INFLUENCE OF KNOWLEDGE, ATTITUDE AND ON MANAGEMENT PRACTICES OF TESTICULAR TORSION AMONG CLINICAL OFFICERS IN TIER THREE HOSPITALS IN KIAMBU COUNTY, KENYA

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DECLARATION AND APPROVAL

Declaration by the student

This thesis is my original work and has not been presented for a degree in any other University or any other award.

Signature: ..... Date: 23/05/2023

Samuel Munyiri Irungu

MCM/40909/2016

Supervisors' Approval

We confirm that the work reported in this thesis has been carried out by the candidate under our supervision.

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DEDICATION

This thesis is dedicated to my wife and my children who have tirelessly encouraged me throughout my proposal writing and finally presentation of the results.

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The goals we set for ourselves surmounts those obstacles that often pave the road to success. My journey from the start until the proper completion of -this project has been possible because of the help and patience of many people and the institution in numerous ways. My greatest appreciation goes to Dr. Jesse Gitaka and Dr. Josphat Njuguna who tirelessly guided me through the entire project. I would like to thank my wife, Mrs. Jedidah Munyiri, who has dedicated a lot of time to support me in my studies. I am also grateful to all those who have given me constant intellectual and moral support throughout my academic journey, especially my colleagues in the School of Clinical Medicine. I express my heartfelt gratitude to all faculty members.

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LIST OF ABBREVIATIONS AND ACRONYMS

AT: Torsion of the Testicular Appendix

ATT: Acute Testicular Torsion

CO: Clinical Officer

COC: Clinical Officers Council

ED: Emergency Department.

EO: Epididymoorchitis

ITT: Intermittent Testicular Torsion

MD: Manual Detorsion

MRI: Magnetic Resonance Imaging

NPV: Negative Predictive Value

OR: Odds Ratio

PPV: Positive Predictive Value

TT: Testicular Torsion

US: Ultrasonography

ABSTRACT

Testicular torsion refers to a surgical emergency that occurs due to the twisting of the spermatic cord and its contents, and affects 1 in every 4000 young men per year globally. The condition is due to inadequate fixation of the testes within the scrotum, which allows excessive movement of the testes within the scrotum. The young boys who present in casualty emergency departments with testicular torsion in Kiambu County, tier three (Level 4 and 5) hospitals are usually seen and examined by Clinical Officers at first contact. At this first contact with the patient, if there is misdiagnosis, it will delay specific treatment and end up with necrosis of the testis whose only option is to remove the testis (orchiectomy). The specific management of testicular torsion is surgical exploratory detorsion if the diagnosis is made within 6 hours. Orchiectomy is done if there is a delay in diagnosis. There has not been any research done to find out the cause of the delayed diagnosis in Kiambu County. The study sought to determine the knowledge, attitudes, and management practices among Clinical Officers in Kiambu County, Kenya. It specifically sought to determine the level of knowledge of testicular torsion among clinical officers working in tier three hospitals in Kiambu County, establish the attitudes of Clinical Officers towards testicular torsion in tier three hospitals in Kiambu County and to determine the management practices of testicular torsion offered by Clinical Officers in tier three hospitals, Kiambu County. The study participants/respondents were Clinical Officers working in both Level 4 and Level 5 hospitals. A cross-sectional descriptive study design was used and collected using questionnaires. The questionnaires were sorted, coded and keyed in SPSS version 22 for the quantitative data analysis.

The knowledge level of the clinical officers was assessed on different aspects as far as management of testicular torsion is concerned. Majority of the clinical officers expressed low knowledge on diagnosis of high riding and horizontal lie in acutely painful scrotum. 59% of clinical officers said the scrotum to be elevated and 20% recommended broad-spectrum antibiotics. In the study, the clinicians expressed a lack of understanding of the relationship between Prehn's sign and testicular torsion. Only a few (15.4%) who indicated that understanding. Testicular torsion to a bigger percentage of COs TT was not a new concept. 85.5% of the respondents indicated they had covered testicular torsion in their basic training. However, the concept of Testicular torsion was new to14.7% of the Clinical Officers. On attitude, 42.3% n=55 of the Clinical Officers somewhat disagreed manual detorsion being professional and ethical and 19.2% of the respondents disagreed in totality that manual detorsion of the testis is professional and ethical in young male child suspected to have testicular torsion. Therefore, Continuous Medical Education in all aspects of testicular torsion conditions is recommended.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This chapter addresses the study's background, problem statement, study purpose, objectives, research questions, justification and significance, scope, limitations and delimitations, and operational definition of critical terms within this field.

This study assesses the knowledge, attitudes, and management practices of Clinical Officers in tier three hospitals in Kiambu County, Kenya, towards testicular torsion, in order to identify factors contributing to delayed diagnosis and improve the quality of care for patients presenting with this surgical emergency.

1.2 Background

The field of study is accidents and emergency medicine, specifically testicular torsion. Testicular torsion (TT) which is twisting of the spermatic cord, results from the inadequate fixation of the testes within the scrotum, which allows excessive movement of the testes within the scrotum. The testes' abnormal attachment is called Bell Clapper deformity and is often bilateral (Robert, 2016). Exploratory detorsion can save eighty percent (80%) of testicular torsion cases if performed within 6hrs. The survival rate of the testis decreases to less than 20% if done beyond 12hours, left with the only option of surgical removal of the Testis-Orchiectomy (Brunicardi *et al*., 2015). If surgical detorsion(untwisting of the spermatic cord by open operation) is not possible, manual detorsion(closed untwisting of the spermatic cord) can be done if TT is detected within 4-6 hours. The manual detorsion process should initially be attempted clockwise beginning on the left and anticlockwise (to counter-clockwise) beginning on the patient's right side (Marcozzi et al., 2001). Diagnosis is by detailed history taking and physical examination, confirmed by: real-time, color ultra sound-which shows decreased blood flow to the testicle instead of the opposite testicle (Brunicardi *et al*., 2015). Early detection by the Clinicians on the first contact with patients with scrotal pain and subsequent manual detorsion of the testis is helpful if they are taught to do so (Marcozzi and Suner, 2001). Healthcare professionals should enlighten prepubertal male patients on TT and the importance of immediately seeking care to mitigate the orchiectomy risk and possible infertility risk (Mansbach et al. 2005).

Globally, Testicular torsion presents a surgical emergency that affects every 1 in 4,000 boys aged below 25 (Ringdahl et al., 2006) and contributes to 25% of severe scrotal pediatrics conditions. Testicular torsion causes considerable morbidity in the pediatric population, but the burden in society is poorly quantified (Lautz et al., 2011)

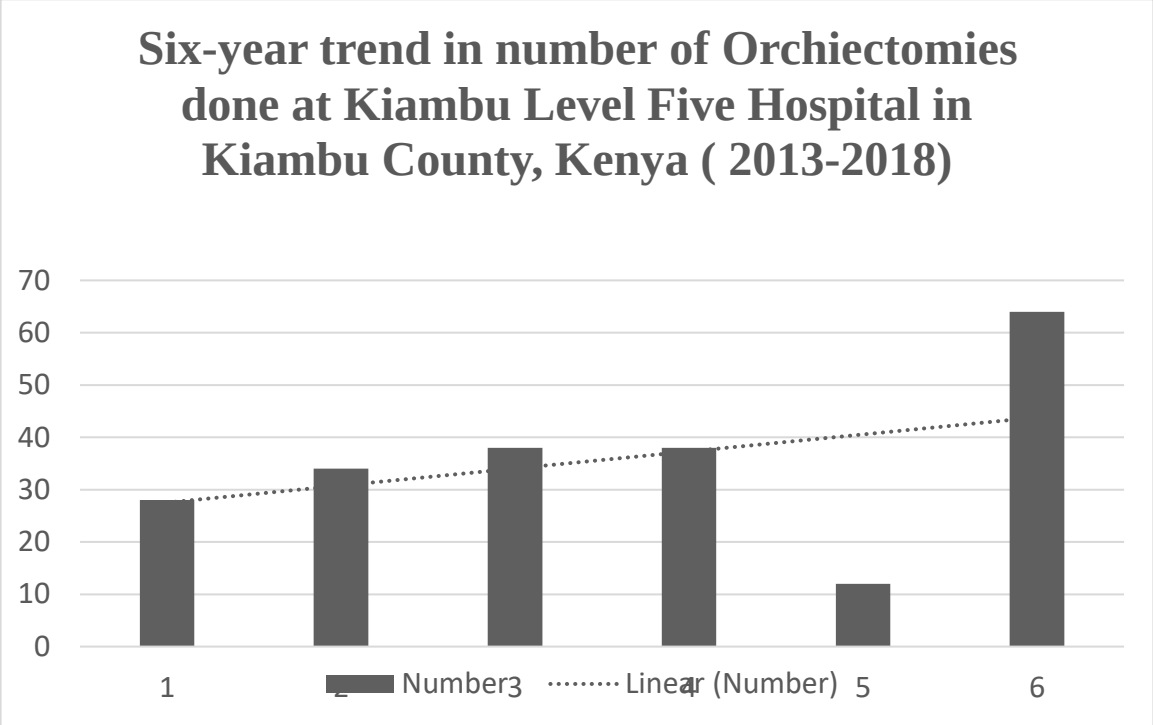
A retrospective study done from January 2007 to June 2015 involving Forty-five patients by Obi, 2017, in Nigeria on intermittent testicular torsion (ITT) noted that the condition is underreported (Creagh et al.,1988), with few cases of adult ITT reported (Kavoussi et al. 2013). Intermittent testicular torsion (ITT) is intermittent twisting of the testis followed by eventual spontaneous untwisting and resolution of testicular pain.

