely management of patients with ATSCI, aiding inexperienced health care practitioners in making evidence-informed decisions, promoting standardization of care across all hospitals, reducing rehabilitation time for ATSCI patients,

lowering treatment costs, lowering rates of secondary complications after ATSCI, lowering rates of morbidity and mortality, and maximizing the use of available resources are all reasons why clinical practice guidelines are so crucial. Therefore, the goals of this study were to assess the extent to which the clinical practice guideline is used in the acute care management of patients with ATSCI, and to identify the socio-demographic characteristics of healthcare providers, health system factors, and knowledge and attitude factors associated with such use.

1.3 Purpose of the study

This study aimed to assess the level of utilization of the CPG among patients with acute traumatic spinal cord injury at the National Spinal Injury Referral Hospital (NSIRH), as well as the socio-demographic factors, health system factors, and knowledge and attitude factors that influence this utilization.

1.4 Objectives of the study

1.4.1 Broad objective

To assess the determinants associated with the utilization of the clinical practice guideline in acute care management among patients with acute traumatic spinal cord injuries (ATSCI) at the National Spinal Injury Referral Hospital, Kenya.

1.4.2 Specific Objectives

1. To determine the level of utilization of the CPG in acute care management among patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya.

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2. To identify sociodemographic characteristics of the health care providers associated with the utilization of the CPG in acute care management of patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya.
3. To determine the health system factors associated with the utilization of the CPG in acute care management among patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya.
4. To establish the association between knowledge, attitude, and utilization of the CPG by the health care providers in acute care management among patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya.

1.5 Research questions

1. What is the level of utilization of the CPG in acute care management of patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya?
2. What are the socio-demographic characteristics of the health care providers associated with the utilization of the CPG in acute care management of patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya?
3. What are the health system factors associated with the utilization of the CPG in acute care management of patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya?
4. Does the knowledge and attitude of health care providers associate with the utilization of the CPG in acute care management of patients with ATSCI at the National Spinal Injury Referral Hospital, Kenya?

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1.6 Justification of the study

According to Kinyanjui *et al*. (2016), spinal cord injuries are the most notable kind of trauma-related injury and a major cause of mortality and disability in Kenya. Progress in reducing the worldwide prevalence of spinal cord injuries has been minimal despite the availability of recognized evidence-based approaches (Ding W. *et al*., 2022). It is still unclear how common SCIs are in contemporary Kenya. Despite the importance of the CPG for the acute care of patients with ATSCI, the empirical review showed that no study has been undertaken on the variables that impact healthcare professionals' adoption of the guideline. There is a substantial morbidity and mortality rate associated with acute traumatic spinal cord injuries, although this may be reduced with the consistent and compliant use of the clinical practice guideline. Despite the availability of these guidelines, spinal cord injuries constitute a significant disease burden affecting males mostly (Kinyanjui *et al*., 2016).

Acute traumatic spinal cord injury (SCI) is a significant health issue in Kenya, contributing to a high burden of morbidity, mortality, and long-term disability. SCI affects mainly young, productive individuals, leading to substantial socioeconomic impacts on patients, their families, and the broader community. Understanding the determinants that influence the utilization of clinical practice guidelines (CPGs) in the management of SCI was essential to improve patient outcomes and optimize resource use. Clinical practice guidelines provide evidence-based recommendations for healthcare providers, standardizing care and reducing variability in clinical practice. Adhering to CPGs can improve the quality of care, reduce complications, and enhance recovery and rehabilitation outcomes for patients with acute traumatic SCI. However, the actual utilization of these guidelines in clinical settings often varies due to multiple factors. This study examined these factors in the context of the National Spinal Injury Referral Hospital in Kenya,

where a significant number of SCI cases are managed. There is limited research on the utilization of CPGs for managing acute traumatic SCI in Kenya. Most existing studies on SCI in Kenya focus on epidemiology, injury mechanisms, or rehabilitation outcomes, with minimal attention to the use and determinants of evidence-based guidelines in clinical practice. This study filled a critical gap in the literature by providing data on the extent to which CPGs are utilized and identifying the barriers and facilitators affecting their use among healthcare providers.

1.7 Scope of the study

The investigation aimed at determining the level of utilization of the CPG in the acute care of patients with ATSCI. Additionally, the study examined the socio-demographic characteristics, health system factors, and the knowledge and attitude factors associated with the utilization of the clinical practice guideline. The research was conducted among 40 healthcare practitioners in a National spinal injury referral hospital (geographic scope). The data collection period was one month while the entire research work took one year (time scope). Information was gathered via the use of a semi-structured questionnaire.

1.8 Limitations of the study

There were no temporal or causal associations between the independent variable and the rate of CPG use since a cross-sectional design was adopted for the research. A larger sample size would have increased the possibilities of generalizing. Furthermore, the study was limited by clinical officers and Nursing officers. The inclusion of other healthcare workers such as specialists, laboratory scientists, radiographers, and physiotherapists who have limited contact with ATSCI patients might have produced different results. This study was limited to the National Spinal Injury

Referral Hospital, Kenya, which has a small sample size making generalization of the results a constraint.

1.9 Delimitations of the study

The research enrolled only 40 NSIRH healthcare practitioners. The survey was narrowed to only four objectives on healthcare professionals' CPG level of utilization, the socio-demographics, the health system factors, and the knowledge and attitude factors.

1.10 Assumptions of the study

The research presumed that participants would provide truthful responses, that participants would be accessible throughout the data collecting period, and that the sample size was representative of all HCWs at NSIRH regarding the level of utilization of the CPG.

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1.11 Operational definition of terms

Acute care management: protocols put in place to prevent further injuries

Acute traumatic spinal cord injury: Injuries to the spinal cord caused by trauma of less than one-year duration

Clinical practice guidelines: These are stepwise source of information for improving patient care.

DALY: Total number of healthy years of life lost due to death or disability (WHO, 2020).

Determinants: Influencing factors on compliance with clinical practice guidelines.

Disease burden: Sum of consequences of a particular disease

Health system factors: Are facility-related determinants that affect the delivery of health services (NCHS, 2018)

Level of utilization: The usage of clinical practice guidelines in clinical decision making

Morbidity: The condition of suffering from a disease (Oxford language, 2023)

Mortality: Death

QALY: illness burden measurement that takes into account both length and quality of life.

Referral: For specialist consultation

Staffing gap: disparity (in percentage terms) between actual and projected staffing levels.

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CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In order to better understand what variable affected the rate at which clinical practice guidelines are utilized in the acute care of patients with ATSCI, this review analyzed and synthesized the available research in this area. This review determined what influenced healthcare providers to follow clinical practice guidelines and outlined the obstacles and possibilities for increasing evidence-based practices in this setting. The study provided a conceptual foundation for the study by explaining important concepts like clinical practice guidelines and acute traumatic spinal cord injury and outlining the factors that influenced how often these recommendations are used.

2.2 Level of utilization of clinical practice guidelines

Level of utilization has been described by Oxford languages as the act of making practical and effective use. In this context, the practical and effective use of clinical practice guidelines in daily practice reduces the burden of spinal cord injuries. CPGs are evidence-based suggestions that aid medical professionals in choosing the best course of treatment for particular clinical situations. It has been demonstrated that using CPGs raises patient safety, minimizes variability in healthcare delivery, and improves the quality of care (Beauchemin *et al*., 2019). Wang *et al*., (2021)conducted a study that supported this, demonstrating a progressive decrease in patient mortality and an increase in treatment modalities when CPGs are used. The use of the CPG reduced the length of hospital stay and death for patients with spinal cord injuries, according to a study by Noonan *et al*. (2014), but it had no effect on the secondary problems that patients experienced during hospital stay. All pertinent data is methodically reviewed and synthesized to produce CPGs, according to Xing *et al*., (2023). The analysis is conducted with recommendations based on the findings, and

the evidence's potency and reliability are evaluated. The recommendations are shared with healthcare practitioners to enhance clinical decision-making further. In order to provide care that is based on scientific evidence, healthcare providers must have access to clinical practice guidelines. They offer a methodical framework for treating patients and promote consistency in care for all patients. They help lower healthcare expenditures by minimizing the number of non-evidence-based tests and procedures (Beauchemin *et al*., 2019). However, their influence on clinical practice has not been optimal as a gap exists between evidence and practice (Lugtenberg *et al*., 2009). Lorenz *et al*. (2023) noted that in order to minimize the gap of translating evidence into clinical practice, updating the knowledge among health care workers is paramount closely followed by change in attitude and then change in behaviour thereby offering precise solutions to improve CPG utilization. Compliance with CPGs is still low around the world despite regular updates and its implementation using numerous strategies (Sasaki *et al*., 2020). Beauchemin *et al*. (2019) reported that from previous studies, it takes almost 20 years for 14% of CPGs made to be utilized in daily clinical practice. Therefore, recognizing the determinants that affect CPG utilization plays very important roles (Bauer *et al*., 2020). Studies that reviewed these determinants in the region of Kenya or East Africa region are scarce. Determinants are categorized as barriers if they discourage utilization of the CPG, categorized as facilitators if they encourage utilization of the CPG and categorized as neutral if they neither discourage nor encourage utilization of the CPG. Lafuente-Lafuente *et al*. (2019) found that 29.8% of health care workers used the guideline in their daily practice whereas Weng *et al*. (2013) found that 41.9% of health care workers in Taiwan reportedly utilized the clinical guidelines for patient management. Contrary to the above findings, Hendaus *et al*. (2014) found that 80% of doctors regularly referred to CPGs in their daily practice while 20% did so very seldom. A study done in Germany by Wangler J. *et al*. (2021)

showed 27% of doctors often used clinical guidelines in their daily practice, 27% used it occasionally, 35% used it rarely and 11% never used it while Lafuente-Lafuente *et al*. (2019) found that 14.2% of health care workers used the clinical guidelines regularly, 15.6% used it occasionally and 70.2% never used it. Studies done in the Middle East and North Africa (MENA) region show that the level of utilization of the CPG is averagely 30% (Almazrou *et al*., 2020) There is a discrepancy between what is recommended in clinical practice guidelines and what is actually done for 30–40% of patients, according to studies conducted in the USA and the Netherlands. Modifications at the individual, organizational, or health system levels are required for effective utilization of the clinical practice guidelines (Correa *et al*., 2020). Clinical practice guidelines for the care of patients with ASCI were first published in 2002 by the American Association of Neurological Surgeons (AANS) and the Congress of Neurological Surgeons (CNS) (Fehlings *et al*., 2017). Since then, they have undergone several revisions. It has been proven with irrefutable evidence that health care workers who utilize the clinical guidelines in their daily practice offer better outcomes to patients. However, deviating from the usage of guidelines is usually accompanied by a good clinical justification because not all patients presents with the same clinical situation. Therefore, 100% utilization of the guidelines is not to be expected. According to Braithwaite *et al*. (2020), 60% of care on average matches evenly with or is equivalent to evidence-based guideline practice, 30% is regarded as low utilization and 10% utilization is regarded as harmful practice to patients. Studies show that between 30 to 40% of patients are not treated according to practice guidelines and 20% of patients receive treatments that were shown to be harmful. The findings were supported by a study done in Netherlands which showed that the recommendations of guidelines are efficiently and effectively utilized in 67% of clinical decisions (Grol R., 2001). However, studies conducted by Dagne *et al*. (2021) showed the level of utilization

of the CPG among nurses in Ethiopia was less than 60%. Barriers such as lack of knowledge, lack of self-efficacy, lack of motivation to use CPG, lack of time were reasons for the low utilization.

Qu *et al*., (2020) conducted a separate study among Dutch health care workers, which revealed that unclear guideline recommendations (43%), organizational constraints (52%), lack of comorbidity management in guidelines, lack of evidence of the guidelines (68%), and lack of knowledge of the guidelines (46%), all contributed to lower levels of utilization. Studies done in the Middle East and North Africa among health care workers showed unawareness and unfamiliarity with the CPG, disagreement with recommendations in the CPG, no time and lack of resources and also lack of rules for circulation and utilization were barriers (Almazrou *et al*., 2020). These findings were similar with a study done by Mutisya *et al*. (2015) in Kenyatta National Hospital, Kenya which showed no access, lack of CPG, no facilities, no knowledge, lack of evidence of the guidelines, no time, lack of authority to change practice, CPG not compatible with established process of the local setting and shortage of staffs were barriers among nurses to the utilization of evidence-based practice. Another contributory finding to the level of utilization involved the evidence level. Guidelines with recommendations of high-level evidence were utilized more than guidelines whose recommendations had a low-level evidence (Cnossen *et al*., 2016) as this makes the guideline trustworthy to effect in the management of patients. According to Liang *et al*. (2017), for a guideline to be practical, it must have guideline implementation tools which advices on how to utilize the recommendations in health care practice and must also have a plan for tracking and assessing the efficacy of the guideline. Lau *et al*. (2009) noted that in order to achieve high utilization, the targeted approaches to effect utilization of the CPG needs to be based on the barriers concerned with the setting in which the utilization occurs. Also, the interventions used should be assessed regularly to ensure they are still applicable.

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2.3 Acute spinal cord injury

A normal function of the cord may be altered if it were to sustain an injury to either the spinal cord or the nerves that originate from it. Spinal cord injury caused by trauma has a significant impact on the number of years spent disabled (Barbiellini *et al*., 2022). It is differentiated into acute and chronic forms. Acute is referred to as less than 1 year of injury while chronic is defined as greater than 1 year of injury. In all, there are 31 pairs of spinal nerves that communicate with the spinal cord. Eight of these nerves are located in the cervical region (C1-C8), 12 are located in the thoracic region (T1-T12), five are located in the lumbar region (L1-L5), and five are located in the sacrum (S1-S5). According to Yusuf *et al*. (2019), between 3 and 25% of spinal cord injuries develop after the first traumatic occurrence when the patient is being transported to a medical facility or while receiving the initial management. Victims of accidents who sustain damage to their spinal cords in Nigeria often do not get the necessary prehospital care or are not adequately transported from the scene of their accidents (Yusuf *et al*., 2019). Injury to the spinal cord has the potential to affect a wide variety of body systems. Patients who have suffered an acute traumatic damage to their spinal cord have a high risk of premature death regardless of where the lesion took place along the spinal cord (Barbiellini *et al*., 2022). The cervical region was the most common site for acute traumatic injury to the spinal cord, accounting for 52.1% of all cases. According to the findings of an Italian study, the mortality rate was highest in patients who had major cervical injuries, particularly four weeks after the accident. This was notably true at that time. According to Barbiellini *et al*. (2022), the percentage of hospitalized patients with ATSCI caused by cervical injuries varied from 5% in China to 92% in Turkey. According to Yusuf *et al*. (2019), vehicular accidents were the major cause of ATSCI in Nigeria, with 81.9% of all cases involving the cervical spine. Cervical spine injury (C3-C5) affects the diaphragm leading to difficulty in breathing and

also affects the tone of the gastroesophageal sphincter predisposing to respiratory aspirations. Other effects seen with cervical spine injury is neurogenic shock.

Spinal cord injury can cause loss of sensation, loss of tone and loss of muscle bulk and power below the level of injury. Symptoms such as numbness/tingling sensations, paralysis, loss of bladder and bowel control, difficulty breathing etc. are frequent encounters. (NINDS, 2023). The consequences of spinal cord injury are numerous for the patient, family relatives and the society because the patients undergo significant psychological complications and are also fully dependent thereby resulting in expensive medical, psychological and rehabilitative care. In the United states, the cost of managing a patient with spinal cord injury during the first year of injury ranges from $375,000 to $1,114,900. In the United Kingdom, 1200 traumatic spinal cord injuries are estimated annually and 40,000 people live with permanent disabilities resulting from trauma to the spinal cord (Sandean D., 2020). According to the OAG analysis of NSIRH data (2015), 135 out of 148 spinal cord injury patients had severe paralysis between 2008 -2012. Majority of spinal cord injury patients at NSIRH did not receive proper medical care due to the public health system not providing adequate treatment. Adequate acute management is essential to prevent further complications while preserving the function of the cord (Sandean D., 2020).

American Spinal Injury Association (ASIA) impairment scale categorizes spinal cord injury into A: complete (no motor or sensory function is preserved in the sacral segments); B: incomplete (sensory is preserved but no motor function below neurological level); C: incomplete (motor function is preserved below the neurological level with muscle grade <3); D: Incomplete (motor function is preserved below the neurological level with muscle grade >3); E: Normal (normal motor and sensory functions) (Roberts T. *et al*., 2017). 90% of patients with complete lesion over 24hrs will not show functional recovery while patients with partial lesion, which has a better

prognosis may regain some or even normal neurological function. In National Trauma center Abuja, Nigeria, a study done by Yusuf *et al*. (2019) showed patients with ASIA category A constituted 52.6% and 19.5% of patients had intact sensorimotor functions (ASIA category E).