In males aged below 18, TT's annual incidence rate is 38 %(Boettcher et al., 2013) The condition has a bimodal distribution, perinatal period and **Intravaginal torsion** (torsion of the testicle within the tunica vaginalis) olescence being the peaks. This reflects the clinical distinction between extra vaginal and intravaginal torsion among newborns and older children, respectively. **Extravaginal torsion (EVT)** refers to torsion that occurs in prenatal (before birth) and neonatal (1month after birth- perinatal testicular torsion). It occurs exclusively within this stage of life. Intravaginal torsion is twisting of the testicle within the tunica vaginalis.

TT is responsible for 5–25% of the acute painful scrotum in children, and delayed diagnosis of the condition may result in the loss of testicles (Boettcher et al., 2013)

In Kenya, local data on the prevalence of testicular torsion is limited (Muriithi et al., 2017). In Kiambu level 5 hospital, the number of orchiectomies done due to testicular torsion is shown in table 1.

Table 1: Six -year trend in number of orchiectomies done at Kiambu Level Five Hospital in Kiambu County, Kenya(2013-2018)



Source: -Kiambu County Health records (2019).

Table 1 shows the number of cases done had been increasing except in 2017, where the data was low, might be due to the frequent strikes by the health workers, including the general Clinical Officers in the year. The increased number of orchiectomies in this county may be due to delayed diagnosis of TT cases leading to surgical removal of the testes (orchiectomy). Total orchiectomies being 214 cases in the six years. In 2018, the number of orchiectomies almost doubled, being 64 compared with 38 cases in 2015 and 2016.

Early diagnosis within six hours after the start of scrotal pain might have saved the testis by doing exploratory surgical distortion. Delays in testicular torsion diagnosis in Kiambu County may occur due to lack of knowledge or limited knowledge of presentation in history and physical examination. A study done in Kenya in two hospitals in Mombasa by Muriithi et al., 2017, the researchers concluded that the Testis salvage low rates in Kenya could be due to delays in presentation and in diagnosis. Therefore, the researchers recommended that a high suspicion index be maintained in all acute scrotal pain cases by the clinicians (Muriithi et al., 2017).It should be noted that orchiectomy in young teens leads to infertility.

1.2. Statement of the problem

The statistical health records show the highest record of orchiectomies done due to testicular torsion in Kiambu Level 5 hospital was 64(2018), which is double of the ones done in 2013(28cases) in the same hospital (Table 1). This shows an increasing trend of orchiectomies in the county which calls for intervention. Prompt recognition of testicular torsion and treatment are essential for testicular salvage, and clinicians must include torsion among patients presenting with acute painful scrotum (Sharp et al., 2013). Time is a critical factor that determines the salvage ability of the testis in testicular torsion (Shah *et al.*, 2006). According to Kiambu County Health Records (2018), there is observed delay in diagnosis for effective management of testicular torsion in Kiambu County, Kenya.

1.3 Purpose of the study

The study's purpose was to generate evidence that can be used to enhance the training of health workers on the management of acute painful scrotal conditions affecting children, adolescents and male teens in primary health care setting in Kenya and other developing countries This study will promote the best practices to salvage the beneficiaries' testes within the stipulated time.

1.4. Objectives of the Study

The following objectives guided the study: -

1.4.1 Broad Objective

The main objective is to establish the influence of knowledge, attitude, on management practices of testicular torsion among Clinical Officers in Tier Three (Level 4 and 5) Hospitals in Kiambu County, Kenya.

1.4.2 Specific Objectives

1. To establish the level of knowledge of testicular torsion among clinical officers working in Tier Three Hospitals in Kiambu County, Kenya.
2. To establish the attitudes of Clinical Officers towards testicular torsion in Tier Three hospitals in Kiambu County, Kenya.

3. To determine the management practices of testicular torsion offered by Clinical Officers in Tier Three hospitals, Kiambu County, Kenya.

1.5 Research questions

1. What is the level of knowledge of testicular torsion amongst Clinical Officers working in tier three hospitals in Kiambu County, Kenya?
2. What are the attitudes of Clinical Officers towards testicular torsion in tier three (Level 4 and 5) hospitals in Kiambu County, Kenya torsion?
3. What are the management practices of testicular torsion offered by Clinical Officers in tier three hospitals, Kiambu County, Kenya?

1.6 Justification of the Study

Studies of malpractice insurance claims revealed that 61% of testicular torsion cases were misdiagnosed as epididymitis. Testicular torsion management is surgical, whereas epididymitis management is medical therapy with antibiotics (Shah, 2006). Orchiectomy is the removal of the testis, which leads to infertility in men (Kliegman *et al*., 2016).

According to Dajusta et al., 2013 several factors make cases of testicular torsion potential litigation area. This includes the urgency necessary to diagnose and treat the condition coupled with the diagnostic uncertainties and inaccuracies. Other factors are a delay in the presentation and a relatively common rate of testicular loss, an unfavorable outcome, and the psychological impact resulting from a testicle loss (Dajusta et al., 2013).

Litigation resulting from torsion affects the United States, where lawsuits are rampant and other countries such as England and Canada. In Kenya, with the introduction of the new constitution of 2010 of the universal right to health, litigations are likely to occur on testicular torsion.

The Level of Knowledge, Attitudes and Practices of testicular torsion is very important at the National, County, and community levels. The study results will be significant at county, community level, and nationally.

1.7 Significance of the Study

Level of Knowledge, Attitudes, and Practices (KAPs) of testicular torsion by Clinical Officer (C.O.) is very important at the National, County, and community level. According to WHO guidelines, Kenya is supposed to have 16,278 clinical officers, against the current 6,000 clinical officers in the public health sector or 40 clinical officers serving 100,000 citizens (Shawiza, 2018).

If the evidence indicates that there is limited knowledge on testicular torsion among Clinical Officers working in Tier Three (Level 5 and 4) hospitals in Kiambu County, a recommendation was made on curriculum inclusion of the desired content of testicular torsion in the training of clinical officers. Seminars, workshops, Continuing Medical Education (CMEs), refresher courses to enhance Knowledge on Testicular Torsion, and publication of evidence in the peer review Journals.

A study was done by Karanja (2012) on Patients' quality ratings of Kenya's clinical officers' outpatient visits concluded that there is a need for training of Clinical Officers on client management and patient-centeredness. The information that will be obtained would help in recommendations of the Clinical Officers to attend CMEs, workshops, seminars and refresher courses to gain knowledge on TT to help them diagnose testicular torsion in time before necrosis (death) of testis occurs.

This study, which was conducted in Kiambu County and the researcher, believes that it will help in the formulation of guidelines that will be used to help the clinicians to have best practices in testicular torsion management.

Level of Knowledge, Attitudes, and Practices of testicular torsion is essential for Clinical Officers working in Tier Three in Kiambu County. When Clinical Officers do not have reasonable knowledge on testicular torsion, they may misdiagnose TT during the screening process and prescribe overtreatment with antibiotics and pain-relieving drugs without proper management. The results of the study will be significant nationally and also at County Level.

1.8 Scope of the study

The study took place in three level-5 hospitals, which include Kiambu, Gatundu, and Thika. It also covered ten-level four hospitals. Study participants were Clinical Officers

working in the above facilities. The study excluded Clinical Officers who are not directly involved in the management of the patients.

1.9 Limitations of the study

The study limitations included the following:

Most clinicians are busier in OPD, attending to patients during morning hours, making data collection difficult during the period. To this effect, the researcher collected data at times that are convenient to the respondents, such as in the afternoon.

Clinical Officers who work in Outpatient and Casualty departments are more likely to come across patients with scrotal pain whose differential diagnosis is testicular torsion (Binita, 2006). This study examined whether these General Clinical Officers have requisite knowledge, attitude, and management of testicular torsion.

1.10 Delimitations of the Study

The target population were the Clinical Officers working in Tier Three hospitals in Kiambu County. Clinical officers with specialties in ear, nose, and throat, ophthalmology, and anesthesia, may not give reliable data in this study, and therefore were not included in the study.

Most Clinical Officers involved in administration are not likely to have come across a patient with scrotal pain and, therefore, were not included in the study.

1.11 Assumptions

1. The researcher is assuming that the Clinical Officers working in Tier Three (Level 4 and 5) hospitals will cooperate and participate in the study.
2. The researcher also assumes that the participants/respondents will be available and set some time to fill the questionnaires on time.

1.12 Operational definitions of key terms

A **clinical officer** (**CO**): is an essential service provider in Kenya working at the primary healthcare level'.

A **physical examination**, **medical examination**, or **clinical examination:** This is the investigation of patients' bodies for signs of disease. Medication professionals conduct the investigation and involve taking of a patient's medical history. The

physical investigation and medical history are essential in the diagnosis and devising treatment plans. Data from this procedure forms part of a patient's medical record.

Medical history: This refers to clinicians' information through specific questioning of the patient or other people who know the patient. The information is crucial in diagnosis and treatment.

Diagnosis is the identification of the nature and cause of a specific phenomenon.

Testicle or **testis** is a male's reproductive glands for animals and humans. The testes produce both sperm, androgens, and primarily testosterone.

Testicular torsion -twisting of the spermatic cord (which suspends the testicle) which cuts off the blood supply to the testis. Severe scrotal pain is a common symptom among children.

Prehn's sign. Named after Douglas T. Prehn, an urologist, this medical diagnostic marker was once thought to help establish whether the presenting scrotal **pain** was due to acute epididymitis or testicular torsion.

Epididymitis is an epididymis's inflammation. The epididymis is a tube that stores and carries sperms and is located at the rear of the testis. Swelling of the tube causes pain and makes the testicles swell. While the **condition affects** males of all ages, men aged between 14 and 35 are the most vulnerable.

Orchitis is inflammation of one or both of the testicles.

Scintigraphy is a technique for obtaining images of body organs or recording their functioning using a scintillation counter or similar detector in conjunction with a radioactive tracer.

Orchiectomy (also named orchiectomy, or orchi) is the surgical removal of one or both testis testicles. The removal of both testicles (bilateral **orchiectomy**) constitutes surgical castration.

A **Doppler ultrasound** is a test for measuring blood flow rate through veins and arteries in the arms and legs. Vascular flow studies or blood flow studies are crucial in detecting abnormal flow in blood vessels or body organs.

Doppler ultrasonography is the generation of tissue and body fluid movements imaging relative to the study's probe velocity using the Doppler effect.

Magnetic Resonance Imaging is a radiology imaging technique for forming pictures of both anatomical and physiological processes of healthy and diseased bodies. MRI scanners generate organ pictures using strong magnetic fields and field gradients as well as radio waves.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature related to general literature review including pathophysology, risk factors ,diagnosis and interventions, prevalence of testicular torsion theoretical literature review, conceptual framework, theoretical framework, research gaps and provides a literature review summary. The main objective is to establish the influence of knowledge, attitude, on management practices of testicular torsion among Clinical Officers in Tier Three (Level 4 and 5) Hospitals in Kiambu County, Kenya.

2.2 General literature Review

2.2.1 Pathophysiology

Testicular torsion refers to a surgical emergency entailing the twisting of the spermatic cord along a longitudinal axis, resulting in limited testicular blood flow. The onset of severe scrotal pain is a clinical marker of testicular torsion with subsequent scrotal swelling, vomiting, and nausea. Physical examination often finds a high-riding testis with a transverse lie. The findings may co-exist with absent cremasteric reflex, which are a hint of testicular torsion **(Howe, et.al, 2017).** The surgical emergency mainly affects the adolescent population though it can occur at any age. Testicular torsion is due to inadequate testicular attachment within the scrotum, causing excessive testes' movement in the scrotum. Abnormal attachment is a bilateral phenomenon termed Bell Clapper deformity (Robert, 2016). Incidences of torsion interfere with blood supply to the testicles, resulting in testicular loss or damage if not timely addressed. The condition may present as acute testicular torsion (ATT) or intermittent testicular torsion (ITT) (Ugwumba, et.al, 2016). A study was done by Obi, 2017 in Nigeria concluded that most intermittent testicular torsion occurs because of the horizontal line of the testis. The condition affects the left testis than most the right testis and predominantly unilateral. Diagnosis of intermittent testicular torsion should be made when a patient reports intermittent testicular pain and if an abnormal testicular lie exists (Obi, 2017).

Testicular torsion impares the testicular blood supply and may lead to testicular loss or damage should surgical intervention delay. The condition may present as acute testicular torsion (ATT) or cases of intermittent testicular torsion (ITT) (Ugwumba et al., 2016). Testicular torsion is the chief cause of testicular pain among boys above 12 years (Kliegman *et al.,* 2016). On the occurrence of testicular torsion, venous congestion commences and then disrupts arterial blood flow. The chances of testis survival hinge on the torsion's; duration and severity. After 4-6 hours of zero testicular blood flow, an irreversible loss of spermatogenesis occurs (Kliegman et al., 2016).

A retrospective study in the US involving males between 1 and 25 years concluded that testicular torsion was more frequent than testicular tumors, and advancing age was the singular known risk factor for surgical intervention (Mansbach et al. 2005). The researchers suggested that healthcare professionals enlighten prepubertal male patients on the condition and the importance of immediately seeking care to mitigate the orchiectomy risk and possible fertility reduction (Mansbach et al. 2005).

2.2.2 Risk factors

Headway and Reynard (2013) studied the six-hour rule of testis fixation and noted that prolonged ischemia period results in loss of affected testes. The study aimed at the exploration of the historical and recent evidence serving as the basis of the urological rule that surgical intervention within six hours after testicular torsion is essential for the testicular salvage. Besides, the study investigated the utilization of the information as a guide in testicular torsion medico-legal cases. Lack of treatment beyond six hours results in testes necrosis and later atrophy. Headway and Reynard (2013) also found out that the severity of testicular torsion was a crucial determinant and that testicular salvage was possible at up to 24 hours in cases where the twist was less than 360 degrees. The latest clinical series augment these conclusions and propose a ≥98% success rate when surgery is done within six hours. A 12-hour delay of testicular salvage reduces the success rate to 89%.

2.2.3 Diagnosis and interventions

Testicular torsion often starts with acute unilateral scrotal pain followed by nausea and vomiting. Imaging is a critical part of the diagnosis, with Doppler ultrasonography

being the most common modality because it is highly sensitive. According to David and Silverman (2011), the ultrasonography testicular torsion reveals a slight reduction or lack of testicular blood flow.

Surgical intervention (exploratory detorsion) can salvage Eighty percent (80%) of the testes when surgery is done within 6 hours. The survival rate of the testis decreases to less than 20% if done beyond 12 hours, left with the only option of surgical removal of the testis-orchiectomy (Brunicardi *et al*., 2015). Manual detorsion can be done if detected within 4-6 hours. Diagnosis is by detailed history taking and physical examination, confirmed by: real-time, color ultra sound-which shows decreased testicular blood flow as opposed to the opposite testis (Brunicardi *et al*., 2015).

2.2.4 Prevalence of Testicular Torsion

Globally, Testicular torsion presents a surgical emergency that affects every 1 in 4,000 boys aged below 25 (Ringdahl et al., 2006) and contributes to 25% of severe scrotal pediatrics conditions. Testicular torsion causes considerable morbidity in the pediatric population, but the burden in society is poorly quantified (Lautz et al., 2011)

A retrospective study done from January 2007 to June 2015 involving Forty-five patients by Obi, 2017, in Nigeria on intermittent testicular torsion (ITT) noted that the condition is underreported (Creagh et al.,1988), with few cases of adult ITT reported (Kavoussi et al. 2013).

According to research done by Baruga1 and Munabi (2013), the researchers noted that cases of testicular loss in Africa are a result of delays in referral and surgery after initial contact with healthcare workers. The researchers also found that testicular torsion was a prevalent surgical emergency in Africa affecting adolescent males who report unexpected onset of severe scrotal pain. According to Barugal and Munabi (2013), most infertility cases in Africa are due to testicular torsions. The study entails a retrospective surgical audit of patients' records spanning over 30 years for symptoms of testicular torsion with data analysis to identify changes in country diagnosis patterns. The researchers recommended using age as a diagnostic rule of thumb in low resource settings among communities and lower cadre healthcare workers (Baruga1& Mumbai, 2013).

A bilateral testicular torsion case report by Kuremu, 2004 from Eldoret, Kenya, noted a misdiagnosis of testicular torsion. The report aimed to emphasize the severity of testicular torsion misdiagnosis. Kuremu (2004) noted that accurate diagnosis and timely commencement of correct intervention are essential in preventing loss of male's total reproductive potential.