Risk factors are grouped into traumatic and non-traumatic. Motor vehicular collisions and falls are the most frequent traumatic risk factors with other traumatic causes ranging from gunshots, assaults, sports injuries, industrial accidents and surgical injuries. Non-traumatic causes are diseases and conditions that damage the spinal cord. (NINDS, 2023). This study focused on acute traumatic spinal cord injury. Complications such as urosepsis, venous thromboembolism, major depressive disorder, orthostatic hypotension, sinus bradycardia, autonomic dysreflexia and pressure sores are the most frequent. According to Barbiellini *et al*. (2022), elderly patients who have suffered acute traumatic lesions to the spinal cord have a tendency to have a poorer prognosis and a lower likelihood of recovery than younger patients. According to the findings of a research that was conducted by Victor F. Leite *et al*. (2018), urosepsis is responsible for 10.7% of fatalities, while pressure sores resulted in 7.1% of deaths in Brazil. In Nigeria, at the National Trauma Center Abuja, the most common complication was pressure sores (23.3%) out of the 31.6% of patients that developed complications (Yusuf *et al*., 2019).

According to the Global Burden of Disease (2019), spinal cord injuries constituted 20.64 million of prevalent cases, 0.9 million incident cases, and 6.2 million years of healthy life lost due to disability of total spinal cord injury disability in 2019. This is an increase from the 11.37 million patients who suffered from spinal cord injuries in 1990. (Global burden of disease study 2019). Incidence rate in Portugal was 57.8 cases per million, Russia had 44.0 cases per million and Italy had 14.7 cases per million (Barbiellini *et al*., 2022). Studies conducted in South Africa and Botswana found that annual incidences there were 75.6 and 13, respectively, per million people

(Joseph C. *et al*., 2015). There is a large amount of variation in the incidence, prevalence, and mortality rates of ATSCIs across different locales. This variation is caused by changes in the sources of injury, patient demographics, cultural variables, and treatment options that are accessible (Barbiellini *et al*., 2022). No national database found in Kenya for epidemiology of acute traumatic spinal cord injuries.

2.4 Socio-demographic factors associated with level of utilization of the CPG

Age, gender, level of education, cadre and years of working experience are some of the sociodemographic factors that affects the level of utilization of the CPG in the acute care of patients with ATSCI.

2.4.1 Age

Younger doctors have a more positive opinion of guidelines compared to older doctors as this instrument have been incorporated in their curriculum during their days of medical school (Wangler *et al*., 2021). This was corroborated by a study done by Reynolds *et al*. (2018) which showed younger health care workers showed less barriers in terms of knowledge of the guideline use than older healthcare workers. This could be explained by younger health care workers tending to utilize the guidelines more to avoid medical errors as they are still fragile in terms of skills, experience and also lack of self-efficacy. They may also be more pressured to use this guideline by their superiors. Older doctors tend to favour their experience more than the guidelines as it is hard to overcome old or previous habits and routines. Also, litigation awareness is more common in this generation of young health care workers and this has influenced the utilization of clinical practice guidelines. A study conducted by Dagne *et al*. (2021) in Ethiopia showed younger nurses utilized the CPG less compared to older nurses because the younger nurses were beginners in the

profession and hence lacked the experience in using the CPG. However, this was corroborated by a study done by Reynolds *et al*. (2018) which showed younger nurses had more knowledge about the SCI guidelines compared to the older nurses but lacked the confidence in applying the knowledge.

2.4.2. Gender

Gender has been a less researched barrier in the utilization of the CPG among healthcare workers with very limited data as healthcare workers are trained to use evidence-based practice equally irrespective of their gender. In contrast to male physicians, female physicians were found to have a more positive attitude toward the use of CPGs, according to a study conducted by Zhang *et al*., (2021). A similar study done by Alqahtani *et al*. (2022) in Saudi Arabia showed male nurses had more barriers to the usage of the CPG compared to female nurses. An explanation for this was due to the gender segregation in the country which led to female and male units in hospitals. The female unit had more clinics, therefore, more clinical exposure and high level of utilization of the CPG for the female nurses while the male unit had less clinics leading to the male nurses having lesser opportunities to apply the CPG.

According to Sergeant *et al*. (2021) previous studies showed female physicians were more likely to practice evidence-based medicine in accordance with the CPG and also offer preventive care to patients compared to male physicians. This finding was corroborated by a study done by Sada *et al*. (2023) in Bahrain, which showed female health care workers were more inclined in using the CPG concerned with women's health compared to male health care workers. An explanation for this could be that females are more empathic and sympathetic in nature compared to males.

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2.4.3 Level of education

The field of medicine requires constant learning as it is a continually advancing field. Staying well-informed and competent is of paramount importance (Thompson AE., 2014). Health care workers with an advanced educational level were more likely to be in tune with the guideline recommendations and also have an increased level of utilization of this guideline due to their advanced training in the field of medicine compared those without a higher level of education. As noted by a study done by Lugtenberg *et al*. (2009), clinical practice guidelines are an integral part of the postgraduate training and continuing medical education for Dutch GPs. According to a study by Ulndreaj *et al*., (2016), clinical practice guidelines are an essential component of Dutch GPs' postgraduate training and ongoing medical education. In the course of their advanced training, they may have been involved in publishing scientific articles and taking part in quality improvement projects (Thompson AE., 2014). This was corroborated by a study done by Weng *et al*. (2013) which showed health care professionals in Taiwan who had postgraduate qualifications utilized the clinical guidelines more than those who did not possess this and also a similar research done by Pitsillidou *et al*. (2021) which showed nurses who had diploma or degree reported having more obstacles to the utilization of the CPG than nurses with masters or doctoral degrees. However, contrary to the above findings, a study done in Saudi Arabia showed nurses with a bachelors' degree experienced more barriers compared to nurses with diplomas despite evidence-based practice guidelines being incorporated into their basic education (Alqahtani *et al*., 2022). In sub-Saharan Africa, studies done by Zewdie *et al*. (2023) in Ethiopia showed that health care workers who had a bachelors' degree and above were thrice more likely to utilize the CPG compared to those with less qualifications while in Nigeria, Desalu *et al*. (2021) showed in a study

that medical practitioners with post graduate training utilized the CPG more frequently and were more familiar than those without post graduate training.

2.4.4 Cadre

The field of medicine is a team work field made of a variety of cadres of health care professionals. These multidisciplinary teams work together to understand the patient's situation, ask specific questions, make an initial assessment and finally provide a solution. In health care, physicians are the highest cadre of health care professionals making them the leader of the team and decision makers. Due to this, they are the ones who utilize the clinical practice guidelines more than the other health care workers in the management of patients. But Nurses constitute a larger percentage of health care workers in the health sector and thus are also required to convert evidence-based guidelines into practice contributing to good patient outcomes (Cassidy *et al*., 2021). A study done by Wahabi *et al*. (2011) in Saudi Arabia showed nurses were notably more likely to use the clinical practice guidelines compared to physicians due to the variation in their professional education and training and also their roles during practice. However, a study done by Weng *et al*. (2013) revealed a contrary result which showed nurses were least likely to utilize the clinical guidelines and would rather rely on their own experience or colleagues' experience, nursing literatures, training programs etc. This finding was corroborated by a study done by Fossum *et al*. (2022) which showed nurses commonly used online sources and reference materials and colleagues and least commonly used nursing journals, their basic education and personal experience than use the CPG as a source of information in their daily clinical practice. Due to nurses increasing workload and increasing level of accountability to patients, their practice is paramount to evidence-based clinical guidelines (Stokke *et al*., 2014) as patients with spinal cord injury are the most vulnerable in all patient groups, therefore, should receive the best care to prevent secondary injuries. Nurses do not

have an authority over patient management. However, they are involved in SCI patient management in accordance with the guidelines which include regular motor and sensory assessments, skin care, range of motion exercises, pulmonary toileting, bowel and bladder management among others.

2.4.5 Years of working experience

Physicians with more years of experience did not use the guidelines as much, according to Ropper *et al*., (2015), because they did not agree with, apply, or have evidence to support the recommendations in the guidelines. Some of the factors that contributed to this group of physicians were guidelines that were too restrictive to allow for freedom of treatment and guidelines that did not apply to patients with associated comorbidities. Other barriers included healthcare workers' belief that they treat the patient rather than the disease, which led them to disregard the CPG, and their lack of motivation stemming from previous habits and routines, particularly from hospital norms that have proven to be effective in the health facility despite adequate evidence from the CPG. But a study done by Wahabi *et al*. (2011) showed dissimilar results where physicians with increasing years of experience had a higher level of guideline utilization which occurred due to the clinical practice guidelines being part of the curriculum during their postgraduate specialist training. This result was also observed by Hendaus *et al*. (2014) which showed health care workers with greater than 16 years' experience were familiar with the clinical practice guidelines compared to those with less than 5 years. For the nurses, a study done by Pitsillidou *et al*. (2021) showed nurses with less years of experience reported experiencing more barriers in the utilization of the CPG than nurses with more years of experience. This was corroborated by a study done in sub-Saharan Africa by Zewdie *et al*. (2023) in Ethiopia, which showed health care workers with longer years of experience (>5yrs) were almost thrice more likely to utilize the CPG compared to those

with below 5yrs experience. A study done by Stokke *et al*. (2014) showed that nurses rarely translate research evidence from guidelines into practice and would rather use the experience of their colleagues, experts' opinions of senior colleagues, information from their university education and other nursing seminars.

2.5 Health system factors associated with level of utilization

A healthcare provider's adherence to evidence-based clinical practice standards may be moderated by the organizational structure in which they work. Health-system barriers are the most important barriers in the level of utilization of clinical practice guidelines among healthcare workers (Selahattin *et al*., 2021). Trained health care providers, adequate health care providers, guideline barriers and availability of diagnostic equipment and facilities are a number of the health system factors that can influence the level of utilization of clinical practice guidelines. A detailed review of these factors is discussed below.

2.5.1 Trained healthcare providers

Another factor that influences the level of utilization of the CPG is the lack of training of healthcare workers in the use of these guidelines. Barriers such as lack of skills or inability to use clinical opinion to apply scientific knowledge and deal with uncertainty, ambiguous roles, lack of incentives to use guidelines and lack of self-efficacy and not having enough expertise to carry out specific procedures influenced the level of utilization of the clinical practice guidelines (Selahattin *et al*., 2021). According to OAG analysis (2015), nurses in NSIRH did not have the specialized skills necessary to manage spinal cord injury patients. This was corroborated by studies done by Majid *et al*. (2011) and Pitsillidou *et al*. (2021) which showed nurses who took part in CPG training programs experienced less barriers in CPG utilization than those who didn't attend. Important

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areas noted by nurses concerning training in the study of Majid *et al*. (2011) were not knowing which clinical scenarios that would necessitate them to utilize the CPG and knowledge of the CPG. A study done by Weng *et al*. (2013) in Taiwan showed 30.3% of healthcare professionals took part in training programs and 16.8% had the required skills for guideline utilization. Effective utilization of clinical practice guidelines requires targeted training. Studies done indicated that traditional learning of clinical practice guidelines offer little improvement in daily clinical practice and a small or no change in the behaviour of health care workers whereas targeted training which includes a more interactive digital education had a better effectiveness (Tudor Car *et al*., 2019). This study proves that adequately training healthcare workers in the usage of the CPG increased the level of utilization compared to those not trained. Targeted training using workshops, seminars, conferences and short courses can be used as opposed to the educational training. Training offers the health care workers a platform to address their concerns with any of the recommendations of the guideline, it gives more information and technical knowledge about the guideline, it proves to the health care workers the level of evidence of each of the CPG recommendations during use, it shows them the appropriate way to apply the recommendations for quick and effective quality care to patients, it increases their preparedness in handling TSCI patients, it emphasizes the importance of teamwork, team dynamics and role delineation and also regular training enables constant development and skill improvement to keep abreast with the latest advancement in medicine. Untrained health care workers will inadvertently slow done health care service delivery to the patients. However, Valenstein-Mah *et al*. (2020) showed in a study that CPG training of health care workers did not increase its utilization compared to no training but rather resulted in more knowledge of the CPG.

2.5.2 Guideline barriers

Clinical practice guidelines play an important part in promoting evidence-based care and aiding healthcare workers in making well-informed clinical decisions. These guidelines also serve to standardize care across various healthcare facilities. It is vital to note that clinical practice guidelines do not replace the clinical judgement of healthcare workers; rather, they bridge the gap between the healthcare worker's actions and the scientific evidence supporting those actions (Kristensen *et al*., 2016).

The concept of evidence-based guidelines emerged in the 1980s and was based on research evidence from experts (Guerra-Farfan *et al*., 2022). Since their introduction, clinical practice guidelines have undergone regular reviews and updates to align with new discoveries in medicine and advancements in medical technologies. The significance of these guidelines is evident in their impact on daily clinical practice, leading to improved health outcomes and reduced morbidity and mortality for patients. Moreover, they contribute to cost reduction and resource optimization within healthcare facilities while enhancing the overall quality of care (Guerra-Farfan *et al*., 2022). Barriers such as unavailability of guidelines, unclear or confusing guidelines, guidelines not being up to date, guidelines being too complex to use and not user-friendly, presence of contradictory recommendations, lack of agreement regarding the content, lack of outcome expectancy, not comprehensible, lack of accessibility and restriction to the freedom of treatment were noted to influence the utilization of clinical practice guidelines (Selahattin *et al*., 2021). Guidelines not presented in a clear and concise fashion are difficult to utilize and the healthcare worker is less likely to be influenced by the clinical practice guidelines. Patients with comorbidities confuse the health care worker as the recommendation about comorbidities in the guideline is unclear (Correa *et al*., 2020). The CPG not tackling comorbidities is usually an obstacle as utilization of such CPGs

in patient management may often lead to difficult and sometimes unfavorable treatments as comorbidity is highly linked to higher mortality. This may cause healthcare workers to utilize multiple independent CPGs to address this thereby causing harm to patients (Hughes *et al*., 2013). Unclear presentation about the role, identity and responsibility of healthcare workers reduces the utilization of the guideline (Wang *et al*., 2023). Guidelines that are challenging to understand or have a different language have a negative influence on its utilization (Correa *et al*., 2020).

Healthcare professionals argue that the guidelines' benefits did not outweigh their drawbacks and that certain of their recommendations were not supported by scientific evidence, leading to disagreement over their applicability(Yue *et al*., 2017). The fact that the guidelines were out of date contributed to the issue, since recommendations should be updated every three to five years to maintain their credibility given how quickly the medical field is developing(Strohm *et al*., 2018). This was supported by a study conducted in South Africa by Hejrati *et al*., (2024), which revealed that the CPG had low utilization and had delayed revisions whose recommendations didn't align with current clinical evidence.

Clinical practice guidelines being out of date separates the standard and current clinical practice to the point its utilization will be reduced(Christodoulou *et al*., 2019). Guidelines having contradictory recommendations results when evidence of a recommendation is insufficient due to the developers differing approach to evidence and also conflict of interest among them (Graham *et al*., 2011). Lack of accessibility to clinical practice guidelines in a health facility results in non-compliance which can result in poor health outcomes for patients and needless health costs and resource usage for health systems and even unsuitable care not related with the recommendations in the clinical practice guidelines. This contrasted the study done by Cook *et al*. (2018) which showed lack of accessibility to the CPG was the least important barrier but rather insufficient time

to apply the CPG to practice was notable. Also, health care workers having uncertainty about the benefits and outcome expectation of using clinical practice guidelines reduces its utilization. A study done in Cameroon and South Africa showed barriers to utilization in Cameroon included lack of human resources, lack of skills and conflicting recommendations in the CPG while in South Africa, guidelines were not easily accessible, difficult and time consuming to read, does not apply to recent clinical evidences and also doesn't align with the established process of their facility (Naude *et al*., 2015). In a separate study done by Pather *et al*. (2019) in South Africa, health care workers noted the CPG was more specialist than generalist oriented which gave the inclination to generalist that specialist are to be depended on for instructions rather than depending on the CPG. This will however affect the cooperation between generalists and specialists in patient management. Other barriers noted were multiple guidelines from different sources which caused confusion among the health care workers as to which of the recommended CPG is best to utilize. For the individual factors, level of awareness, no time and no motivation due to work inertia were noted as hindrances to CPG utilization. Health system factors barriers included lack of proper dissemination and poor communication of the CPG to health care workers, lack of training and whose responsibility it was to mandate the implementation. In other low-and middle-income countries, studies done by Puchalski *et al*. (2016) showed barriers to the guideline utilization included lack of materials (medications, equipment etc.), shortages of staffs, lack of resources (funding), lack of communication and information sharing methods and unawareness of the guidelines were the most frequent, while lack of training, no knowledge and skills, out of date guidelines, disagreement with the guideline recommendations, no belief in the guideline and lack of clarity on roles to carry out recommendations were less frequent. In other words, according to Lin *et al*. (2009) CPG must have certain attributes to be considered a good source of advice and

these include evidence-based recommendations must be systematic and extensive, recommendations must have evidence, recommendations must be based on the outcome of the patient rather than on the outcome of the disease, guideline forming process must be transparent, possible conflict of interest must be recognized and tackled and recommendations must not be rigid so as to be applicable to numerous clinical scenarios.

2.5.3 Adequate health care providers

Inadequate motivation and retention methods, increasing migration, low production rate, inadequate pay packages, etc. are only some of the chronic problems linked to Kenya's uneven distribution of health care professionals. When compared to the SDGs threshold index of 44.5 per 10,000 population, Kenya's 2020 ratio of 30.14 physicians, nurses, and clinical officers per 10,000 people was just 68% adequate. The government of Kenya has made substantial investments in the medical field throughout the years. Despite these gains, Kenya still has to make another 32% before it reaches the 44.5 per 10,000 SDG benchmark score (Okoroafor *et al*., 2022).