According to the research by Mansbach et al., 2005, testicular torsion affects about 1 in 4,000 under the age of 25. Torsion is most common in adolescent males (Mansbach et al., 2005), those between 12 and 18 years old account for 65 percent of people with the condition, according to Cleveland Clinic. However, infants and older adults can also be affected. Many of those who have testicular torsion are born with a higher risk for the condition, although they may not know it. The suspected diagnosis of Torsion (TT) should be based on presenting illness, history, the symptoms, and the physical checkup. There are many diseases that can mimic the symptoms. TT is found in 10%–54% of the cases presented with an acute scrotum (Feher et al., 2016).On physical examination, the common suspicious findings are a positive Prehn's sign (when elevation fails to decrease the pain in the affected testicle), a high-riding and horizontally positioned testis (Brunzel's sign), or scrotal skin retraction (Ger.'s sign). The latter is usually present in the bell clapper deformity. Cremasteric reflex absence is an almost positive sensitive sign of TT. The specificity is only 66% because this sign can occur in many other diseases. However, in a few cases, TT appears with a preserved cremasteric reflex (Feher et al., 2016).
Maranya et al., (2011) study of two hospitals in Mombasa concluded that testicular torsions in Kenya were associated with low salvage rates of the testis.

The researchers recommended an increase of public understanding, augmented with teenage, parental, clinician, teacher, and adult male education acute scrotal pain consequences (Maranya et al., 2011)

According to Sharp et al. (2013), a testicular torsion cases with a rate of 3.8 per 100,000 males under 18years. It involves the twisting of spermatic code and its content. The conditions account for 10% to 15% of total acute scrotal disease among children and are responsible for 42% of orchiectomy among boys undertaking surgical intervention. Immediate identification and treatment of the condition are crucial for successful testicular salvage, and clinicians must exclude testicular torsion patients with severe scrotal pain.

Testicular torsion has a clinical presentation of severe acute unilateral scrotal pain, vomiting, and nausea.

In Kenya, local data on the prevalence of testicular torsion is limited (Muriithi et al., 2017). A study done in Kenya in two hospitals in Mombasa, namely, Coast General Hospital, Mombasa, and Pandya Memorial Hospital, Mombasa showed that Testis salvage rates were lower in our setup compared to other studies (Muriithi et al., 2017). The retrospective study focused on patient files of 90 patients admitted in the hospitals between January 2011 to December 2015. The study aimed at determining the incidence and clinical presentation of patients with testicular torsion in Kenya. Results**:** The researchers concluded that the Testis salvage low rates in Kenya could be due to delays in presentation and in diagnosis. Therefore, they recommended that a high suspicion index be maintained in all acute scrotal pain cases. (Muriithi et al., 2017).

2.3 Theoretical Framework/Theoretical Literature review

2.3.1 Donabedian Model of quality care

The study utilized the Donabedian Model for healthcare quality. This model is crucial for evaluating the quality of care patients receive in healthcare facilities. The model is a robust framework for measuring the quality of care healthcare professionals render in healthcare institutions.

The researcher determined how the structures, processes, and healthcare outcomes can be used to reduce orchiectomies done due to TT in tier three hospitals in Kiambu county can be achieved.

Donabedian (2005) notes that - “structure” entails the setting in which the health care is provided. This includes facilities, equipments, and the number of medical personnel and the qualifications of medical personnel.

“process”-denotes the component of the care given such as delay before receiving specific management can be, patients before arrival to the health facility, facility delay, and health care provider delay (in this study being the Clinical Officer)

"Outcome-is return of the function and recovery such as the number of orchiectomies done due to TT.

In terms of structures, this study will determine the qualifications of Clinical Officers and their numbers in the county as first stop health care providers of young boys with TT.

In terms of "process", the researcher will assess the component of health care given to suspected cases of TT.

The "outcome" measures will determine the outcome of TT and the measures to reduce the number of orchiectomies done due to TT in Kiambu County.

2.4 Empirical Literature

This includes previous studies done on TT.

2.4.1 Testicular torsion management

Management of testicular torsion involves surgical detorsion of the testes and orchidopexy. Salvage rates are governed by the speed of diagnosis and treatment. Delay in diagnosis or treatment can result in non-viable testes, and this is described as a Missed Testicular Torsion (MTT) (Muriithi et al., 2017).

Testicular Torsion is the primary cause of testicular pain among boys age 12 to 18yrs (Kliegman et al., 2016). The survival rate of the testis decreases to less than 20% if done beyond twelve hours, left with the only option of surgical removal of the testis - Orchiectomy (Brunicardi et al., 2015). Manual detorsion can be done if detected within four to six hours.

Testicular torsion focuses on organ salvage. Therefore, immediate diagnosis and intervention of testicular torsion are vital in maximizing the chances of testicular survival. The duration of testicular torsion symptoms and ultrasound results influence the testis viability (Howe et al., 2017). Non-surgical management of the condition through manual detorsion can be explored. Manual detorsion is a robust intervention, and achieving complete detorsion is not possible in cases of acute twist or when testicular ischemia persists (Howe et al., 2017). Besides, the testicle may experience future torsion. Surgical exploration helps address the shortcomings of manual detorsion and is a gold standard in the treatment of cases of probable testicular torsion (Howe et al., 2017).

During manual detorsion, analgesic administration through intravenous sedation or a spermatic cord nerve block relaxes cremasteric fibers and eases the pain for easy

manipulation of the testis. As part of the informed surgical consent, it is important to counsel the patient before the operation on the possibility of orchiectomy (Howe et al., 2017).

In Kiambu County, the primary health workers who are the first contact to the patients are the Clinical Officers. Their provisional diagnosis or impression on the first contact with the patient will affect the overall management of the patient. Misdiagnosis as epididymitis (Epididymoorchitis) ends up with a patient put on a broad-spectrum antibiotic and hence delays in the proper management of the patient. Delay of more than six hours, the patient will end up with gangrenous testis leading to orchiectomy (Kliegman et al., 2016).

Knowledge of testicular torsion presentation in history and physical examination among clinical officers is paramount in making the correct diagnosis and eventually specific surgical intervention (Kliegman et al., 2016)

Testicular torsion often starts with acute unilateral scrotal pain followed by nausea and vomiting. Imaging is a critical part of the diagnosis, with Doppler ultrasonography being the most common modality because it is highly sensitive. According to David and Silverman (2011), the ultrasonography testicular torsion reveals a slight reduction or lack of testicular blood flow.

A study done by (Arevalo et al. 2018) concluded that addressing delays in the diagnosis and transfer of testicular cases is likely to improve testicular salvage rates. The study's objective was whether straight to the operating room (STOR) practice likely to lower costs, reduce ischemia period, and promote success of testicular torsion.

In a retrospective study, Preece et al. (2017) determined that the transfer of testicular torsion cases, especially over great distances, negatively affects the management of the condition and threatens testicular viability. The researchers found out that healthcare facilities were highly likely to transfer patients to the tertiary facilities at night or on weekends. Besides, delayed specific intervention of testicular torsion threatens testicular viability and increases the risk of testicular loss. Preece et al. (2017) recommended that Urologists attempt to correct TT when patients visit a health facility. This recommendation shows that Clinical Officers should have adequate Knowledge, Attitude, and specific management practices on testicular torsion (TT) and pass the same knowledge to the

communities in the catchment areas around the health facilities they work in. It is important to note there are no urologists in tier three hospitals in Kiambu County.

Afsarlar et al. (2016) conducted a study and found out that standardization of pediatric processes is essential in improving testicular salvage rates. The researchers found out that patient delays in seeking medical attention were the single most challenging and contributor of testicular loss, and diagnosis and intervention delays remain avoidable contributors of testicular loss. The aim of the study was to create a standardized process for the improvement of patient movement from the Emergency Room (ER) to Operating Room (OR) children with severe scrotal pain.

2.4.2 Knowledge of testicular torsion

Testicular torsion necessitates ready knowledge to diagnosis and treatment, to salvage the testis if one within six hours. The condition causes testicular pain in boys aged between 12 and 18 years (Kliegman *et* al., 2016).

Srinivasan et al. (2011) studied boys with acute scrotal pain and noted that accurate history and physical checkups should be the first step before deciding on radiographic or surgical evaluation. The aim of the study was to establish the best predictors of testicular torsion and identify the standard of physical examination and history of boys' acute scrotal pain. (Srinivasan et al., 2011).

In a study done in Nigeria by Obi (2017) *on* intermittent testicular torsion, the researcher concluded that horizontal testicular lie was the chief cause of intermittent testicular torsion. The condition affected more of the left than the right testis and is often unilateral. Occurrences of intermittent testicular pain together with abnormal testicular lie call for the diagnosis of intermittent testicular torsion. Undertaking advance bilateral orchidopexy is valuable (Obi, 2017). The study aimed at highlighting the clinical presentation of intermittent testicular torsion and attraction attention to the condition’s underreporting. A positive diagnosis of intermittent torsion was made due to recurrent scrotal pain, absence of urinary symptoms, the incidence of an unusual testicular lie in otherwise normal testicles, and negative urine cultures.