According to the OAG analysis of NSIRH staff establishment (2015), it reported a lack of adequate proficient personnel as it had a 33% staffing gap of medical officers, 10% staffing gap of nursing officers and a 60% staffing gap of consultants. A study done by Weng *et al*. (2013) showed inadequate time as the most notable hindrance for health care professionals in relation to the shortage of staffs and high workload. This was corroborated by a study done by Wangler J. *et al*. (2021) which showed 63% of health care workers lacked enough time to utilize the guidelines in daily practice especially when the workload becomes heavy. Lack of time to apply the recommendations of the guideline to each patient due to shortage of staffs will have a negative influence on the guideline's utilization as a direct result of the large volumes of patients in NSIRH.

Lack of time may also contribute to lack of privacy to use the CPG at the point of care as patients may lose confidence in a health care worker who regularly consults an external source of advice from the CPG. Adequate number of staffs will ensure higher performance of the CPG utilization. It encourages timely management of patients' needs in an efficient manner without putting excessive stress on the existing employees which will lead to a 'burn-out'. Overworked employees may have little time to read and use the CPG leading to low utilization in clinical practice. Adequate staffing of health care workers improves patients' outcome and satisfaction, reduces the risk of clinical errors and patients' financial costs.

2.5.4 Availability of diagnostic equipment and facilities

The most important diagnostic imaging tool in evaluating and detecting acute spinal cord injury is the Magnetic Resonance Imaging (MRI) because it can readily detect spinal cord abnormalities, soft tissues abnormalities, disc herniation, ligamentous injury and cord compression which may not be visualized on other imaging modalities. Early detection can lead to a precise diagnosis, early management and appropriately timed referral to surgical specialists. (Arash Ghaffari-Rafi *et al*., 2021). According to research done by Arash Ghaffari-Rafi *et al*. (2021), the clinical practice guideline recommends that patients who have suffered an acute damage to the spinal cord get an MRI within the first 72 hours after the accident, prior to any surgical intervention and also to make an informed clinical decision. Computed tomography (CT) scan is usually considered to assess stable vs unstable injuries (Kumar Y. *et al*., 2016). However, the unavailability of these equipment will influence the utilization of the clinical practice guideline thereby increasing morbidity and mortality of these patients. According to OAG analysis (2015), NSIRH did not have adequate diagnostic equipment such as the CT scan or MRI to perform a comprehensive evaluation of patients with trauma to the spinal cord thereby resulting in treatment failure and prolong periods

of rehabilitation. The NSIRH also lacked an intensive care unit (ICU) or a high dependency unit (HDU) for the acutely ill patients and a fully equipped theatre for spinal surgeries. There are also 40 beds which are not sufficient to cater for the spinal cord injury patients. The World Health Organization concluded that half to more than three-quarters of health care equipment in low-and middle-income countries do not function. Tinkle *et al*. (2016) concluded that those who lacked the necessary resources to utilize the clinical practice guidelines had minimal compliance rates than those who had resources. A study done by Puchalski *et al*. (2016) showed lack of equipment among other facility-based resources was the most common barrier leading to low level utilization of the CPG in low- and middle-income countries. This finding was corroborated by a study done by Stokes *et al*. (2016) which showed resource unavailability as a major barrier to the utilization of the CPG in Sub-Saharan Africa. This may lead to negative health outcomes for the patients who will be receiving health care not in line with current clinical evidence. Equipment unavailability can also be problematic for the staffs particularly in training of junior staffs in the usage of such equipment and frustrations with discouragement among staffs.

2.6 Knowledge and attitude factors associated with level of utilization

According to Selahattin *et al*. (2021) knowledge and attitude have been related to the level of utilization of clinical practice guidelines. These factors with an evaluation of evidence of the influence of these factors including barriers related to knowledge and to attitude.

2.6.1 Barriers related to knowledge

One of the main ways that patients can benefit from clinical practice guidelines is if healthcare professionals are aware of them. In a study by Evaniew *et al*., (2015), 46% of Dutch general practitioners did not know the recommendations of guidelines, either because they were unaware

of their existence or because they knew the guidelines' specifics but not what they recommended. Additionally, there wasn't enough knowledge to access this medical guideline.

This was corroborated by a study done by Weng *et al*. (2013) which showed 28.7% of healthcare professionals reported having the knowledge to utilize the guideline recommendations, out of which physicians were the most out of the other professional cadres and also a study done by Birrenbach *et al*. (2016) which showed 70% lacked awareness, 57% lacked familiarity of the guidelines and 43% lacked the know-how to access the guidelines. Fossum *et al*. (2022) revealed that nurses did appreciate the use of CPGs for better patient outcome, however, they did not have the knowledge to practice in line with the recommendations of the CPG. However, too much knowledge in terms of the CPG having large number of recommendations to utilize dampens the zeal to utilize it as healthcare workers may not be able to apply all recommendations at once (Xing *et al*., 2023). Other researchers discovered that knowledge wasn't enough by itself to facilitate nurses in the utilization of the CPG as other factors in unison with knowledge played crucial roles (Abuadas, 2021).

A study done by Tinkle *et al*. (2016) showed that those who were familiar and aware with the guidelines complied more times than those who were not. Knowledge of the guidelines enhances self-confidence and self-efficacy when attending to patients in making the right and appropriate clinical decision tailored to the patients' needs. It improving patients' outcome, reduces financial costs, wastage of hospital resources and reduces the patients' hospital length of stay. In addition to how both variables relate to each other, there is sparse literature showing a relationship between knowledge of the clinical practice guidelines and its level of utilization in Kenya.

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2.6.2 Barriers related to attitude

Health care workers with a more positive attitude towards the clinical practice guidelines and a more positive opinion on the barriers of clinical practice guidelines utilization can share their skills, experience and knowledge with other health care workers thereby increasing the level of utilization of clinical practice guidelines (Badhiwala *et al*., 2021).

Ahuja *et al*., (2017) found that the organizational structure had a significant impact on physicians' attitudes regarding clinical practice guidelines and their use. According to Tinkle *et al*. (2016), health care workers with a positive attitude towards the clinical practice guidelines were more probably going to utilize the guidelines compared to those with a negative and neutral attitude towards clinical practice guidelines. A study done by Weng *et al*. (2013) showed physicians had a more positive attitude towards guideline utilization compared to nurses who had a negative attitude. In contrast, a study done by Stokke *et al*. (2014) showed that nurses had a more positive than negative attitude towards guideline utilization but had a low level of utilization. This was corroborated by a study done by Birrenbach *et al*. (2016) which showed physicians had a positive attitude towards guideline utilization, however had a low utilization of it. Nevertheless, nurses who see the benefit of evidence based clinical guidelines in addition to a positive attitude towards it enhanced its utilization. According to Wengel *et al*.,(2018), barriers related to attitude had both positives and negatives which included reduction of the clinical freedom of health care workers, guidelines not applicable to all patients, no improvement in patients outcomes after utilization of guidelines, an appropriate source of guidance, a good educational tool, standardizes quality and practice of health care workers among others. A study done by Selahattin *et al*. (2021), showed positive attitude such as minimization in malpractice cases, reduction of health care costs, reduction in defensive medicine and negative attitude such as job unsatisfaction among physicians,

minimization of research activity, guidelines being only useful for beginners, lack of autonomy of the health care worker in daily medical practice.

The most common reason for disagreement with clinical practice guidelines (68%) was that they were not applicable to patients with concomitant conditions, according to Burke *et al*., (2016). The guidelines' lack of supporting data for a recommendation also had a detrimental effect on doctors' attitudes. Twenty percent of doctors lacked the confidence to follow the recommendations of the guidelines because they lacked the necessary training and skills. 30% of physicians had doubt in the recommendation achieving better patient outcomes while 27% lacked motivation to change previous practices due to already established habits and routines (Jones *et al*., 2018). However, in Sub-Saharan Africa, a study done by Zewdie *et al*. (2023) in Ethiopia, showed that health care workers with a positive attitude towards CPG use were 2 times more likely to utilize it. This was similar to a study done by Mutisya *et al*. (2015) in Kenya where nurses had a more positive attitude to translate research findings to practice.

2.7 Summary of literature review

Especially in Kenya, there is a dearth of research that examines the degree to which the CPG in the management of ATSCI are utilized and the variables that contribute to this phenomenon. Most studies had a bivariate analysis therefore providing limited insight into the association among the variables. Studies evaluating the association between sociodemographic characteristics, health system factors, and the knowledge and attitude factors and how it relates to the level of utilization of the CPG in the acute care management of patients with acute traumatic spinal cord injuries are justified as a result of this reason.

2.8 Theoretical framework

2.8.1 Theory of Planned Behavior

According to Rich *et al*. (2020), TPB investigates the prior knowledge, expectations, and intentions of individuals in order to give an explanation for their acts. According to the theory of planned behaviour (TPB), the individual's attitude towards the activity, the subjective norm surrounding the action, and the individual's feeling of behavioural control over the behaviour are the three most crucial factors in forming an individual's conduct. In other words, an individual's attitude is the most important factor in moulding their behaviour.

The theory of planned behaviour (TPB) was explored to determine the characteristics that influence healthcare professionals' desires to employ CPGs in the context of utilizing CPGs in the acute care treatment of individuals suffering from acute spinal cord injury. One's "attitude" towards using clinical practice guidelines (CPGs) in treating acute spinal cord injury was being discussed here. More patients would benefit if healthcare providers had a more positive outlook on using CPGs. The health care workers' normative beliefs may profoundly affect healthcare providers' intentions to implement CPGs. For instance, if health care workers believe that their superiors and peers implement CPGs, it will increase the likelihood that they will do so (Kortteisto *et al*., 2010). The likelihood of CPG adoption can be affected by healthcare professionals' views on how simple or complex they are to use and their level of self-assurance in applying them. TPB has been employed in several studies to gain insight into healthcare professionals' intentions towards applying clinical practice guidelines (CPGs). Kortteisto *et al*. (2010), for instance, employed TPB to learn what factors prompted healthcare providers to adopt CPGs. Healthcare workers' willingness to utilize CPGs was found to be substantially foretold by the attitude of healthcare

staff, their subjective norm, and their perceived level of behavioural control significantly impacted their preparedness to employ CPGs.

It was shown that a person's attitude, their subjective norm, and their perceived level of behavioural control were important predictors of CPG compliance. As a consequence of this, Theory of planned behaviour was used to investigate the factors that impact the decisions that medical professionals make about the application of the CPG in the care of patients who have suffered from ATSCI. Healthcare providers' intentions to follow the clinical practice guideline (CPG) can be improved by developing interventions that address barriers to the CPG adoption.

2.9 Conceptual framework

Figure 2.1 presents a conceptual framework which depicted the relationship between socio-demographic characteristics, health system factors, and health care workers' knowledge and attitude factors, as well as the level to which the CPG is used. It studied the independent variables which are the socio-demographic factors in terms of age, level of education, cadre and years of working experience and their impact of the level of utilization of the clinical practice guideline. It also examined the health system variables such as trained health care providers, availability of guidelines, adequate health care providers and availability of diagnostic equipment and facilities and how they impacted the level of utilization of the clinical practice guideline. Finally, this study looked at the knowledge and attitude factors to the utilization of the clinical practice guideline. The dependent variable, level of utilization of the CPG, was impacted by the sociodemographic, health-system factors, and the knowledge and attitude factors. The external factor (intervening factor) was the clinical guidelines at level 4-6 hospitals. With effective implementation, the clinical practice guideline with favorable independent characteristics had seen an increased use from previous research.

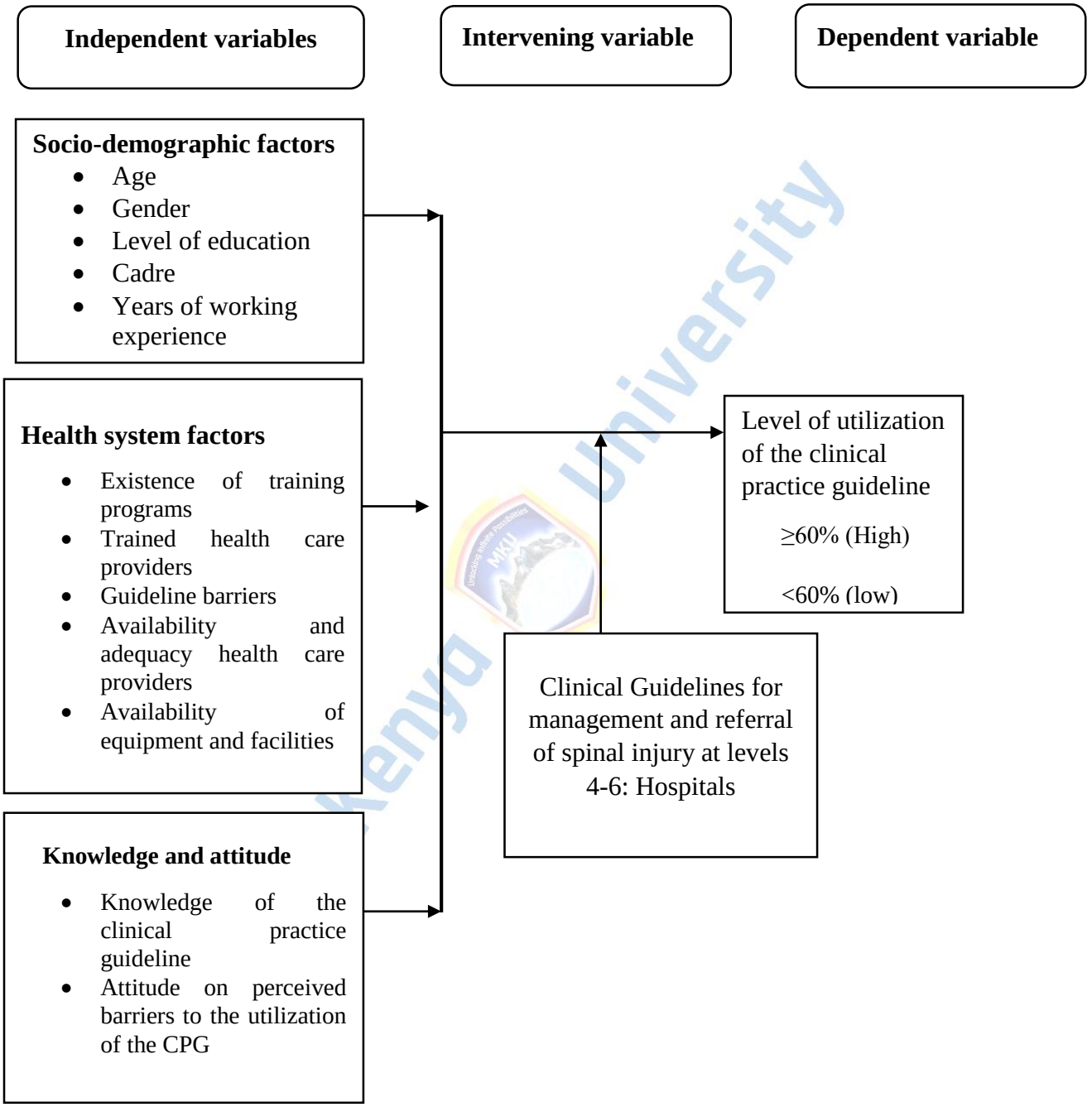

Figure 2.1: Conceptual Framework

CHAPTER THREE: METHODOLOGY

3.1 Introduction

Topics addressed in this section include research methodology, study variables, population of interest, sampling procedures, sample size determination, inclusion and exclusion criteria, data collection instrument, validity and reliability, statistical analysis and reporting and ethical approval.

3.2 Research design

An analytical cross-sectional design was used in determining the socio-demographic factors, health-system factors and knowledge and attitude factors influencing CPG utilization. It was used because it analyzed and quantified the relationship between independent and dependent variables. It collected all the numerous variables at once.

3.3 Study variables

Level of CPG utilization, a binary variable with the possible values "low" and "high," served as the dependent variable. The independent variables included the socio-demographic, health system, and knowledge and attitude components. Socio-demographic variables included age, gender, educational level, cadre and years of working experience. Health system factors included trained health care providers, guideline barriers, adequate health care providers and availability of diagnostic equipment and facilities while Knowledge and attitude factors included knowledge of the clinical practice guideline and attitude on perceived drawbacks to using the guideline. The research examined the independent variables' effect on CPG utilization. Favorable independent

variables increase the level of utilization of the CPG while unfavorable independent variables decrease the level of utilization of the CPG.

3.4 Location of the study

Because no other public institution provides specialized care for people with spinal cord injuries, the study was conducted at the National Spinal Injury Referral Hospital (NSIH). It is a level 6 hospital with 40 beds and 135 staffs (Ministry of Health, 2015). It is located in Kilimani, Nairobi County and it lies between the coordinates 1° 17' 17" to the south and 36° 47' 38" to the east. It receives patients referred from private and public institutions in the whole of the republic and neighbouring counties as well. Data from NSIH indicated that annually, it manages an average of 205 spinal injury patients (OAG analysis of NSIH data).

3.5 Target and study population

Health care providers in NSIRH were the study's target group (Clinical officers and nurses). The target group was specifically chosen because they are in charge of utilizing the clinical practice guideline in managing patients with acute traumatic spinal cord injuries.

3.6 Sampling

3.6.1 Sample size determination

A complete enumeration of the population of the study which was 40 was selected as the sample size.