A study done by Ugwumba et al.(2016) in Nigeria teaching hospital at Enugu between January 1999 and December 2009, on 59 testicular torsion found out that there

was a late presentation of intermittent testicular torsion pre- and intra-hospital phases. The researchers noted physician/health worker and community enlightenment improved the testicular salvage rate (Ugwumba et al., 2016).

Boettcher et al. (2011) reviewed retrospective studies of children and adolescents and found out that predictors such as abnormal ipsilateral cremasteric reflex, a high position of the testicle, high position of the testicle, nausea or vomiting, short pain duration, and scrotal skin changes increased the likelihood of TT.

A retrospective study done in Kenya in two hospitals, Coast General Hospital (a level 5 hospital) in Mombasa and Moi County Hospital in Voi, by Maranya et al., 2011, found that there was low salvage of testis after testicular torsion.

Out of the 29 patients operated on for acute testicular torsion included in the study, only four cases had viable testes salvage (salvage rate of 14%), while seven had bilateral orchidopexy due to occasional testicular torsion. However, three patients had orchidopexy of the contralateral testes because of missed torsions that resulted in total testicular atrophy. Surgical exploration was done on two patients diagnosed with epididymoorchitis, one being a testicular torsion of excised appendix testis. There was no case of testicular torsion after orchidopexy.

Maranya et al. (2011) concluded that testicular torsion salvage rates were low in the setup and recommended more public awareness and education targeting clinicians, parents, teachers, adolescents, and adult males on the consequences of severe scrotal pain. A study done by Wang & Zengnan, 2018 between October 2005and June 2016 concluded that Physicians/clinicians should be on the lookout for the specific clinical manifestations of TT. The study objective was to evaluate testicular torsion manifestations that accompany severe abdominal pain and increase understanding of the condition with accompanying symptoms. The researchers reviewed nine patients with testicular torsion with few cases of severe abdominal pain instead of scrotal pain being the primary manifestation (Wang & Zengnan, 2018).

After reviewing 543 cases of surgical testicular torsion explorations among boys for severe pain Glabek et al. (1999) established that 16.6% cases were testicular torsion and 46% appendage Testicular Torsion. The researchers recommended that all boys presenting acute scrotal pain receive surgical intervention. Where prompt surgical

testicular torsion explorations are not possible, manual testicular detorsion is undertaken (Glabeke et al., 1999).

2.4.3 Attitudes on testicular Torsion

A retrospective study was done from January 2007 to June 2015 involving Forty-five patients by Obi, 2017, in Nigeria on intermittent testicular torsion (ITT) noted that the condition is underreported (Creagh et al.,1988), with few cases of adult ITT reported (Kavoussi et al. 2013). The main objective was to describe a clinical characteristic of patients having intermittent testicular torsion (ITT) and highlight their condition.
The condition requires prompt diagnosis and treatment knowledge necessary to salvage when done within six hours. Kliegman et al. (2016) note that the condition is responsible for most cases of testicular pain among boys aged between 12 and 18yrs.

Torsion occurs when the testes have inadequate scrotum fixation allowing excessive testicular movement. The abnormal attachment is often bilateral and termed as Bell Clapper deformity (Robert, 2016). There is a restriction in blood supply to the testes, causing severe testicular pain and possibly permanent damage to the testis when the spermatic cord becomes twisted. Eighty percent (80%) of the testes can be salvaged if surgery in exploratory detorsion is done before the lapse of six hours. The testis survival rate is less than 20% if surgery is done beyond twelve hours, left with the only option of surgical removal of the testis - Orchiectomy (Brunicardi et al., 2015). Manual detorsion can be done if detected within four to six hours. Physical examination of torsion patients may indicate a high-riding testicle and absence of cremasteric reflex. Where patient history and physical checkup hint to testicular torsion, immediate surgical exploration and imaging studies are required. In such cases, there is a four- to an eight-hour window before irreversible ischemic damage. Where delays occur, patients are at risk of decreased fertility or orchiectomy in some cases (Sharp et al., 2013).

A study done by Ugwumba et al.(2016) in Nigeria teaching hospital at Enugu between January 1999 and December 2009, on 59 testicular torsion found out that there was a late presentation of intermittent testicular torsion pre- and intra-hospital phases. The researchers noted physician/health worker and community enlightenment improved the testicular salvage rate (Ugwumba et al., 2016).

Diagnosis is by detailed history taking and physical examination, confirmed by: real-time, color ultra sound-which shows decreased testicular blood flow as opposed to the opposite testis (Brunicardi et al., 2015).

In Kiambu County, in one of tier three hospitals (Kiambu Level 5), the number of orchiectomies done due to testicular torsion is as follows: as shown by table 1

Table 1: No. of orchiectomies done at Kiambu Level 5 Hospital in Kiambu County

Year	2013	2014	2015	2016	2017	2018	Total orchiectomies in the 6year period
Orchiectomies Done due to testicular torsion	28	34	38	38	12	64	214

Source: -Kiambu County Health records (2019)

Table 1 shows the number of cases done had been increasing except in 2017, where the data was low might be due to the frequent strikes by the health workers, including the general Clinical Officers in the year. The gap in this county may be due to diagnosis delays of the testicular torsion resulting in surgical removal of the testis's totaling 214 cases in the six years. In 2018, the number of orchiectomies almost doubled, being 64 compared with 38 cases in 2015 and 2016. Early diagnosis within six hours after the start of scrotal pain might have saved the testis by doing exploratory surgical distortion.

The diagnosis delay of the testicular torsion cases in Kiambu County may have been caused by a lack of knowledge or low knowledge of presentation both in history and physical examination.

2.4.4 Attitudes on testicular torsion

Testicular torsion is a condition that affects testicular blood flow and requires emergency attention. The conditions affect the spermatic cord, which twist, inhibits testicular blood flow and cause acute pain and swelling. Specifically, the torsion takes place in a medial direction and in the inner parts of the thigh. According to Marcozzi et al. (2001),

the manual detorsion should first be done clockwise on the left and anticlockwise counter-clockwise on the patient's right side.

Marcozzi et al. (2001) note that early scrotal examination was done in the emergency department may be overlooked, but it could generate accurate information for determining pathological processes. According to statistics of 523 children visiting the emergency department with an average age of ten years and nine months, had a high incidence of testicular torsion (Goldman et al. 2010). The other symptoms diagnosed include painlessness in twenty-four hours with nausea or vomiting presenting with a high testis position and unusual cremasteric reflex.

2.5 Conceptual Framework

A Conceptual framework utilized in a study to outline the available courses of action or specifically to maps an ideal approach to a phenomenon. It comprises unique concepts linking to an existing or planned system of methods. They are types of intermediate theory with the potential of connecting to all inquiry aspects (Mwituria, 2012). Below is the conceptual framework for this study: -