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3.6.2 Sampling procedures

A census sampling was employed. Data was collected from each and every clinical and nursing officer in NSIRH that was eligible for the study.

3.7 Inclusion criteria

Healthcare workers with at least one-year of experience were considered, permanent staff at NSIRH and those who consented to the study were also recruited.

3.8 Exclusion criteria

Specialists, Health care workers who had less than one-year of experience, part-time healthcare workers, and those who refused to consent in the study were excluded from the research. Staff with no qualification related to acute traumatic spinal cord injury management were also eliminated from the study.

3.9 Data collection instruments and procedures

A semi-structured research questionnaire adopted from past research Qumseya *et al*., (2021) was used to collect the quantitative data. There were three sections to the tool. Section A collected information on socio-demographic factors, section B collected information on health system factors, and section C collected information on the level of utilization of clinical practice guidelines and the knowledge and attitude factors.

3.10 Pre-testing of data collection instruments

For the semi-structured questionnaire, pre-testing was carried out in Nairobi Spine and Orthopaedic Centre among 8 participants (20% of the sample size) to compare and contrast for

uncertainty and confirmed the validity of the data collection instrument. Feedback was collected and adjustment was made to the tools.

3.11 Validity of the research instruments

To establish content validity, it was determined by checking that the questionnaire questions directly addressed the aims of the research and was additionally verified by research supervisors and expertise in the discipline eliminating any ambiguity in the questions. Each of them examined how the questions related to one another and determined if they measured the same construct. The questionnaire's clarity, thoroughness, and relevance to the participants' experiences was guaranteed based on the experts' recommendations.

3.12 Reliability of the research instruments

The devised questionnaire was pre-tested on the health care professionals at the Nairobi Spine and Orthopaedic Centre to ensure consistency of the data collection tools. In addition, a retest was done in which the same subset of participants was surveyed and the results compared to check for consistent findings. The quantitative data were entered into a statistical package for social sciences (SPSS) version 27 for internal consistency of the semi-structured questionnaire and a Cronbach's alpha of 0.743 for the binary scale and 0.831 for the Likert scale were found suggesting the data collection tool was reliable.

3.13 Data analysis and presentation

The Statistical Package for the Social Sciences (SPSS) version (27) was used in the performance of the quantitative analysis. After the information was entered into an Excel sheet and inspected for outliers, inconsistencies, and gaps in the data, it was then imported into SPSS and additional

analysis performed on it. The mean and standard deviation was used to summarize the numerical data, while the categorical variables was summarized by frequencies and percentages. In the process of doing a bivariate analysis, cross-tabulations and the chi-square test of independence were used to investigate the degree to which the dependent and independent variables were connected to one another at 95% confidence interval. A p-value that is either less than or equal to 0.05 was used as the cut-off point for statistical significance. Binomial logistic regression at 95% confidence interval was used to test for further association and to control for confounders for the variables that was shown to be significant in bivariate analysis. The results were then presented in text, tables, and graphics. Level of utilization of the CPG was presented using a pie-chart with its follow-up question presented using a frequency table. The socio-demographic factors, health system factors and knowledge factors were presented with a frequency table while attitude factors with frequency table and mean and standard deviation table. Table 3.1 summarizes the data analysis.

Table 3.1: Data analysis summary

Specific objectives	**Independent variables**	**Dependent variable**	**Data analysis**
1. To determine the level of utilization of the CPG		Level of utilization of the CPG	Descriptive statistics
2. To identify the socio-demographic factors associated with the utilization of the CPG	Age, gender, level of education, cadre, years of working experience	Level of utilization of the CPG	Descriptive statistics Chi-square analysis

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3. To determine the health system factors associated with the utilization of the CPG	Trained health care providers, guideline barriers, adequate health care providers, availability of diagnostic equipment and facilities	Level of utilization of the CPG	Descriptive statistics Chi-square analysis Binary logistic regression
4. To determine the knowledge and attitude factors influencing the utilization of the CPG	Knowledge of the CPG, attitude on perceived barriers to the utilization of the CPG	Level of utilization of the CPG	Descriptive statistics Mean and standard deviation Chi-square analysis

3.14 Ethical consideration

This research sought ethical approval from the Mount Kenya University Institutional Ethics Review Committee (IERC). National Commission for Science, Technology and Innovation (NACOSTI) granted a permit to conduct the study. Permission to conduct the study was also obtained from the County Commissioner, Ministry of Education and Ministry of Health in Nairobi county. Further, permission was obtained from the Chief Executive Officer of National Spinal Injury Referral Hospital, Nairobi county. The participants voluntarily chose to participate, and the researcher got the informed consent in writing. The anonymity and privacy of the participants was upheld. The goal, benefits, and potential hazards of the study were all explained to the respondents. Each respondent was given an identification number rather than their name to use in the questionnaire. The research was carried out in a private setting in order to preserve the respondents' privacy. The study had no potential risk, no psychological harm nor conflict of interest with any third party

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CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter describes the findings of the study carried out in National Spinal Injury Referral Hospital (NSIRH); Kenya in October 2023 accompanied by the establishment of past studies. Being a quantitative study, quantitative data only will be discussed in this chapter. The results were presented objectively under the main subject matter of the study. The quantitative results were presented as univariate, bivariate, and multivariate statistics.

4.2 Response rate

A census sampling technique was conducted where all 40 respondents available were studied and from which all 40 fully responded to the posed questions. This translated to a response rate of 100% which was acceptable and representative according to Mugenda & Mugenda (2003).

4.3 Level of utilization of the clinical practice guideline

This study sought to determine the level of utilization of the clinical practice guideline in the acute care management of patients with acute traumatic spinal cord injury among 40 health care workers. As shown in figure 4.1 below, only 9(22.5%) of participants responded to having utilized the clinical practice guideline in daily practice out of a sample of 40 participants who fully responded to the posed questions. The level of utilization of the CPG was low, based on the study conducted by Braithwaite *et al*. (2020) which suggests figures ≥60% as the cutoff for high utilization and <60% as low utilization. This finding was not surprising as it corroborated the studies done by Nkrumah *et al*. (2018) in Ghana which showed 25.3% of health care workers utilized the CPG and Lafuente-Lafuente *et al*. (2019) in France with 29.8% of health care practitioners utilizing the CPG

in daily practice. However, contrary to these findings, a study done by Hendaus *et al*. (2014) in Qatar showed a high level of utilization of the clinical guidelines by health care practitioners with 80% and 78.7% of health care workers in Nigeria utilized the CPG (Bankole *et al*., 2022)

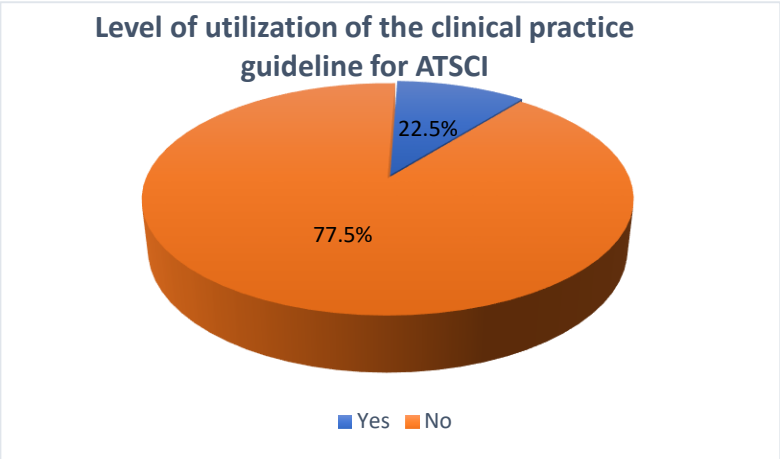

Figure 4.1: Level of utilization of the clinical practice guideline for ATSCI

On the follow-up question as indicated in Table 4.1, 62.5% of health care workers did not use the clinical practice guideline in their daily practice, 15% used rarely, 20% used sometimes and 2.5% used most of the time

Table 4.1: Multiple responses on frequency of level of utilization of the CPG

Frequency of Level of utilization of the CPG	Categories	Frequency of responses from cases	Percentage of cases %
	Most of the time	1	2.5
	Sometimes	8	20
	Rarely	6	15
	Not at all	25	62.5
Total		40	100

This bore some similarity to the earlier results of Lafuente-Lafuente *et al*. (2019) which showed 14.2% of health care workers used the guideline most of the time, 15.6% used it sometimes and

70.2% never used it in daily practice. This persistent low level of utilization of the CPG between this current study and the previous studies could be due to lack of training or training programs for the CPG, out of date guideline (>5 years), guideline not offering standardized care, lack of motivation to change previous habits amongst others as reported by participants

4.4 Descriptive statistics on socio-demographic factors

The study aims to provide a descriptive analysis on socio-demographic factors age, gender, level of education, cadre and years of working experience. As presented in table 4.2, the age group sampled was between 28-58 years, with most of the participants being between 30-49 years at 67.5%. Participants greater than 50 years of age constituted 17.5%, those between the ages of 0-29 years constituted 22.5%. All with a mean age of 40.8 years.

Regarding gender, 92.5% are females and 7.5% are males. The reason for this disparity was because the study was focused on clinical and nursing officers. Averagely in health facilities, more females are nurses than clinicians. Regarding the participants level of education as presented in table 4.2, most of the participants (62.5%) had a diploma. 2.5% had a certificate, 5% had a higher diploma, 25% had a bachelors' degree and 5% had a masters' degree.

For the cadre of these professionals, 92.5% are nursing officers and 7.5% are clinical officers. The most likely reason for the observation could be associated with nurses being the largest group out of all the healthcare cadres as noted by Cassidy *et al*. (2021). As indicated in table 4.2, for the years of working experience, most of the participants (45%) had 10-19 years of experience, this was followed closely by 25% who had 0-9 years of experience. 22.5% were between 20-29 years of experience while 7.5% had greater than 30 years of working experience. All with a mean of 16.1 years.

Table 4.2: Descriptive statistics on socio-demographic factors

Independent variable	Categories	Frequency	Valid percentage %
Age	0-29	6	15
	30-49	27	67.5
	50 and above	7	17.5
Gender	Male	3	7.5
	Female	37	92.5
Education level	Diploma	25	62.5
	Higher diploma	2	5
	Bachelors	10	25
	Masters	2	5
	Others (Certificate)	1	2.5
Cadre	Clinical officers	3	7.5
	Nursing officers	37	92.5
Working experience	0- 9years	10	25
	10-19 years	18	45
	20-29 years	9	22.5
	>30 years	3	7.5

4.5 Influence of socio-demographic factors on level of utilization of the CPG

The second objective of this study was to identify the socio-demographic factors associated with the level of utilization of the CPG in the acute care management of patients with ATSCI. Socio-demographic variables were run on a chi-square test of independence to test any statistically significant relationships between level of utilization of the CPG and the independent variables as shown in table 4.3. However, no socio-demographic variables were shown to have a statistically significant relationship with the dependent variable.

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As shown in table 4.3, 25.9% and 28.6% of the respondents in the ages 30-49 and ≥50 years respectively reported to utilize the CPG in their daily practice. The above observation could be accounted for older health care workers having more experience in their profession compared to younger health care workers with less experience (Reynolds *et al*., 2018). In running the chi square test of independence, age was found not to be statistically significantly related to the level of utilization of the CPG (X^2=2.027, df=2, p=0.355). Therefore, the level of utilization of the CPG was independent of age in this study. These findings were consistent with the works of Pitsillidou *et al*. (2021) in Cyprus which found no relationship between age and level of utilization of the CPG (p=0.393). On the contrary, a previously conducted study done by Dagne *et al*. (2021) in Ethiopia showed a statistically significant relationship between the 2 variables (AOR=5.98, 95% C.I: 1.34-26.7). Possible explanation for this variation could be the latter study focused more on nurses' contrary to this study.

Concerning gender as illustrated in table 4.3, 33.3% of male and 21.6% of female health care workers utilized the guideline in their daily clinical practice. These findings contrasted the study of Alqahtani *et al*. (2022) in Saudi Arabia which showed female health care workers utilized the guideline more and had less barriers to its usage. The relationship between gender and guideline utilization has been rarely studied. However, an explanation for this contrast could be that female health care workers are more inclined to use CPGs concerned with women's health compared to male health care workers who don't use regardless of patient's gender (Sada *et al*., 2023). Also, the gender disparities in this study could account for the variations in the two studies. As presented in table 4.3, chi-square findings revealed no statistically significant association between gender and level of utilization of the CPG (X^2=0.218, df=1, p=0.64). This result corroborated the studies of (Lafuente-Lafuente *et al*., 2015; Alqahtani *et al*., 2022) in France and Saudi Arabia respectively

which showed no statistical association between gender and utilization of the CPG. However, this contrasted the studies of (Sada *et al*., 2023; Pitsillidou *et al*., 2021) in Bahrain and Cyprus respectively which revealed a statistical association between the two variables. An explanation for this could be the vast gender imbalance in this study and the present study.

From table 4.3, for education level, showed that 50% of respondents who had a post-graduate training utilized the CPG more than those who had basic training. The observed results could be because respondents with post-graduate training were exposed to CPGs in their curriculum of advanced training. A non-statistically significant association between education level and utilization of the CPG was observed in the chi-square analysis (X^2=0.571, df=3, p=0.463). This finding agrees with the findings of (Famutimi *et al*., 2015; Alqahtani *et al*., 2022; Nkrumah *et al*., 2018) in Nigeria, Saudi Arabia and Ghana respectively which showed no statistically significant relationship between education level and utilization of the CPG. However, this contrasted findings from the studies of (Sada *et al*., 2023; Zewdie *et al*., 2023) in Bahrain and Ethiopia respectively which showed a statistically significant association between the two variables. This result finding could be explained by majority of the respondents being nurses who according to prior research depend on their superiors or colleagues' experience and training programs regardless of education level (Weng *et al*., 2013).

Concerning Cadre of the health care workers, as shown in table 4.3, when comparing the utilization of the CPG in these two groups of health care professionals, only 24.3% of nurses utilized the CPG in their daily clinical practice. These findings may be due to cadre imbalance with 92.5% of respondents being nurses as they constitute a larger percentage of health care workers in the hospital (Cassidy *et al*., 2021). As provided in table 4.3, there was a non-significant statistical association between cadre and level of utilization of the CPG in a chi-square test of independence

(X^2 =0.942, df=1, p=0.332). This result implies that the level of utilization of the CPG was influenced by other factors other than cadre. This compares with the studies of (Wahabi *et al*., 2011; Nkrumah *et al*., 2018) in Saudi Arabia and Ghana respectively which showed no statistically significant association between the two variables. However, this contrasted a study done by Weng *et al*. (2013) in Taiwan where there was a statistically significant association between cadre and level of utilization of the CPG (p<0.001). An explanation for these findings could be due to the variations in the processes instituted in implementation and utilization of the CPG in different countries for different cadres of health care workers.

For years of working experience, as provided in table 4.3, 27.8% and 44.4% of the respondents with 10-19 years and 20-29 years of experience respectively utilized the CPG in their daily clinical practice. This implies that more years of experience supported the increased utilization of the CPG (Zewdie *et al*., 2023). A non-statistically significant relationship between the years of experience and level of utilization of the CPG was revealed on the chi-square test of independence analysis (X^2 =6.547, df =3, p=0.088). This corroborates the findings of (Weng *et al*., 2013; Nkrumah *et al*., 2018; Alqahtani *et al*., 2022) in Taiwan, Ghana and Saudi Arabia respectively which showed a non-statistically significant relationship between years of working experience and level of CPG utilization. However, this contrasted the findings of (Bankole *et al*., 2022; Ammouri *et al*., 2014; Zewdie *et al*., 2023) in Nigeria, Oman and Ethiopia respectively which showed a statistically significant association between the two variables. An explanation for these findings could be health care workers with more years of working experience tend to rely on their expertise and the hospital norms while those with less years of experience mostly rely on their superiors as a source of advice (Stokke *et al*., 2014)

Table 1.3: Cross-tabulation on socio-demographic factors and utilization of the clinical practice guideline

Independent variable	Categories	Dependent variable (level of utilization of the clinical practice guideline)		Statistical significance
		Yes (N=9)	No(N=31)	
Age	0-29	0(0.0%)	6(100%)	X^2=2.027
	30-49	7(25.9%)	20(74.1%)	df=2
	50 and above	2(28.6%)	5(71.4%)	p=0.355
Gender	Male	1(33.3%)	2(66.7%)	X^2=0.218
	female	8(21.6%)	29(78.4%)	df=1
				p=0.64
Education level	Diploma	4(16%)	21(84%)	X^2=0.571
	Higher diploma	1(50%)	1(50%)	df=3
	Bachelors	3(30%)	7(70%)	p=0.463
	Masters	1(50%)	1(50%)	
	Others	0(0.0%)	1(100%)	
Cadre	Clinical officer	0(0.0%)	3(100%)	X^2=0.942
	Nursing officer	9(24.3%)	28(75.7%)	df=1
				p=0.332
Years of working experience	0-9	0(0.0%)	10(100%)	X^2=6.547
	10-19	5(27.8%)	13(72.2%)	df=3
	20-29	4(44.4%)	5(55.6%)	p=0.088
	30 and above	0(0.0%)	3(100%)	

4.6 Health system factors associated with level of utilization of the CPG

This study also sought to determine health system factors influencing the level of utilization of the CPG in the acute care management of patients with ATSCI. First, a univariate analysis was run to summarize the data and describe the pattern of responses to the health system variables among the participants as presented in table 4.4. Thereafter, a bivariate analysis was run using a chi-square statistic to check for associations between health system factors and the level of utilization of the

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CPG as shown in table 4.5. Variables that displayed a statistically significant relationship with the dependent variable were fitted into a binary logistic regression as presented in table 4.6.