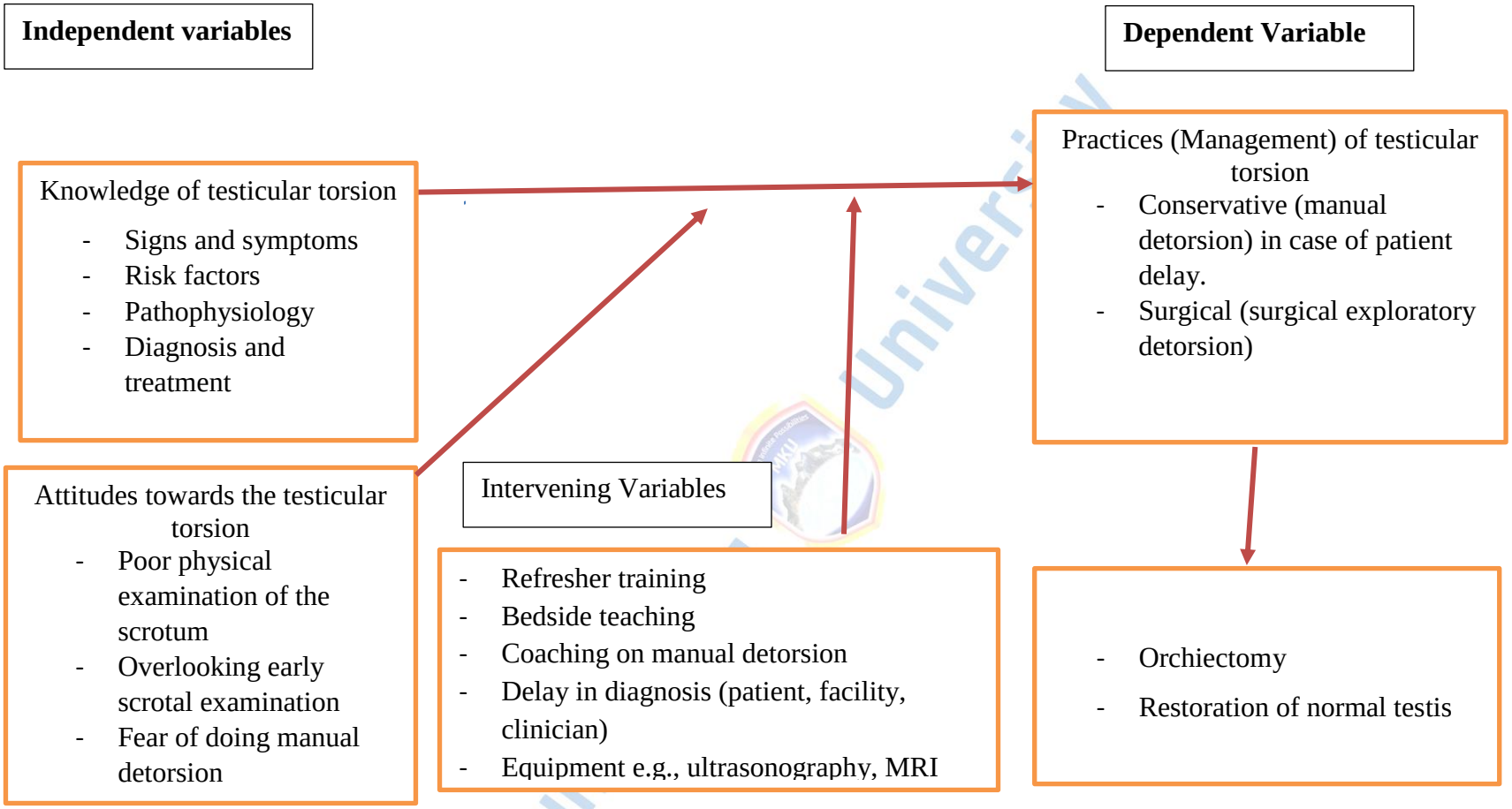


Figure 2: Conceptual Framework

Source: Author

Knowledge and attitude are the independent variables. These two influenced practice (management). The outcome (dependent variable) of practice is either orchiectomy or restore normal testis. The intervening variables then were the training (e.g., refresher training, bed site teaching, coaching etc.), and infrastructure (facilities, equipment, e.g., ultrasonography/MRI), policies/guidelines, ambulance etc. The intervening variables influenced the practice, e.g., early diagnosis, which ultimately improved the outcome of testicular torsion.

2.6 Research Gaps

There is no research that have been done on the influence of Knowledge, Attitudes, and Practices (KAPs) on the management of testicular torsion among General Clinical Officers in Kiambu County, Kenya. General Clinical Officers are the first contact with any male child with acute scrotal pain, and any misdiagnosis at that first contact led to delay in the specific correct management of testicular torsion. Delay in diagnosis leads to necrosis of the testis, of which the treatment will be orchiectomy. This study will investigate whether Clinical Officers in Level four and Level five hospitals have adequate knowledge to diagnose Testicular Torsion, their Attitudes, and their Management practices for Testicular Torsion in Kiambu County,Kenya

2.7 Summary of Literature Review

The annual incidence of testicular torsion among males under 18 years is 3.8% per 100,000 males (Sharp et al., 2013). The condition is responsible for 5% - 25% severe scrotal pain among children, and a delayed diagnosis and intervention reduces the chances of testicular salvage. Clinical identification of testicular torsion (TT) requires proper history taking and proper physical examination by the clinicians even if ultrasound facilities are unavailable. (Boettcher et al., 2013)

Testicular torsion is due to inadequate testis fixation in the scrotum, allowing excessive testicular movement. The abnormal attachment is bilateral and is termed as the Bell Clapper deformity (Robert, 2016). There is a restriction in blood supply to the testes, causing severe testicular pain and possibly permanent damage to the testis when the spermatic cord becomes twisted. Eighty percent (80%) of the testes can be salvaged if surgery (surgical exploratory detorsion) is done in six hours. The survival rate of the testis

reduces below 20% if done beyond twelve hours, left with the only option of surgical removal of the testis - orchiectomy (Brunicardi *et al*., 2015).

TWIST (**Testicular Workup for Ischemia and Suspected Torsion)** is a 7-point tool to evaluate acute scrotal pain.**To make** clinical decision the tool is used for the workup and management of acute scrotal emergencies whereTT is suspected. TWISTuses history and examination to estimate the likelihood of TT.(Barbosa et al.,2013) Its aim is to reduce the number of unnecessary ultrasounds in cases of suspected TT.

The criteria used:Testicular swelling(2points),Hard testis(2points),absent cremasteric reflex(2points),nausea & vomiting(1point),high riding testis (1point)-(Sheth et al.,2016)

Interpretation:

score-0-2=low risk therefore no ultrasound or urological consultation required

Score-3-4=intermediate risk therefore ultrasound warranted.

Score -5 or above: high risk therefore ultrasound not required- urgent urological consultation and surgery required to salvage testis (Sheth et al.,2016)

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

The chapter is composed of an outline of the procedures carried out in the study. The element includes the research design and its components, namely: Target population, study sample design, data collection techniques to be used, and the procedures. It also comprises the data analysis methods for the study. The main objective is to establish the influence of knowledge, attitude, on management practices of testicular torsion among Clinical Officers in Tier Three (Level 4 and 5) Hospitals in Kiambu County, Kenya.

3.1 Research design

The research design was a cross-sectional descriptive design. The researcher collected and analyzed data without manipulation.

3.2 Location of the Study

Kiambu County is part of former Central Kenya. The county neighbors on the North and North East Murang'a County, Nyandarua County to the North West, Nairobi County to the South, Machakos County to the East, and Nakuru County to the West. The location measures 2,543.4 square kilometers.

The total population of the county is 2,126,441. The growth rate is 3% per annum (Kiambu Health Records, 2018). The county has three level 5 Hospitals and 10 Level 4 hospitals. The total number of Clinical Officers who are directly the first contacts to the patients in Out Patient Departments (OPD) in tier three Hospitals is 130. (Table 2).

3.3 Target population

The Clinical Officers working in tier three hospitals in Kiambu County,Kenya was the target population. These Clinical Officers are both Diploma and Degree holders working in Tier Three (Level 4 and 5) hospitals in Kiambu County who are directly involved in the management of patients. The Clinical Officers were used as the study respondents because they are the first contact of patients when the patients arrive in the Out Patient Department (OPD) with scrotal pain. Table 2 shows level 4, level 5 hospitals, and the clinical officers in each hospital category. The total number is 130.

Table 2: Clinical Officers Working in Tier Three Hospitals in Kiambu County

Hospital	Level	Number
Kiambu	5	23
Thika	5	21
Gatundu	5	11
Igegania	4	9
Ruiru	4	17
Kihara	4	8
Tigoni	4	13
Lari	4	4
Karuri	4	6
Lusegeti	4	2
Kigumo	4	7
Wangige	4	7
Nyathuna	4	2
	TOTAL	130

Source: Kiambu County Health Records (2020).

3.4 Sampling procedures and sample size

All the thirteen tier three hospitals were purposefully involved in the study. All the 130 General Clinical Officers attending to patients in the sampled hospitals were included in the sample size. The Total number of the Clinical Officers in all the 13 level 4 and level 5 hospitals was 130. Any form of sampling would have reduced this figure to less than 100 participants and therefore sampling was not done. Census method was taken as the sample size.

3.5 Inclusion criteria

All the general clinical officers working in the sampled hospitals who were constantly attending to patients were included in the study.

3.6 Exclusion criteria

Clinical officers involved in administrative duties and not directly attending to patients were not included in the study.

Clinical Officers with specialties such as ear, nose and throat, anesthesia, Ophthalmology, etc., who are not likely to see a patient with scrotal pain were not included in the study.

3.7 Research Instruments

Mwituria (2012) argues that research instruments are testing devices essential in measuring a given phenomenon and can be in the form of a questionnaire or an interview. To construct a research instrument, e.g., a questionnaire must be guided by all the specific objectives and the study questions. Data was collected with the use of validated self-designed semi-structured questionnaires that were distributed to the participants. Likert scales in the questionnaires was used to test for attitudes, practices, and opinions. Research Instruments for participants' attitude were the Likert scale in the questionnaires, which was used to test for Attitudes, Practices, and Opinions. Research Instruments for management practices, the researcher used a retrospective design where the researcher collected data from the files for cases that have been managed by the clinicians. Research Instrument for knowledge level, the researcher used questionnaires with study questions which were structured (closed-ended) for quantitative designs and unstructured open-ended for qualitative design. The unstructured questions had blank spaces for the respondents to fill.

3.8. Pilot of Research Instruments

The researcher in this study conducted a pilot study involving general Clinical Officers who are indistinguishable from the target participants to evaluate the research tool's content validity. This was a Level 5 hospital in the neighboring county (Nairobi). The reason for choosing another County was to check whether the instruments could measure the required data. The researcher reviewed the instruments from a randomized hospital in the county (Mama Lucy level 5 hospital, Nairobi). The participants felt that the research tools questionnaires were almost like an examination but appreciated that they

needed a refresher course on TT. The questionnaires were modified to fit the working environment.