4.6.1 Descriptive statistics on health system factors among respondents

As illustrated in table 4.4, a univariate analysis was done on the health system factors among the respondents which showed for adequately trained health care providers, 70% of the respondents reported not having been trained on how to utilize the CPG in daily practice for management of patients with ATSCI. This could be due to 92.5% of respondents not having a post-graduate training in their studies where CPG is an integral part of their curriculum (Pitsillidou *et al*., 2021).

Concerning training programs organized by NSIRH, in table 4.4, 100% reported not being offered training programs in the utilization of the CPG. This corresponds to findings from Farokhzadian *et al*. (2015) in Iran which showed 87.4% of health care workers never participated in training programs in the utilization of the CPG. This may be due to 75% of the respondents who had over 10 years of working experience in their clinical practice and this may have necessitated NSIRH not to restrict the health care workers' clinical freedom. 67.5% of respondents claimed to have the expertise to carry out all the recommendations of the CPG. This finding was higher than the findings of Weng *et al*. (2013) in Taiwan which showed 16.8% of health care workers had the required expertise to carry out the guideline recommendations. This could be due to the workers length of working experience. 57.5% of the respondents claimed not having their performance in the CPG utilization evaluated by their superiors. This could be linked to lack of protocols and processes for utilization of the CPG in the facility (Almazrou *et al*., 2020).

Concerning the guideline barriers in table 4.4, 92.5% of respondents claimed not having a personal copy of the CPG. This could be due to the CPG being inaccessible with improper dissemination

and poor communication to staffs (Pather *et al*., 2019). 47.5% of the respondents claimed the available CPG was not beneficial to their daily practice which could be linked to the CPG recommendation not aligning with the already established hospital processes and norms (Naude *et al*., 2015) and also due to health care workers being uncertain about the outcome expectation (Weng *et al*., 2023) in ATSCI patients' management. 57.5% of respondents claimed the CPG recommendations were written in a clear and concise manner for easy use. However, 72.5% of respondents reported the CPG was not up to date. The CPG being outdated by more than 5 years could explain this observation (Alonso-Coello *et al*., 2011).

From table 4.4, 72.5% of respondents claimed the recommendations of the CPG were not complex to use in daily practice with 72.5% reporting the recommendations of the CPG were more generalist than specialist. 52.5% and 57.5% of respondents reported volume of work and work shift respectively did not interfere with the utilization of the CPG in daily practice. 65% of respondents ascertained the CPG offered a logical basis of referral of ATSCI patients to specialists. However, 55% of respondents claimed the CPG's utilization did not offer standardized care to ATSCI patients in NSIRH. This could be linked to the guideline not being up to date and therefore not applying to recent clinical evidences (Naude *et al*., 2015). 50% of the respondents in table 4.4, reported they lack the time to apply the CPG recommendation to ATSCI patients. This could be due to the high volume of patients they manage daily. While 65% of respondents reported the CPG was not compatible with the already established process of management of ATSI patients in NSIRH. This could be linked to the national CPG being developed from international standard CPGs that may not apply to the poor-resource settings here. 90% of the respondents reported that the CPG does not restrict their continuity of self-education.

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For adequate health care providers in table 4.4, though shortage of staffs were a notable issue in NSIRH with 95% of respondents reporting this. However, 72.5% claimed the shortage of staffs did not affect the utilization of the CPG in terms of lack of time. For availability of diagnostic equipment and facilities in table 4.4, 100% of respondents reported NSIRH had adequate resources such as disposable and non-disposable materials, a functioning magnetic resonance imaging (MRI) and a functioning operating theatre in facilitating the use of the CPG in proper management of patients with ATSCI. However, 100% of the respondents claimed no functioning ICU/HDU.

Table 4.4 shows that there were a number of barriers in the health system factors affecting the utilization of the CPG which includes lack of training programs (100%), lack of copy of the CPG (92.5%), CPG not up to date (72.5%), inadequately CPG trained health care workers (70%), CPG not compatible with established processes (65%), lack of CPG performance evaluation (57.5%), CPG not standardizing care (55%), CPG not beneficial to daily clinical practice (52.5%). For the facilitators of CPG utilization in the health system factors, the most important facilitator was adequate materials and diagnostic equipment and facilities (100%) and the least important facilitator was volume of work not interfering with CPG usage (52.5%).

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Table 4.4: Frequency table on health system factors and level of utilization of the CPG

Independent variable	Categories	Frequency (N)	Valid percentage %
TRAINED HEALTH CARE PROVIDERS			
Trained in the utilization of the CPG	Yes	12	30
	No	28	70
Training programs organized by NSIRH	Yes	0	0.0
	No	40	100
Expertise to carry out all recommendations of the CPG	Yes	27	67.5
	No	13	32.5
Performance evaluation by superiors	Yes	17	42.5
	No	23	57.5
GUIDELINE BARRIERS			
Have a copy	Yes	3	7.5
	No	37	92.5
The CPG beneficial to daily practice	Yes	21	52.5
	No	19	47.5
Recommendations in a clear and concise Manner	Yes	23	57.5
	No	11	27.5
	I don't know	6	15
Guideline up-to-date	Yes	0	0.0
	No	29	72.5
	I don't know	11	27.5
Complex recommendations of the CPG	Yes	7	17.5
	No	29	72.5
	I don't know	4	10
Guideline recommendations more specialist than generalist oriented	Yes	6	15
	No	29	72.5
	I don't know	5	12.5
Volume of work interferes with usage of the CPG	Yes	19	47.5
	No	21	52.5
Work shift interferes with the usage of the CPG	Yes	17	42.5
	No	23	57.5
CPG provides logical basis of referral	Yes	26	65

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	No	11	27.5
	I don't know	3	7.5
CPG usage offers standardization of care	Yes	11	27.5
	No	22	55
	I don't know	7	17.5
Lack of time to apply CPG Recommendations	Yes	20	50
	No	20	50
CPG compatible with established process of NSIRH	Yes	26	65
	No	9	22.5
	I don't know	5	12.5
CPG usage restricts continuity of self Education	Yes	4	10
	No	36	90
ADEQUATE HEALTHCARE PROVIDERS			
Shortage of staffs	Yes	38	95
	No	2	5
Lack of time to use CPG due to shortage of Staffs	Yes	9	23.7
	No	29	76.3
AVAILABILITY OF DIAGNOSTIC EQUIPMENT AND FACILITIES			
NSIRH have adequate disposable and non-disposable materials	Yes	40	100
	No	0	0.0
NSIRH have a functioning MRI	Yes	40	100
	No	0	0.0
NSIRH have a functioning ICU/HDU	Yes	0	0.0
	No	40	100
NSIRH have a functioning operating theatre	Yes	40	100
	No	0	0.0

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4.6.2 Health system factors influencing level of utilization of the CPG

The third objective was to determine the health system factors contributing to the utilization of the CPG in the acute care management of patients with ATSCI in NSIRH. The relationship between health system factors and level of utilization of the CPG was established through the chi-square test of independence (table 4.5) after which variables that were statistically significant were modeled into a binary logistic regression model (table 4.6).

The model's omnibus test was statistically significant (X^2=4.341, df=1, p=0.037) which demonstrates the level of utilization of the CPG was influenced by the variables in the model. The model summary suggests that the included variables account for 15.7% of the variance in the guideline utilization based on Nagelkerke R2. The classification table demonstrates that the model correctly predicted guideline usage in 80% of the cases. The Hosmer and Lemeshow goodness of fit test were not statistically significant (X^2=11.273, df=8, p=0.187) showing that the prediction model was a good fit.

For adequately trained health care providers, as shown in table 4.5, 33.3% of respondents who had been trained utilized the CPG in daily practice. As mentioned earlier, this could be due to majority of the respondents not having a post-graduate qualification. As illustrated in table 4.5, 22.5% of participants who reported no training programs offered by NSIRH for the utilization of the CPG utilized the CPG. This could be due to inadequate resources to facilitate training programs.

Regarding the expertise to carry out the recommendations in the CPG in table 4.5, 33.3% of respondents who had the expertise utilized the CPG in their daily practice. This implies that having the skills to use the CPG encouraged its utilization. 35.3% of respondents whose CPG performance

was evaluated by superiors utilized the CPG in daily clinical practice. This implies that appraisals and clinical supervisions encouraged utilization of the CPG.

In summary, as illustrated in table 4.5, the results of the chi-squared test showed a statistically significant relationship between the trained health care providers and level of utilization of the CPG X^2=10.223, df=3, p=0.017. This implies that adequately trained health care workers encouraged the utilization of the CPG. This was fitted into a logistic regression model which revealed a statistically significant association between the two variables (p=0.046) implying it as a predictor variable for the level of utilization of the CPG as shown in table 4.6. Consequently, health care workers who are trained were up to 25.50 times more likely to utilize the CPG in their daily clinical practice than those who were not (OR=25.494, 95% C.I: 1.055-616.022). This corroborated the studies of (Zewdie *et al*., 2023; Weng *et al*., 2013) in Ethiopia and Taiwan respectively who found a statistically significant association between CPG trained health care providers and its level of utilization. However, this contrasted the study of Valenstein-Mah *et al*. (2020) in USA which showed no statistically significant association between CPG trained health care providers and level of utilization of the CPG (p>0.05). An explanation for these variations could be due to the health care workers professional experience and the already established hospital processes and protocols where the studies were carried out.

For the guideline barriers as shown in table 4.5, 100% of respondents who had a copy of the CPG utilized it. This suggests that possessing a copy of the CPG encouraged health care workers to its ease of utilization. In table 4.5, 33.3% of respondents who reported the CPG being beneficial to daily practice utilized it. This implies that if the CPG offered better patient outcome as against other sources of advice, utilization of the CPG will be encouraged (Wang *et al*., 2023). This finding may be associated with a positive agreement with the recommendations of the CPG amongst the

health care workers. 34.8% of respondents who reported the recommendations of the CPG were presented in a clear and concise manner utilized it. This means that a well-presented CPG recommendation may be viewed by health care workers as detailed, reliable and trustworthy to encourage utilization as CPG not easy to understand negatively influences its utilization (Correa *et al*., 2020).

From table 4.5, 31% of the respondents who reported the available CPG being out of date utilized it. This could be due to the CPG being the only one available in NSIRH for use and probably still offered some benefits in management of patients with ATSCI. 31% of the respondents who reported the CPG recommendations were not complex utilized the CPG. This implies that easy to use CPG has a positive influence on its utilization by health care workers. 31% of respondents who regarded the CPG as more generalist than specialist oriented utilized the CPG. This implies effective utilization of the CPG depends on its recommendations being able to be carried out by all cadres of health care workers.

Pertaining to the volume of work, 33.3% of respondents who reported the work load did not interfere with usage of the CPG utilized it (Table 4.5). This implies that despite the busy schedule of health care workers, evidence-based quality of care is of paramount importance as strategies may be developed to mitigate the high workload to enable them offer quality care to patients with ATSCI. Regarding work shift as shown in table 4.5, 34.8% of respondents who reported their work shift did not interfere with the usage of the CPG utilized it. The findings in table 4.5 shows that 34.6% of the respondents who reported the CPG offered a logical basis of referral of ATSCI patients had utilized it. Owing to the delicate nature of patients with ATSCI, health care workers would prefer a CPG that offers timely referral of these patients to specialists. (Ghaffari-Rafi *et al*., 2021).

From table 4.5, 27.3% of respondents who reported the CPG offered standardized care of patients utilized the CPG in daily clinical practice. This implies that CPGs that offer standardized treatment approaches are more likely to be used by health care workers for patient management. 35% of respondents who reported no lack of time to apply the CPG recommendations in clinical practice utilized the CPG. This could be attributed to the few recommendations put in place to follow in the CPG. As illustrated in table 4.5, 30.8% of respondents who reported the CPG recommendations was not compatible with established practice processes in NSIRH utilized the CPG. This could be due to the guideline recommendations being developed from international sources and therefore may not be appropriate for poor-resource settings. 25% of respondents who reported the CPG restricts their continuity of self-education utilize the guideline. This may be due to the CPG available not offering recent evidences for the health care workers to keep up to date with career development.

In summary, as illustrated in table 4.5, the results of the chi-squared test showed a non-statistically significant relationship between the guideline barriers and level of utilization of the CPG $X^2=7.749$, df=10, p=0.653. This implies that the guideline barriers noted did not influence the utilization of the CPG. This finding corroborated with the study of Sada *et al*. (2022) in Bahrain which found no statistically significant association between the guideline barriers and its level of utilization ($p>0.05$). However, this contrasted the study of Dagne *et al*. (2021) in Ethiopia which showed a statistically significant association between the guideline barriers and its level of utilization (p=0.001). An explanation for these variations could be due to the type of guideline used in these different settings and also the protocols that had been put in place to mitigate these barriers to enable the health care workers continuous provision of evidence-based care.

For adequate health care providers, 23.7% of respondents who reported there were shortage of staffs in NSIRH for all cadres of health utilized the CPG (table 4.5). This may be due to Kenya's sustainable development goals (SDG) index threshold of 30.14 per 10,000 health care workers as against 44.5 per 10,000 (Okoroafor *et al*., 2020). Further, 27.3% of respondents who utilized the CPG reported shortage of staffs in terms of lack of time was not a barrier to its utilization.

In summary, as illustrated in table 4.5, the results of the chi-squared test showed a non-statistically significant relationship between adequate health care providers and level of utilization of the CPG $X^2=0.726$, df=2, p=0.696. This finding is comparable with the study of Sada *et al*. (2022) which showed no statistically significant association between the two variables (p>0.05). However, this finding disagrees with the studies of (Hashish *et al*., 2020; Orangi *et al*., 2023) in Egypt and low- and middle-income countries which showed a statistically significant association between adequate health care providers and level of utilization of the CPG. These result variations could be explained due to the number of employees available and type of health facility in these two studies.

For availability of diagnostic equipment and facilities, in table 4.5, 22.5% of respondents who reported adequate availability of materials and equipment to facilitate the CPG use, utilized the CPG. This could be due to NSIRH being the only level 6 hospital for spinal cord injury management necessitating provision of adequate resources by the government. In Chi-square analysis, the statistical computations couldn't be performed due to the variable being a constant. This limitation prevents from drawing conclusions about its relationship with the utilization of the CPG.

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Table 4.5: Cross-tabulations on health system factors and utilization of the clinical practice guideline

Independent variable	Categories	Dependent variable (level of utilization of the clinical practice guideline)		Statistical significance
		Yes (N=9)	No(N=31)	
TRAINED HEALTHCARE PROVIDERS				X^2=10.223 df=3 p=0.017
Trained in the utilization of the CPG	Yes	4(33.3%)	8(66.7%)	
	No	5(17.9%)	23(82.1%)	
Training programs organized by NSIRH	Yes	0(0.0%)	0(0.0%)	
	No	9(22.5%)	31(77.5%)	
Expertise to carry out recommendations in the CPG	Yes	9(33.3%)	18(66.7%)	
	No	0(0.0%)	13(100%)	
Performance evaluated by superiors	Yes	6(35.3%)	11(64.7%)	
	No	3(13%)	20(87%)	
GUIDELINE BARRIERS				X^2=7.749 df=10 p=0.653
Have a copy	Yes	3(100%)	0(0.0%)	
	No	6(16.2%)	31(83.8%)	
Guideline beneficial to daily practice	Yes	7(33.3%)	14(66.7%)	
	No	2(10.5%)	17(89.5%)	
Recommendations in a clear and concise manner	Yes	8(34.8%)	15(65.2%)	
	No	1(9.1%)	10(90.9%)	
	I don't know	0(0.0%)	6(100%)	
Is the guideline up to date (at least 5yrs	Yes	0(0.0%)	0(0.0%)	
	No	9(31%)	20(69%)	
	I don't know	0(0.0%)	11(100%)	
Is guideline complex	Yes	0(0.0%)	7(100%)	
	No	9(31%)	20(69%)	
	I don't know	0(0.0%)	4(100%)	

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Is guideline more specialist than generalist oriented	Yes	0(0.0%)	6(100%)	
	No	9(31%)	20(69%)	
	I don't know	0(0.0%)	5(100%)	
Volume of work interfere with usage of CPG	Yes	2(10.5%)	17(89.5%)	
	No	7(33.3%)	14(66.7%)	
Work shift interfere with usage of CPG	Yes	1(5.9%)	16(94.1%)	
	No	8(34.8%)	15(65.2%)	
Guideline provide basis of logical referral	Yes	9(34.6%)	17(65.4%)	
	No	0(0.0%)	11(100%)	
	I don't know	0(0.0%)	3(100%)	
Guideline offer standardization of care	Yes	3(27.3%)	8(72.7%)	
	No	6(27.3%)	16(72.7%)	
	I don't know	0(0.0%)	7(100%)	
Lack of time to apply recommendation of the CPG	Yes	2(10%)	18(90%)	
	No	7(35%)	13(65%)	
Guideline compatible with established practice in NSIRH	Yes	8(30.8%)	18(69.2%)	
	No	1(11.1%)	8(88.9%)	
	I don't know	0(0.0%)	5(100%)	
Guideline restricts continuity of self-education	Yes	1(25%)	3(75%)	
	No	8(22.2%)	28(77.8%)	
ADEQUATE HEALTHCARE PROVIDERS				X^2=0.726 df= 2 P=0.696
Shortage of staffs	Yes	9(23.7%)	29(76.3%)	
	No	0(0.0%)	2(100%)	
Lack of time to use CPG due to shortage of staffs	Yes	3(33.3%)	6(66.7%)	
	No	6(20.7%)	23(79.3%)	
AVAILABILITY OF DIAGNOSTIC EQUIPMENT AND FACILITIES				NIL
Adequate disposable	Yes	9(22.5%)	31(77.5%)	

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and non-disposable materials	No	0(0.0%)	0(0.0%)
Functioning MRI	Yes	9(22.5%)	31(77.5%)
	No	0(0.0%)	0(0.0%)
Functioning ICU/HDU	Yes	0(0.0%)	0(0.0%)
	No	9(22.5%)	31(77.5%)
Functioning operating Theatre	Yes	9(22.5%)	31(77.5%)
	No	0(100%)	0(0.0%)

Table 4.6: Binary logistic regression model on health system factors

Variables in the Equation

							95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	Trained health care providers	3.238	1.6525	3.972	1	.046	25.494	1.055	616.022
	Constant	-3.883	2.499	2.415	1	.120	.021		

a. Variable(s) entered on step 1: Trained health care providers.

4.7 Knowledge and attitude associated with level of utilization of the CPG

This study also proposed to determine knowledge and attitude of health care workers influencing the level of utilization of the CPG. This section describes the respondents' knowledge and attitude before presenting the chi-square results.

4.7.1 Descriptive statistics on knowledge among respondents

As illustrated in table 4.7, 85% of the respondents were aware of the CPG. This could be due to the nature of the profession which is almost always justified by evidence-based approaches (Ding *et al*., 2022). Concerning familiarity in table 4.7, 72.5% of respondents reported they were familiar with the content of the CPG. In order to be able to choose the best plan of treatment for SCI patients, familiarity with the CPG is of paramount importance. (Beauchemin *et al*., 2019). 70% of the respondents purported they know-how to access the CPG at the point of care. This enables health care workers to easily consult for advice especially in scenarios that causes confusion in SCI patient management.

From table 4.7, 75% of respondents claimed the recommendations of the CPG had clarity and was comprehensible. This encourages a positive influence on its utilization. 62.5% of respondents reported that they know their roles and responsibilities in the CPG recommendations. Ambiguity about whose job it is to carry out a task leaves the health care worker unprepared in handling patients with TSCI. 77.5% of respondents claimed they adhere to the recommendations of the CPG. This encourages standardization of care to patients and also in clinical practice. 72.5% of respondents reported the CPG in use is based on scientific evidence. This enables the health care worker to trust the CPG to offer better patient outcome.

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Table 4.7: Frequency table on knowledge factors and level of utilization of the CPG

Independent variable	Categories	Frequency (N)	Percentage (%)
KNOWLEDGE OF THE CPG			
Awareness of the CPG	Yes	34	85
	No	6	15
Familiarity with the CPG	Yes	29	72.5
	No	11	27.5
Know-how to access the CPG at the point of care	Yes	28	70
	No	12	30
Ability to clearly read and understand the CPG	Yes	30	75
	No	10	25
Knowledge of the role and Responsibility	Yes	25	62.5
	No	15	37.5
Adherence to the CPG recommendations	Yes	31	77.5
	No	9	22.5
The CPG based on scientific evidence	Yes	29	72.5
	No	7	17.5
	I don't know	4	10

4.7.2 Association between Knowledge factor and level of utilization of the CPG

The hypothesized knowledge factor was first analyzed in a chi-square test of independence to check its association with the dependent variable, the level of utilization of the CPG. The variable did not show a statistically significant association.

From table 4.8, 26.5% of the participants who had awareness of the CPG utilized it. This affirms awareness plays a key role in the practice of evidence-based medicine. Health care workers who were aware complied more times than those who were not (Tinkle *et al*., 2016). 31% of respondents who were familiar with the CPG utilized it. This shows that not just being aware but

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also familiarity with the contents of the CPG encouraged its utilization more times more than those who were not familiar but aware (Tinkle *et al*., 2016). 32.1% of respondents who claimed the CPG was easy to access at the point of care utilized the CPG. This implies that due to the sensitive nature of ATSCI, the CPG being easy to access encouraged its utilization.

30% of respondents who reported to be able to clearly read and understand the CPG recommendations utilized it (table 4.8). This shows that guidelines written in a language familiar with the health care workers enables its usage in patient management. 36% of respondents who claimed the CPG offered role delineations utilized it. This implies that when health care workers are delegated tasks as per the CPG recommendation, it creates a structured management of patients. Table 4.8 shows 29% of respondents who reported they adhered to the recommendations of the CPG effectively utilized it. This shows that adherence which produces the outcome designed by guideline recommendation encourages further utilization of the CPG. 31% of the respondents who reported the CPG is based on scientific evidence utilized it. This implies that when the CPG is of scientific evidence, this encourages the health care workers to integrate it with their clinical skills to make decisions for the patient.

In summary, as illustrated in table 4.8, the results of the chi-squared test showed a non-statistically significant relationship between knowledge of the CPG and its level of utilization $X^2=6.968$, df=6, p=0.324. This corroborates the study of Hashish *et al*. (2020) in Egypt which showed a non-statistically significant relationship between knowledge of the CPG and its utilization (p=0.189). However, this contrasted the studies of (Zewdie *et al*., 2023; Dagne *et al*., 2021) in Ethiopia and Bankole *et al*. (2022) in Nigeria which found a statistically significant association between the two variables. An explanation for these variations could be due to health care workers relying more on their experience, presence of an already established hospital practice norm and the type of

guideline in place in these areas of studies. This shows that knowledge is not entirely enough to encourage the health care workers to utilize the CPG (Abuadas, 2021).

Table 4.8: Cross-tabulation on knowledge factors and utilization of the clinical practice guideline

Independent variable	Categories	Dependent variable (level of utilization of the clinical practice guideline)		Statistical significance
		Yes (N=9)	No(N=31)	
KNOWLEDGE OF THE CPG				X^2=6.968 Df=6 P=0.324
Awareness of the CPG	Yes	9(26.5%)	25(73.5%)	
	No	0(0.0%)	6(100%)	
Familiarity with the CPG	Yes	9(31%)	20(69%)	
	No	0(0.0%)	11(100%)	
Easy access to the CPG at the point of care	Yes	9(32.1%)	19(67.9%)	
	No	0(0.0%)	12(100%)	
Clearly read and understand the CPG	Yes	9(30%)	21(70%)	
	No	0(0.0%)	10(100%)	
Role and responsibility	Yes	9(36%)	16(64%)	
	No	0(0.0%)	15(100%)	
Adherence to the CPG recommendations	Yes	9(29%)	22(71%)	
	No	0(0.0%)	9(100%)	
CPG based on scientific evidence	Yes	9(31%)	20(69%)	
	No	0(0.0%)	7(100%)	
	I don't know	0(0.0%)	4(100%)	

4.7.3 Descriptive statistics on attitude among respondents

As illustrated in table 4.9, a 5-point Likert scale was designed to group the respondents' attitude into strongly agree, agree, neutral, disagree and strongly disagree. Regarding the attitude of health

care workers towards CPG utilization, health care workers at NSIRH believed that CPGs are an appropriate source of advice (100%), it may improve the standard of patient's care (100%), it may reduce defensive medicine (82.5%), it may minimize malpractice cases (95%), it may standardize the quality and practice of health care workers (90%), 67.5% reported they lacked the motivation to use guidelines due to work inertia and 60% ascertained that the CPG does not address patients with secondary complications of ATSCI.

However, health care workers at NSIRH strongly disagreed/disagreed to statements like CPGs are only useful for beginners in the medical profession (72.5%), CPGs interfere with health care workers clinical judgement and decisions (67.5%), CPGs may lead to job unsatisfaction (75%) and CPGs restrict health care workers clinical freedom (50%). Notably, health care workers neither agreed nor disagreed to statements like some of the CPG recommendations lacked evidence (45%), CPGs oversimplifies medical practice into "cookbook medicine" (47.5%) and CPGs don not apply to patients with comorbidities (52.5%). Needful to say, health care workers had a disagreement and a neutral standpoint equally to the statement "the CPG recommendations will not achieve better patient outcome" (35%).

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Table 4.9: Frequency table on attitude factors towards CPG utilization

Items	Strongly agree/agree n (%)	Neutral n (%)	Strongly disagree/ disagree n (%)
The guideline is an appropriate source of advice	40 (100)	0 (0.0)	0 (0.0)
It may improve the standard of patient's care	40 (100)	0 (0.0)	0 (0.0)
It may reduce defensive medicine	33 (82.5)	4 (10)	3 (7.5)
It may minimize malpractice cases	38 (95)	2 (5)	0 (0.0)
It may standardize the quality and practice of health care workers	36 (90)	3 (7.5)	1 (2.5)
It may minimize the cost of healthcare	31 (77.5)	2 (5)	7 (17.5)
Some of the recommendations in the guideline lacks evidence	16 (40)	18 (45)	6 (15)
The guideline recommendations will not achieve better patient outcome	12 (30)	14 (35)	14 (35)
It oversimplifies medical practice into "cookbook medicine"	7 (17.5)	19 (47.5)	14 (35)
I lack motivation to utilize the guideline because of previous habits and routines in my medical practice	27 (67.5)	2 (5)	11 (27.5)
It is only useful for beginners in the medical profession	6 (15)	5 (12.5)	29 (72.5)
It interferes with the healthcare worker's clinical judgement and decisions	4 (10)	9 (22.5)	27 (67.5)
It may lead to job unsatisfaction for the health care worker	2 (5)	8 (20)	30 (75)
It restricts the health care worker's clinical freedom	9 (22.5)	11 (27.5)	20 (50)
It does not address patients with secondary complications (UTI, VTE, pressure sores etc.)	26 (65)	14 (35)	0 (0)
It does not apply to patients with comorbidities	6 (15)	21 (52.5)	13 (32.5)

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4.7.4 Association between attitude factor and the level of utilization of CPGs

The hypothesized attitude factor was first analyzed in an adapted attitude scale, then the chi-square test of independence to check its association with the dependent variable, the level of utilization of the CPG. The variable did not show a statistically significant association. The five-point Likert scale serves as an interval scale, with considerable significance attributed to the mean. Ranging from 1 to 1.8, responses indicate a strong disagreement. Falling between 1.81 and 2.60 suggests a stance of disagreement. The interval of 2.61 to 3.40 signifies a neutral standpoint, while 3.41 to 4.20 reflects agreement. Finally, scores from 4.21 to 5 denote a strong agreement. These mean values offer insight into the healthcare providers' attitudes concerning the extent of Clinical Practice Guideline (CPG) utilization in the acute care management of patients with Acute Traumatic Spinal Cord Injuries (ATSCI), as outlined in table 4.10.

The mean and standard deviation for favourable statements like the guideline is an appropriate source of advice 4.60(0.496), it may improve the standard of patients' care 4.70(0.464), it may reduce defensive medicine 4.25(1.006), it may minimize malpractice cases 4.55(0.597) and it may standardize the quality and practice of health care workers 4.55(0.749) denoted a strong agreement while it may minimize the cost of health care 3.98(1.074) reflected agreement of the health care workers' attitude towards CPG utilization. The most important attitude towards CPG utilization for the favorable statements was respondents believed CPG may improve the standard of patients' care 4.70(0.464) while the least important attitude was respondents believed CPG may minimize the cost of health care 3.98(1.074)

The mean and standard deviation for unfavourable statements like some of the recommendations in the CPG lacks evidence 3.25(0.809), the guideline recommendations will not achieve better

patient outcome 2.88(0.939), it oversimplifies medical practice into "cookbook medicine" 2.75(0.840), lack of motivation to use due to inertia of practice 3.20(1.244) and it does not apply to patients with comorbidities 2.75(0.809) signified a neutral standpoint of health care workers' attitude towards CPG utilization. It is only useful for beginners in the profession 2.18(1.130), it interferes with health care workers' clinical judgement and decisions 2.23(0.891), it may lead to job unsatisfaction 2.08(0.797) and it restricts clinical freedom 2.55(1.037) suggested a stance of disagreement while it does not address patients with secondary complications 3.65(0.483) reflected agreement of the health care workers' attitude towards CPG utilization. The most important attitude for the unfavourable statements towards CPG utilization was respondents believed CPG do not address patients with secondary complications 3.64(0.483) while the least important attitude was respondents believed CPG use may lead to job unsatisfaction 2.68 (0.797).

The level of utilization of the Clinical Practice Guideline (CPG) in the acute care management of patients with Acute Traumatic Spinal Cord Injuries (ATSCI) is reflected in the overall mean utilization score of 3.39 ± 0.84, derived from a five-point Likert scale. The overall standard deviation of 0.84 suggests a relatively low degree of variability in the responses. The overall mean utilization score falls within the range of 2.61 to 3.40 on the Likert scale, indicating a neutral standpoint among healthcare providers. The neutral attitude suggests that, on average, healthcare providers neither strongly agree nor disagree with the utilization of the CPG in the acute care management of ATSCI patients. This corroborates a study done by Tinkle *et al*. (2016) in New Mexico which showed health care workers who had a neutral and negative attitude utilized the CPG less than those who had a positive attitude. However, this contrasted the previous study by Graham *et al*. (2000) in Canada which showed health care workers who had a neutral attitude used

the CPG thrice more and those with positive attitude 5 times more in comparison to those who had a negative attitude.

Table 4.10: Mean and STD on health care providers' attitude towards utilization of CPG

Items	SDA	DA	N	A	SA	Mean	SD
The guideline is an appropriate source of advice	0	0	0	16	24	4.60	0.496
It may improve the standard of patient's care	0	0	0	12	28	4.70	0.464
It may reduce defensive medicine	1	2	4	12	21	4.25	1.006
It may minimize malpractice cases	0	0	2	14	24	4.55	0.597
It may standardize the quality and practice of health care workers	0	1	3	9	27	4.55	0.749
It may minimize the cost of healthcare	0	7	2	16	15	3.98	1.074
Some of the recommendations in the guideline lacks evidence	1	5	18	15	1	3.25	0.809
The guideline recommendations will not achieve better patient outcome	3	11	14	12	0	2.88	0.939
It oversimplifies medical practice into "cookbook medicine"	3	11	19	7	0	2.75	0.840
I lack motivation to utilize the guideline because of previous habits and routines in my medical practice	8	3	2	27	0	3.20	1.244
It is only useful for beginners in the medical profession	12	17	5	4	2	2.18	1.130
It interferes with the healthcare worker's clinical judgement and decisions	8	19	9	4	0	2.23	0.891
It may lead to job unsatisfaction for the health care worker	9	21	8	2	0	2.08	0.797
It restricts the health care workers' clinical freedom	7	13	11	9	0	2.55	1.037

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It does not address TSCI patients with secondary complications (UTI, VTE, pressure sores etc.)	0	0	14	26	0	3.65	0.483
It does not apply to patients with comorbidities	3	10	21	6	0	2.75	0.809

Note: N = 40; SDA = Strongly Disagree; DA = Disagree; N = Neutral; A = Agree; SA = Strongly Agree. Overall mean utilization score = 54.15/16 = 3.3844 ~ 3.39; Overall standard deviation =13.365/16 = 0.8353 ~ 0.84

As shown in table 4.11, the chi-square statistic results with values X^2 =14.057, df =14, *p*=0.445 indicated a non-statistically significant relationship between attitude and level of utilization of the CPG. This implies that the neutral attitude of health care workers had no influence on the utilization of the CPG. This finding corroborated the studies of (Desalu *et al*., 2022; Birrenbach *et al*., 2016) in Nigeria and Switzerland respectively which showed no statistically significant association between the two variables. However, this contrasted the studies of Hashish *et al*., 2020; Selahattin *et al*., 2021) in Egypt and Turkey respectively which found a statistically significant relationship between attitude and CPG utilization. An explanation for the disparities in the above reported findings could be the variations in the training of the health care workers regarding CPG use which informed their attitude towards it.

Table 4.11: Association between Attitude factors and the level of utilization of the CPG

	Dependent variable (Level of utilization of the clinical practice guideline)		
	X^2	Df	P-value
Independent variable (Attitude Factor)	14.057	14	0.445

CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the study results, conclusion, and recommendations.

5.2 Summary of the result findings

The study aimed to investigate the level of utilization of the CPG and the related factors. In summary, the level of utilization of the CPG was low at 22.5%. Concerning socio-demographic factors, most of the respondents were between the ages of 30-39 years (67.5%) with the majority being female (92.5%). Those who had diplomas were the most (62.5%) and most of the respondents had 10-19 years of working experience (45%). Chi-square findings revealed that age (p=0.355), gender (p=0.64), level of education (p=0.463), cadre (p=0.332) and years of working experience (p=0.088) did not statistically significantly influence the level of utilization of the CPG.