3.9. Validity of the study

According to Mwituria (2012), data is only useful when it is a measure of what it is ideally supposed to measure. Therefore, the concept of validity relates to the degree to which data collection gives a true measurement or account of acceptable reality (Mwituria, 2012). In this study, the researcher used research tools questionnaires that had been re-tested and found to present a true or valid picture of the level of knowledge or lack of knowledge of the presentation of testicular torsion among the Clinical Officers working in Level 5 and Level 4 hospitals in Kiambu County, Kenya.

Content validity is particularly in research is designed to determine respondents' knowledge in a study area or to gauge personal attributes such as attitudes or beliefs. He argues that researchers can achieve content validity through a pilot study with participants similar to the target participants (Mwituria, 2012). The researcher in this study conducted a pilot study with Clinical Officers (Mama Lucy level 5 hospital) similar to the target research population to test the content validity of the research tools.

3.10. Reliability of the variable

According to Mwituria (2012), validity and reliability measures are essential cornerstones of a research method or study. These measures are the pillars, which influence what scientist accepts as proof. The study was mirror experimental design principles, and the results were able to pass rigorous questioning and skepticism. Any significant results to be reliable must inherently be repeatable by other researchers on the same conditions and generate the same results (Mwituria, 2012). The study mitigated researcher bias in data interpretation through an independent researcher who verified the agreement between the findings and analysis,

3.11. Data Collection Procedures

The study made use of self-developed structured and pretested questionnaires to gain data on participants' knowledge, attitude towards TT, and management practices of TT. From the respondents, which was used to gather the data. The study utilized primary

data. Primary data comprised of the information collected in the field for the first time from the general clinical officers working in tier three hospitals in Kiambu County. The study adopted the use of questionnaires that were distributed to the sample population. The study adopted the use of semi-structured questionnaires where the unstructured questions had blank spaces where the participants filled in their responses, and thus giving room for their views and opinions. The unstructured questions gave extra information related to key questions and enabled the respondents to answer questions without restrictions and hence had more detailed information and was essential for qualitative analysis of data (Mwituria, 2012). The questionnaires were hand-delivered.

3.12 Data analysis techniques

Data entry utilized SPSS version 22.0 for analysis. Analysis of descriptive and inferential statistics was then done, and findings presented. Findings of descriptive statistics were presented using: frequency tables, pie charts, bar charts, converting the statistics to percentages.

3.13 Ethical Considerations

The researcher had permission from the following:

i) Mount Kenya University Ethical Research Review Committee (RSC)

ii) Introduction letter to National Commission for Science Technology and Innovations (NACOSTI) from the school of postgraduate studies.

iii) Kiambu County Health Officers, including relevant Hospital Medical Superintendents.

iv) Informed Consent from the participants/respondents was sought and was assured that: no names were revealed in the study, strict confidentiality of any information of Participants' accessed during the study, and the participants' freedom to voluntarily drop out of them out of the study anytime. The participants were informed of voluntary participation, and no financial incentives. The information gathered from the study was then stored confidentially in both hard and software. They were informed about the study that is about the Level of Knowledge of testicular torsion among Clinical Officers working in Kiambu County and that no risks were encountered because

the researcher used questionnaires and key informers' interviews. The participants/respondents benefited from the study by getting a free copy of the study outcomes. They were informed that no identifying information was availed to anyone not involved in the study.

CHAPTER FOUR
RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the analysis of data and its findings. The findings are presented in accordance with the study objectives. A total of 130 questionnaires were distributed among clinical officers in health care centers in Kiambu. The researcher managed to achieve 100% response rate as the 130 of the distributed questionnaires were dully filled and returned. The response rate was ideal for data analysis generalization of the findings as they met Mugenda and Mugenda (2003) minimum threshold that is a response rate of above 50% is requisite for analysis of data and generalization of the findings to other settings of similar characteristic

The main objective is to establish the influence of knowledge, attitude, on management practices of testicular torsion among Clinical Officers in Tier Three (Level 4 and 5) Hospitals in Kiambu County, Kenya.

4.2 Coverage and response rate

The study target population of clinical officers and the critical personal information sought was highest level of education, name and facility based and cases of acute scrotum pain presented to the health facility to the clinician in a span of one month.

4.3 Characteristics of respondents

Table 4.1 shows respondents' highest qualifications. Among the respondent's majority were diploma holders at 86.2% (n=112), while 6.2% (n=8) and 7.7% (n=10) had Higher diploma and Degree in Clinical Medicine respectively.

Table 4. 1: Showing Respondent's highest qualification

Qualification	Frequency	Percent
Diploma in Clinical Medicine	112	86.2
Higher Diploma in Clinical Medicine	8	6.2
Bachelor's degree in Clinical Medicine	10	7.7
Total	**130**	**100.0**

Based on the findings, all the respondents met the minimum professional qualifications for clinical officers and thus their responses are significant to the study. Since the percentage measures of each category is relevant, it is evident that most of the respondents should be acquainted with knowledge of testicular torsion.

4.3.1 The distribution of clinical officers across the health care facilities in Kiambu County

Table 4.2 reveals the distribution of clinical officers across the health care facilities in Kiambu County.

Table 4. 2: **Shows Name and Level of the Facility covered in the study**

Name	Frequency	Percent
Lari level 4	4	3.1
Igegania level 4	9	6.9
Wangige level 4	7	5.4
Kiambu level 5	23	17.7
Kiharu level 4	8	6.2
Gatundu level 5	11	8.5
Karuri level 4	6	4.6
Thika level 5	21	16.2
Tigoni level 4	13	10.0
Nyathuna level 4	2	1.5
Ruiru level 4	17	13.1

Kigumo level 4	7	5.4
Lusegeti level 4	2	1.5
Total	**130**	**100.0**

The study findings reveal that Kiambu level 5 (17.7% n=23), Thika Level 5 (16.2% n=21), Ruiru Level 4 (13.1% n=17), Tigoni Level 4 (10% n=13) and Gatundu Level 5 (8.5% n=11) had the highest number of Clinical officers who can manage scrotal pain cases among other conditions.

4.4 State of Scrotal pain and TT in hospitals in Kiambu County.

Table 4.3 presents number of cases presented by each health care center in particular month of the study.

Table 4. 3: **Name and Level of the Facility and Cases of Scrotal Pain tabulation.**

Name and Level of the Facility	Less than 5	6 - 10	Above 16	Total
Lari level 4	4	0	0	4
Igegania level 4	9	0	0	9
Wangige level 4	6	0	1	7
Kiambu level 5	13	10	0	23
Kiharu level 4	8	0	0	8
Gatundu level 5	11	0	0	11
Karuri level 4	6	0	0	6
Thika level 5	18	3	0	21
Tigoni level 4	13	0	0	13
Nyathuna level 4	2	0	0	2
Ruiru level 4	16	0	1	17
Kigumo level 4	7	0	0	7
Lusegeti level 4	2	0	0	2
Total	**115**	**13**	**2**	**130**

Table 4.3 shows that most of the health facilities recorded less than 5 cases of acute scrotal pain in that particular month. However, Kiambu Level 5 recorded the highest cases of between 6 to 10 cases.

A further question to probe more about time taken to report scrotal pain in young male teen was posed to the respondents. Figure 4.1 presents the data.