Concerning health system factors influencing the level of utilization of the CPG, for trained health care workers, 70% were not trained to use the CPG, 100% ascertained no CPG training programs organized by NSIRH, 67.5% had the expertise to carry out all recommendations of the CPG and 57.5% were not evaluated by superiors on CPG usage performance. For the guideline barriers, 92.5% did not have a copy of the CPG, 52.5% stated the CPG was beneficial to daily practice, 57.5% ascertained the CPG recommendations were presented in a clear and concise manner. 72.5% each stated the CPG in use was not up to date, the CPG recommendations were not complex, and the CPG recommendations were more generalist than specialist. 52.5% and 57.5% stated the volume of work and work shifts respectively did not interfere with the usage of the CPG, 65% claimed the CPG provided a logical basis of referral, 55% claimed the CPG did not offer standardization of care to patients while there was an equal division between those that had the

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time to apply the CPG recommendations and those who did not (50%). 65% also stated the CPG was not compatible with established process of NSIRH and 90% of respondents' continuity if self-education was not restricted by CPG use. For adequate health care workers, 95% stated there was a shortage of staffs, however 72.5% claimed this shortage did not affect utilization of the CPG. For availability of diagnostic equipment and facilities, 100% claimed NSIRH had adequate disposable and non-disposable materials, a functioning MRI and operating theatre. However, 100% stated no functioning ICU/HDU. In chi-square analysis, trained health care workers (p=0.017) statistically significantly influenced the level of utilization of the CPG whereas guideline barriers (p=0.653), adequate health care providers (p=0696) and availability of diagnostic equipment and facilities (p=nil) did not. However, binary logistic regression analysis, indicated trained health care workers (p=0.046) reserved its initial statistical significance.

On knowledge and attitude among the respondents, 85% were aware of the CPG, 72.5% were familiar with the CPG and 70% knew how to access the CPG at the point of care. Further, 75% can clearly read and understand the CPG, 62.5% knew their roles and responsibilities in the CPG, 77.5% adhered to the CPG recommendations and 72.5% stated the CPG was based on scientific evidence. Concerning attitude, a neutral attitude towards the utilization of the CPG was found amongst the respondents (3.39±0.84). Chi-square findings revealed that knowledge of the CPG (p=0.324) and attitude on perceived barriers (p=0.445) did not influence the level of utilization of the CPG.

5.3 Conclusion

The level of utilization of the CPG in NSIRH was low at 22.5%. The binary logistic regression model found that the trained health care workers was the most statistically significant factor

associated with the utilization of the clinical practice guideline (p=0.04) in the fitness model. This necessitates the need for future interventions to focus on providing targeted CPG training programs which would enable health care workers to effectively choose the best course of treatment thereby lowering the burden of ATSCI especially in these resource-poor settings as this may improve the outcome for patients with ATSCI.

From the socio-demographic factors, the study concluded that the level of utilization of the CPG was independent of age, gender, level of education, cadre and years of working experience.

Regarding health system factors, the study concluded that trained health care workers influenced the level of utilization of the CPG. However, guideline barriers, adequate health care workers and availability of diagnostic equipment and facilities did not influence the level of utilization of the CPG.

About knowledge and attitude, the study concluded that knowledge of the CPG and attitude on perceived barriers did not influence the level of utilization of the CPG.

5.4 Recommendations

5.4.1 Recommendations from the study

1. Guideline developers should develop guidelines with guideline implementation tools (e.g training materials) to promote uptake of the CPG thereby improving health care workers' behaviour and patient outcomes.
2. Health authorities and NSIRH should incorporate regular CPG training programs into the organizational culture to obtain better CPG competence amongst the health care workers.

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3. Ministry of health should institute proper monitoring and evaluation strategies in place to get feedback on the performance assessment of the health care workers' CPG utilization and on the impact of the CPG on health care workers and NSIRH.

5.4.2 Recommendations for further study

1. Future researchers should audit the CPG to address which of the recommendations are beneficial and non-beneficial to enable the guideline developers develop a more focused guideline to make utilization easier.
2. Future researchers should also investigate other sources that health care workers use to support their practice and which can best combine to the CPG to offer a better guideline.

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Mount Kenya University

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APPENDICES

Appendix I: Written Consent Form

PART A

Consent form.

Researcher's name: Chukwuma Ikenna Eke

Topic of the research: Determinants of utilization of the clinical practice guideline (CPG) in the acute care management of patients with acute traumatic spinal cord injury in National spinal injury Referral Hospital (NSIRH), Kenya**.**

Introduction and purpose of the study

My name is Chukwuma Ikenna Eke, a masters' student at Mount Kenya University, conducting a research on determinants of utilization of the clinical practice guideline (CPG) in the acute care management of patients with acute traumatic spinal cord injury at NSIRH. This research is purely academic.

Research description

This study will recruit health care workers (HCWs) who work in NSIRH. The level of utilization of the CPG, sociodemographic characteristics and health system factors will be evaluated. In addition, the HCWs should have at least one-year experience and be permanent staffs of NSIRH.

Involvement and discontinuation from the study

Your choice to be involved in this study is optional and you are free to discontinue as you wish either in writing or verbally.

Potential benefits

Participants will gain more knowledge on the barriers involved towards the regular utilization of CPGs in daily practice

Potential risk and discomfort

Questions on determinants of utilization of the CPG will be a bit sensitive and uncomfortable to answer. However, you are free to skip the question in dispute.

Privacy and secrecy

The data gotten will only be utilized for the indicated research aim. All questionnaires will be securely disposed of after the analysis and presentation of results. Your identity will remain anonymous and will not be disclosed.

Compensation

No fee will be given.

Cost

There are no financial implications to be involved in this study.

Contact Information

You can enquire any information during this study if you have any. Also, you can reach out to me via calls at +254 110058677 or email at mekentaman@gmail.com or contact the Academic advisor and the Dean of the faculty. You can also contact the Institutional Ethical Review Committee (IERC) office at Mount Kenya University at research@mku.ac.ke for any enquiries about the privacy of your data collected, rights or if there are potential risks you may be involved in during this research.

Respondent statement

I have been informed and counselled on the research in details including its possible benefits and hazards. My involvement is purely consensual and I can withdraw from this research at any period. My enquiries concerning this research have been acknowledged by the researcher and I am aware that my privacy will be kept at all times. I give my consent to be involved in this study.

☐ **Yes**

☐ **No**

Researcher statement

The purpose and objectives of this study have been explained to the respondent in the dialect the respondent is familiar with.

Respondent Signature

…… **Date ……**

Researcher Signature

…… **Date ……**

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Appendix II: Semi-Structured Questionnaire

Questionnaire Number ……

Respondent number…….

Date…….....

INSTRUCTIONS

Read the questions and tick appropriately.

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

1. Age _____

2. Gender

a) Male
b) Female

3. What is your highest level of education?

a) Diploma ()
b) Bachelors ()
c) Masters ()
d) PhD ()
e) Any other, specify ……

4. What is your cadre?

a) Nursing officer ()
b) Clinical officer ()
c) Medical officer ()

5. What are your years of working experience? _____

SECTION B: HEALTH SYSTEM FACTORS ***Tick where necessary***

6. Have you been trained in the utilization of the clinical practice guideline in the management of acute traumatic spinal cord injuries?

a) Yes ()
b) No ()

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7. Does NSIRH organize training programs in the utilization of clinical practice guideline for the management of acute traumatic spinal cord injuries?

a) Yes ()

b) No () **If no skip question 7b**

7b. If yes, how often?

a) Weekly ()

b) Monthly ()

c) Yearly ()

d) Others _____

8. Do you have the expertise to carry out all the recommendations in the clinical practice guideline in the management of acute traumatic spinal cord injuries?

a) Yes ()

b) No ()

9. Is your performance in the utilization of this clinical practice guideline evaluated by your superiors?

a) Yes ()

b) No ()

10. Do you have a copy of this guideline?

a) Yes ()

b) No ()

11. Is this clinical practice guideline beneficial to your daily practice as a health care worker?

a) Yes ()

b) No ()

12. Are the recommendations in this guideline presented in a clear and concise manner?

a) Yes ()

b) No ()

c) I don't know ()

13. Is the guideline up to date (at least 5 years old)?

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a) Yes ()

b) No ()

c) I don't know ()

14. Are the guideline recommendations complex or not user-friendly?

a) Yes ()

b) No ()

c) I don't know ()

15. Are the guideline recommendations more specialist than generalist oriented?

a) Yes ()

b) No ()

c) I don't know ()

16. Does the volume of your work interfere with usage of the guideline?

a) Yes ()

b) No ()

17. Does your work shift interfere with the usage of the guideline?

a) Yes ()

b) No ()

18. Does the guideline provide a basis of logical referral of patients?

a) Yes ()

b) No ()

c) I don't know ()

19. Does the guideline offer standardization of care for patients at NSIRH?

a) Yes ()

b) No ()

c) I don't know ()

20. Do you lack the time to apply the guideline recommendations in the management of patients?

a) Yes ()

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b) No ()

21. Is the guideline compatible with the established practice process in NSIRH?

a) Yes ()

b) No ()

c) I don't know ()

22. Does the guideline restrict your continuity of self-education?

a) Yes ()

b) No ()

23. Are there shortage of staffs as per your cadre in NSIRH?

a) Yes ()

b) No () **if no skip question 23b**

23b. If yes, does it affect the utilization of the guideline in terms of lack of time to apply the guideline recommendations to every patient?

a) Yes ()

b) No ()

24. Does NSIRH have adequate disposable and non-disposable materials to facilitate utilization of the guideline?

a) Yes ()

b) No ()

25. Does NSIRH have a functioning MRI?

a) Yes ()

b) No ()

26. Does NSIRH have a functioning ICU or HDU?

a) Yes ()

b) No ()

27. Does NSIRH have a functioning operating theatre?

a) Yes ()

b) No ()

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SECTION C: LEVEL OF UTILIZATION, KNOWLEDGE AND ATTITUDE FACTORS

28. Do you use this guideline in your daily practice?

    a) Yes ()

    b) No ()

29. How frequently do you use this guideline?

    a) Most of the time ()

    b) Sometimes ()

    c) Rarely ()

    d) Not at all ()

30. I am aware of the existence of the clinical practice guideline in NSIRH

    a) Yes ()

    b) No ()

31. I am familiar with and know the specific contents of the guideline

    a) Yes ()

    b) No ()

32. I know how to easily access the guideline at the point of care

    a) Yes ()

    b) No ()

33. I can clearly read and understand the guideline recommendations

    a) Yes ()

    b) No ()

34. I know my role and responsibility in the guideline recommendations

    a) Yes ()

    b) No ()

35. I adhere to the recommendations of the CPG

    a) Yes ()
    b) No ()

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36. The guideline recommendations are based on scientific evidence

a) Yes ()

b) No ()

c) I don't know ()

37. A questionnaire on the attitude towards the utilization of the clinical practice guideline. **{Read the statements and tick the chosen option)**

Attitudinal variable	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
The guideline is an appropriate source of advice					
It may improve the standard of patient's care					
It may reduce defensive medicine					
It may minimize malpractice cases					
It may standardize the quality and practice of health care workers					
It may minimize the cost of healthcare					
Some of the recommendations in the guideline lacks evidence					
The guideline recommendations will not achieve better patient outcome					
It oversimplifies medical practice into "cookbook medicine"					
I lack motivation to utilize the guideline because of previous habits and routines in my medical practice					
It is only useful for beginners in the medical profession					

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It interferes with the healthcare worker's clinical judgement and decisions					
It may lead to job unsatisfaction for the health care worker					
It restricts the health care worker's clinical freedom					
It does not address patients with secondary complications (UTI, VTE, pressure sores etc.)					
It does not apply to patients with comorbidities					

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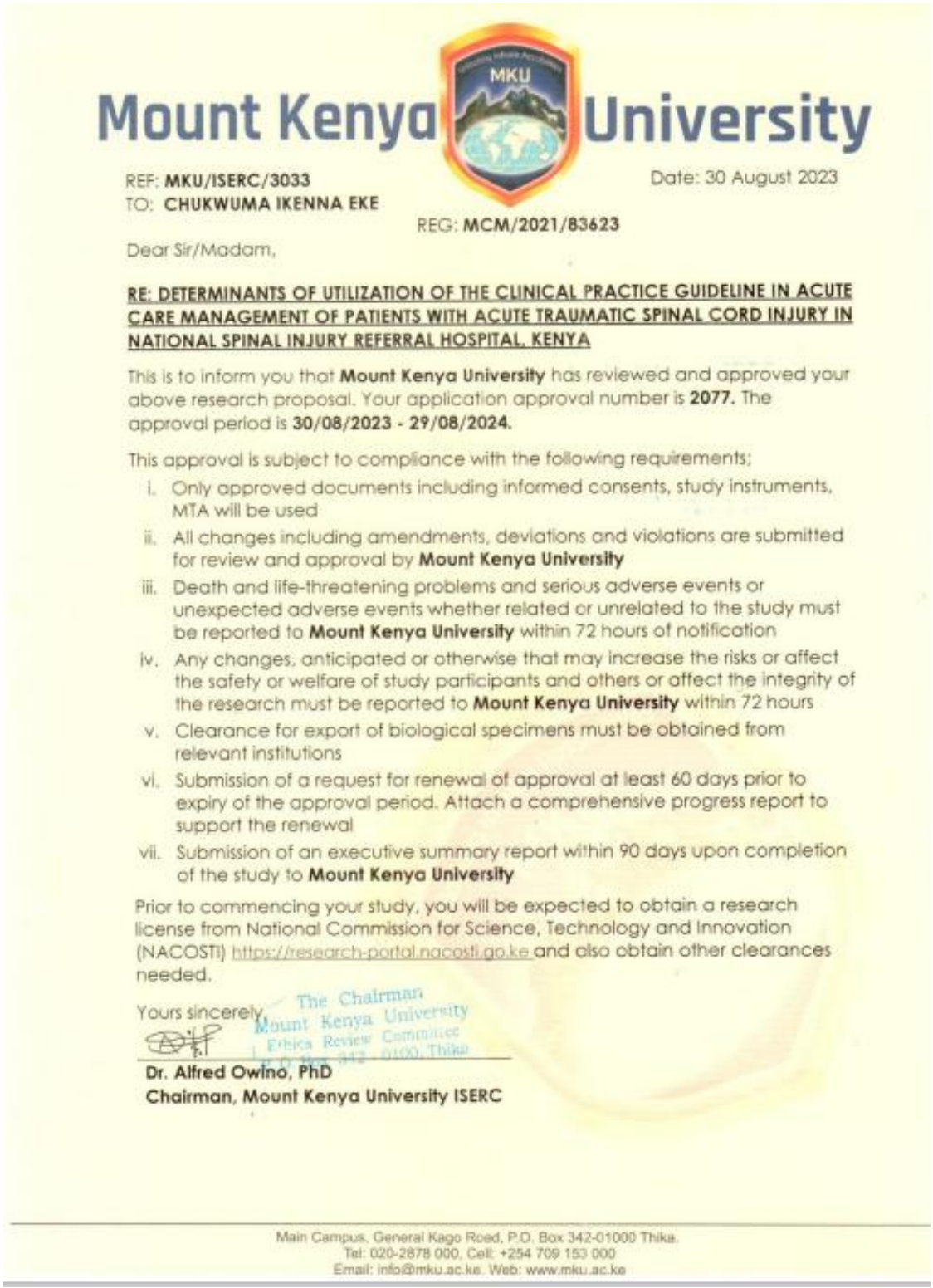
Appendix III: ERC Certificate



Mount Kenya University

REF: **MKU/ISERC/3033**
TO: **CHUKWUMA IKENNA EKE**

Date: 30 August 2023

REG: **MCM/2021/83623**

Dear Sir/Madam,

RE: DETERMINANTS OF UTILIZATION OF THE CLINICAL PRACTICE GUIDELINE IN ACUTE CARE MANAGEMENT OF PATIENTS WITH ACUTE TRAUMATIC SPINAL CORD INJURY IN NATIONAL SPINAL INJURY REFERRAL HOSPITAL, KENYA

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **2077.** The approval period is **30/08/2023 - 29/08/2024.**

This approval is subject to compliance with the following requirements;

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

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

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 01000, Thika

Dr. Alfred Owino, PhD
Chairman, Mount Kenya University ISERC

Main Campus, General Kago Road, P.O. Box 342-01000 Thika.
Tel: 020-2878 000, Cell: +254 709 153 000
Email: info@mku.ac.ke. Web: www.mku.ac.ke

Appendix IV: Postgraduate Introductory Letter

Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MCM/2021/83623

31st August, 2023

National Commission for Science Technology & Innovation (NACOSTI)
Off Waiyaki, Upper Kabete
P.O Box 30623- 00100
NAIROBI, KENYA

Dear Sir/Madam,

RE: CHUKWUMA IKENNA EKE - REGISTRATION NO. MCM/2021/83623

The purpose of this letter is to introduce the above named student who is pursuing **Masters of Clinical Medicine** in the **Department of Clinical Medicine** in the **School of Clinical Sciences.**

The title of the research is "**Determinants of Utilization of the Clinical Practice Guideline in Acute Care Management of Patients with Acute Traumatic Spinal Cord Injury in National Spinal Injury Referral Hospital, Kenya.**" It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **September, 2023 and November, 2023.**

Any assistance accorded to the student will be highly appreciated.

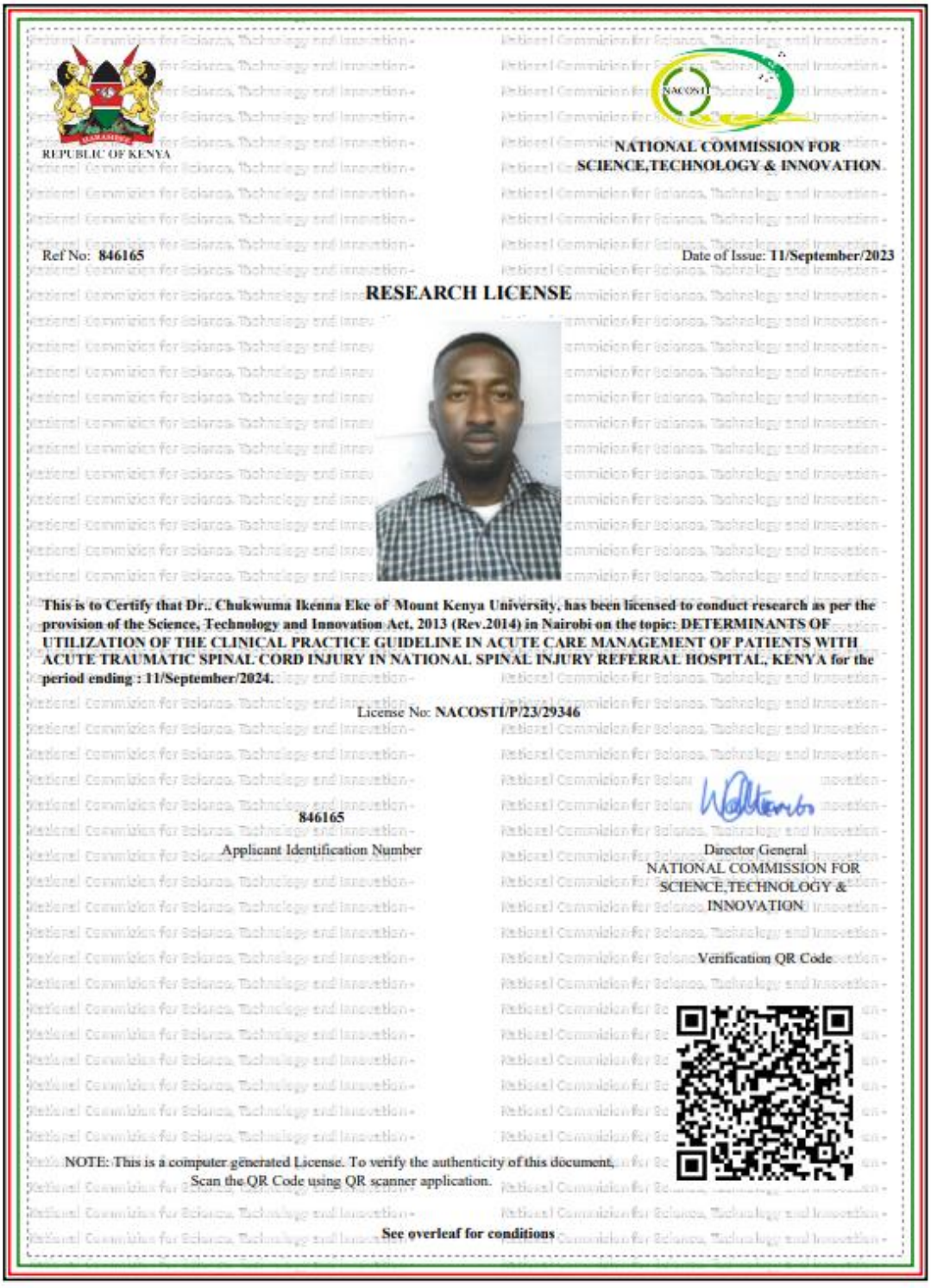
Thank you.

Mount Kenya University P.O. Box 342 - 01000, THIKA Office of the Director Graduate Studies

Dr. Samuel M. Karenga, Ph.D
Director, Graduate Studies
Enc.

Main Campus, General Kago Road, P.O. Box 342-01000 Thika

Appendix V: NACOSTI License for Research



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **846165**

Date of Issue: **11/September/2023**

RESEARCH LICENSE

This is to Certify that Dr.. Chukwuma Ikenna Eke of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: DETERMINANTS OF UTILIZATION OF THE CLINICAL PRACTICE GUIDELINE IN ACUTE CARE MANAGEMENT OF PATIENTS WITH ACUTE TRAUMATIC SPINAL CORD INJURY IN NATIONAL SPINAL INJURY REFERRAL HOSPITAL, KENYA for the period ending : 11/September/2024.

License No: **NACOSTI/P/23/29346**

846165

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix VI: Permit from Ministry of Education

REPUBLIC OF KENYA

MINISTRY OF EDUCATION
STATE DEPARTMENT FOR HIGHER EDUCATION AND RESEARCH
OFFICE OF THE PRINCIPAL SECRETARY

Telephone: 254-20-3318581
Direct Line: 254-20-2228617
E-mail: psecretaryher@education.go.ke
Website: www.education.go.ke
When replying please quote

Jogoo House 'B'
Harambee Avenue
P. O. Box 9583-00200
NAIROBI

Ref: MOE/HE/3/1

Date: 26th September, 2023

Dr. Chukwuma Ikenna Eke
Mount Kenya University
Alpha House- Majengo
THIKA- KIAMBU

RE: RESEARCH AUTHORIZATION

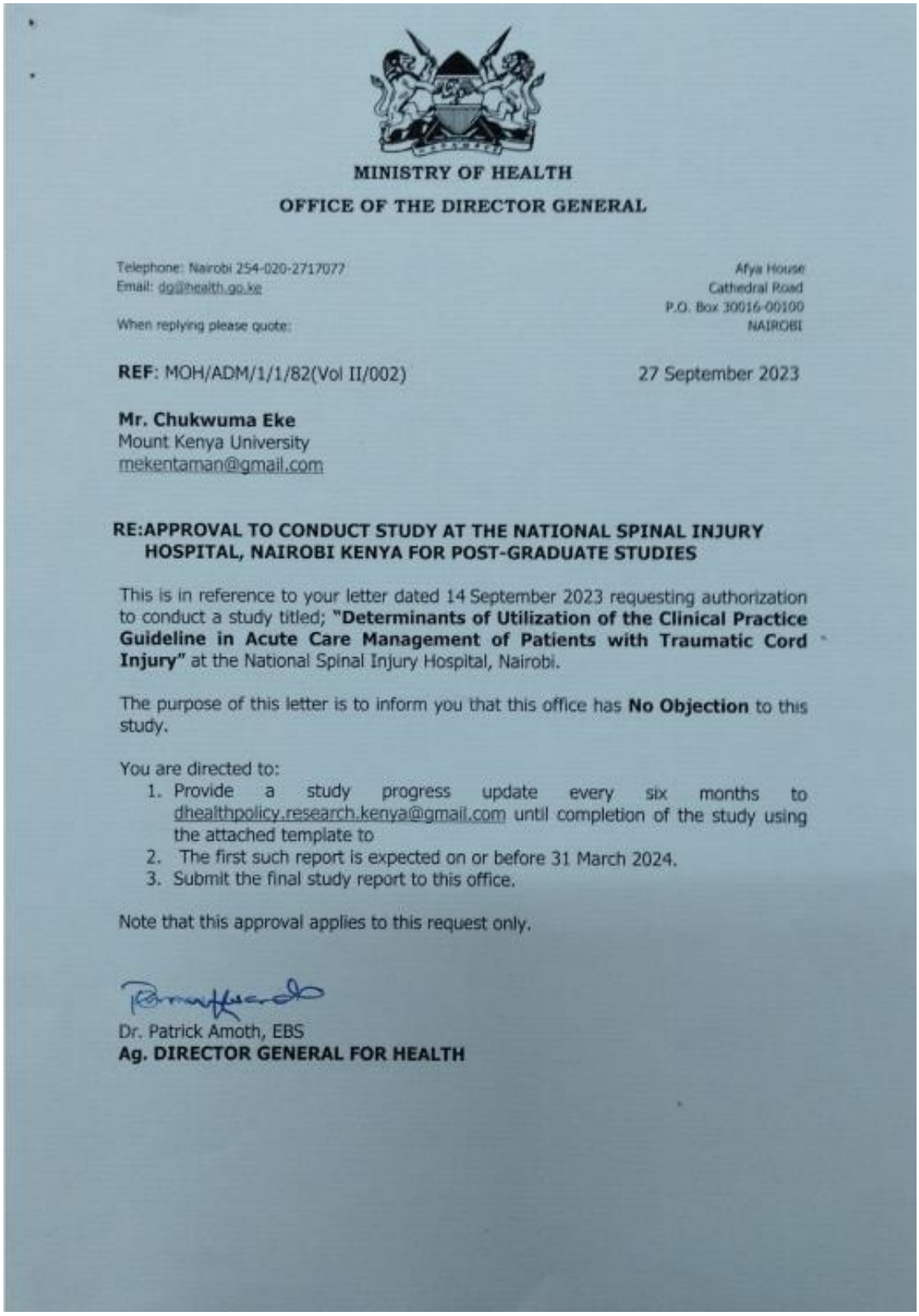
Reference is made to NACOSTI letter Ref. No. **NACOSTI/P/23/29346** dated 11th September, 2023 and a letter from County Commissioner of Nairobi Ref. No..ED10/6 Vol.XXVII(126) dated 14th September, 2023.

You have been authorized to research on "Determinants of Utilization of the Clinical Practice Guideline in Acute Care Management of Patients with Acute Traumatic Spinal Cord Injury" in **National Spinal injury Referral Hospital** Kenya for a period ending 11th September, 2024.

Please accord him the necessary assistance.

Dr. Beatrice Muganda Inyangala
PRINCIPAL SECRETARY

Appendix VII: Permit from Ministry of Health



MINISTRY OF HEALTH

OFFICE OF THE DIRECTOR GENERAL

Telephone: Nairobi 254-020-2717077
Email: dg@health.go.ke

When replying please quote:

Afya House
Cathedral Road
P.O. Box 30016-00100
NAIROBI

REF: MOH/ADM/1/1/82(Vol II/002)

27 September 2023

Mr. Chukwuma Eke
Mount Kenya University
mekentaman@gmail.com

RE:APPROVAL TO CONDUCT STUDY AT THE NATIONAL SPINAL INJURY HOSPITAL, NAIROBI KENYA FOR POST-GRADUATE STUDIES

This is in reference to your letter dated 14 September 2023 requesting authorization to conduct a study titled; **"Determinants of Utilization of the Clinical Practice Guideline in Acute Care Management of Patients with Traumatic Cord Injury"** at the National Spinal Injury Hospital, Nairobi.

The purpose of this letter is to inform you that this office has **No Objection** to this study.

You are directed to:

1. Provide a study progress update every six months to dhealthpolicy.research.kenya@gmail.com until completion of the study using the attached template to
2. The first such report is expected on or before 31 March 2024.
3. Submit the final study report to this office.

Note that this approval applies to this request only.

Dr. Patrick Amoth, EBS
Ag. DIRECTOR GENERAL FOR HEALTH

Appendix VIII: Permit from County commissioner Nairobi

OFFICE OF THE PRESIDENT

MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL ADMINISTRATION
STATE DEPARTMENT FOR INTERNAL SECURITY AND NATIONAL ADMINISTRATION

Telegrams.....
Telephone: Nairobi 316845, 341666
When replying please quote

COUNTY COMMISSIONER
NAIROBI.
P.O. Box 30124-00100
NAIROBI

REF: ED 10/6 VOL. XXVII (126)

14th September, 2023

Dr. Chukwuma Ikenna Eke

Mount Kenya University

RESEARCH AUTHORIZATION

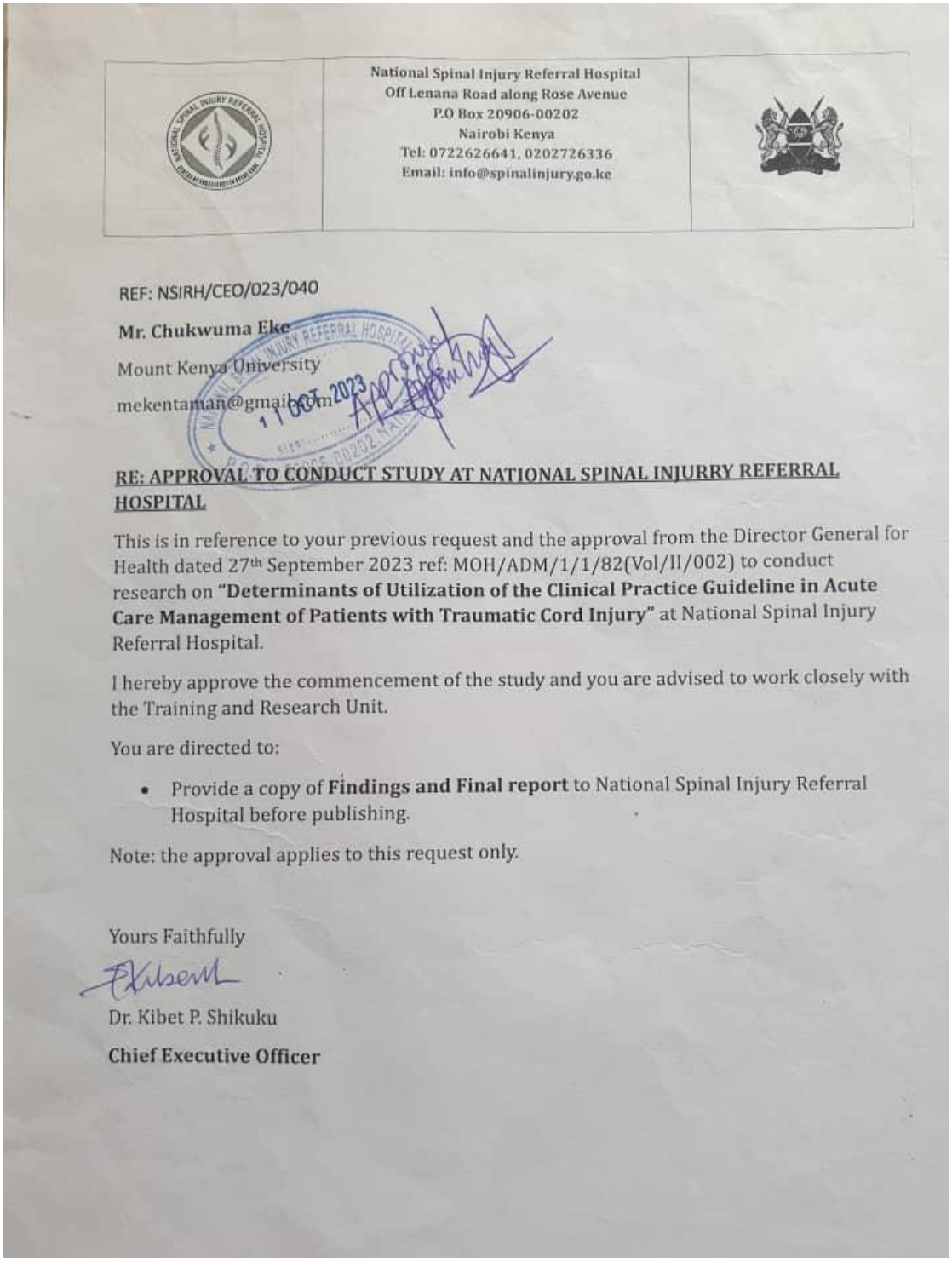
Your letter dated 13th September 2023 refers.

This office has no objection and authority is hereby granted to conduct research on **"Determinants of Utilization of the Clinical Practice Guideline in Acute Care Management of Patients with Acute Traumatic Spinal Cord Injury in National Spinal Injury Referral Hospital, Kenya"** in Nairobi County for the period ending 11th September, 2024.

P. K. ONGERE
For: COUNTY COMMISSIONER

Copy to: Deputy County Commissioner
WESTLANDS SUB-COUNTY

Appendix IX: Letter from NSIRH



National Spinal Injury Referral Hospital
Off Lenana Road along Rose Avenue
P.O Box 20906-00202
Nairobi Kenya
Tel: 0722626641, 0202726336
Email: info@spinalinjury.go.ke

REF: NSIRH/CEO/023/040

Mr. Chukwuma Eke
Mount Kenya University
mekentaman@gmail.com

11 OCT 2023

RE: APPROVAL TO CONDUCT STUDY AT NATIONAL SPINAL INJURRY REFERRAL HOSPITAL

This is in reference to your previous request and the approval from the Director General for Health dated 27th September 2023 ref: MOH/ADM/1/1/82(Vol/II/002) to conduct research on **"Determinants of Utilization of the Clinical Practice Guideline in Acute Care Management of Patients with Traumatic Cord Injury"** at National Spinal Injury Referral Hospital.

I hereby approve the commencement of the study and you are advised to work closely with the Training and Research Unit.

You are directed to:

- Provide a copy of **Findings and Final report** to National Spinal Injury Referral Hospital before publishing.

Note: the approval applies to this request only.

Yours Faithfully

Dr. Kibet P. Shikuku
Chief Executive Officer

Appendix X: Map of Kenya showing NSIRH

Mount Kenya University