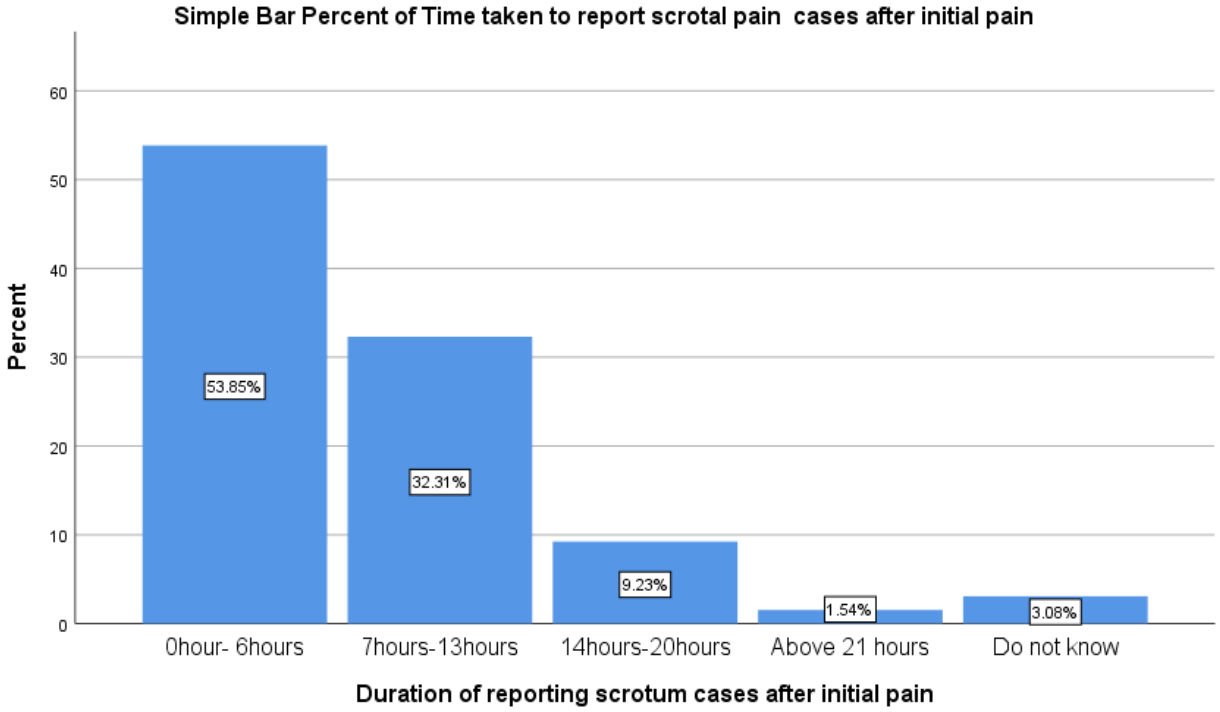


Figure 4. 1: Time taken to report scrotal pain cases after initial pain

Findings in figure 4.1 shows that 53.85% (n=70) of the scrotal pain cases were reported between 0- 6 hours after the onset of the pain.However, 32.31 %(n=42) are said to have seen scrotal pain cases between 7 to 13 hours. This is a delay of between 1 and 7hours when 6-hour rule is applied. 9.23 %(n=12) said patients sought medical attention after 14 to 20 hours. It should be noted this is a delay of between 8hours to 14 hours. It should be noted that the survival rate of the testis reduces below 20% if done beyond twelve hours, left with the only option of surgical removal of the testis - orchiectomy (Brunicardi *et al*., 2015).This calls for community health education on young male teen with scrotal pain to urgently seek medical attention within 6hours as a surgical emergency.

1.54 %(n=2) report scrotal pain after 21 hours. This is a delay of 15 hours. However 3.08% (n=4) of the clinical officers do not know after how long young male teens reported after onset of scrotal pain. In regard to the study findings on time taken of a young male teen with scrotal pain to seek medical attention. Observation of the results shows that a considerable percentage of the initial cases seen by clinical officers were if pain has

persisted and could not be endured any longer. It is observed that only 53.85% (n=70) of the scrotal pain cases were reported within 6hour rule when 80% of the testis can be salvaged testis (Kliegman et al., 2016).

A section (3.08%) of clinical officers demonstrated negligence on their part by mentioning that they are not aware of the duration after which a patient with scrotal pain sought medical attention after onset of scrotal pain.

4.5 Testicular Torsion Management.

Provisional Diagnosis in with high riding testes and Horizontal lie with acutely painful scrotum

Regarding the question on provisional diagnosis for young boys with high riding testis and horizontal lie with acutely painful scrotum; Epididymitis, Orchitis, Testicular Torsion, Epididymoorchitis are the common diagnosis as demonstrated in figure 4.2.

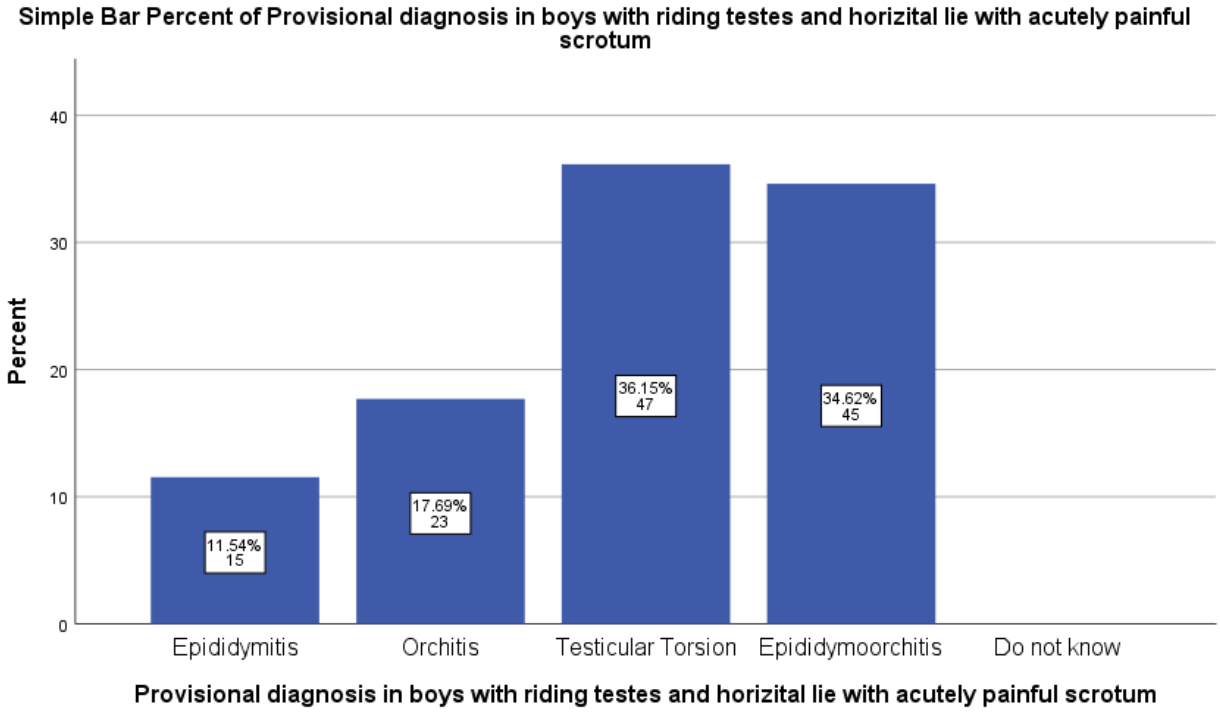


Figure 4.2: **showing clinical officer provisional diagnosis in boys with high riding testes and horizontal lie with acutely painful scrotum**

Study findings indicate that 11.54% (n=15) of the clinical officers were of the view that such cases be diagnosed as epididymitis. In this case of high riding testes and horizontal lie with acutely painful scrotum, 17.68% (n=23) were of the view that it is likely

to be Orchitis. 36.15% (n=47) of the clinical officer were of the opinion that such symptoms are of testicular torsion diagnosis while 34, 62% (n=45) indicated that they would diagnosis the patient as Epididymitis. In regarding findings, respondents demonstrated average understanding of testicular torsion. However, a considerable portion of the COs noted that provisional diagnosis for such signs is epididymitis (34.62%n=45). This is largely attributed to epididymitis having similar signs as testicular torsion hence the confusion. It should be noted that the correct diagnosis in this case is TT. Misdiagnosis as epididymitis will end up with mismanagement by giving broad-spectrum antibiotics instead of referral for surgery (surgical exploratory detorsion).It should be noted that 63 % n=83 of the COs made wrong diagnosis.

Management of a young boy with acute onset of scrotal pain with absent cremasteric reflex.

A question was posed to the clinicians about the management of patient who present with acute onset of scrotal pain without cremasteric reflex. In response, table 4.3 tabulates the results.

Table 4. 4: Showing Management of a boy with acute onset of scrotal pain with absent cremasteric reflex

Management	Frequency	Percent
Broad-Spectrum Antibiotics	27	20.8
Attempt manual Detorsion	15	11.5
Prescribe analgesics and tell the patient to come back after 2 days if no improvement	11	8.5
Apply scrotal support to elevate the testis	77	59.2
Total	130	100.0

From table 4.4 (20.08% n=27) of the clinical officers would prescribe broad-spectrum antibiotics for the Management of acute onset of scrotal pain with absent cremasteric reflex, 11.5% (n=15) of COs recommended attempt of manual detorsion. The correct management would be to attempt manual detortion and then refer for surgical intervention. More than 88% of the COs had wrong management of the condition. 59.2 %(n=77) of the clinical officers suggested the application of scrotal support to elevate the

testes which will make the condition worse. About management of a boy with acute onset of scrotal pain with absent cremasteric reflex, the clinical officers have demonstrated low level of knowledge as far as the relationship of TT and cremasteric sign is concerned.

Further, clinical officers were asked about the likely cause of excruciating pain after testis raising. Table 4.5 presents the likely impression of worsening sudden acute pain after testis raising.

4.5.1 Management Practices

According to Sharp et al. (2013), testicular torsion cases have a rate of 3.8 per 100,000 males under 18 years. Regarding testicular torsion management practices, the study endeavored to determine particular diagnosis for such cases. Are as shown in figure 4.5.

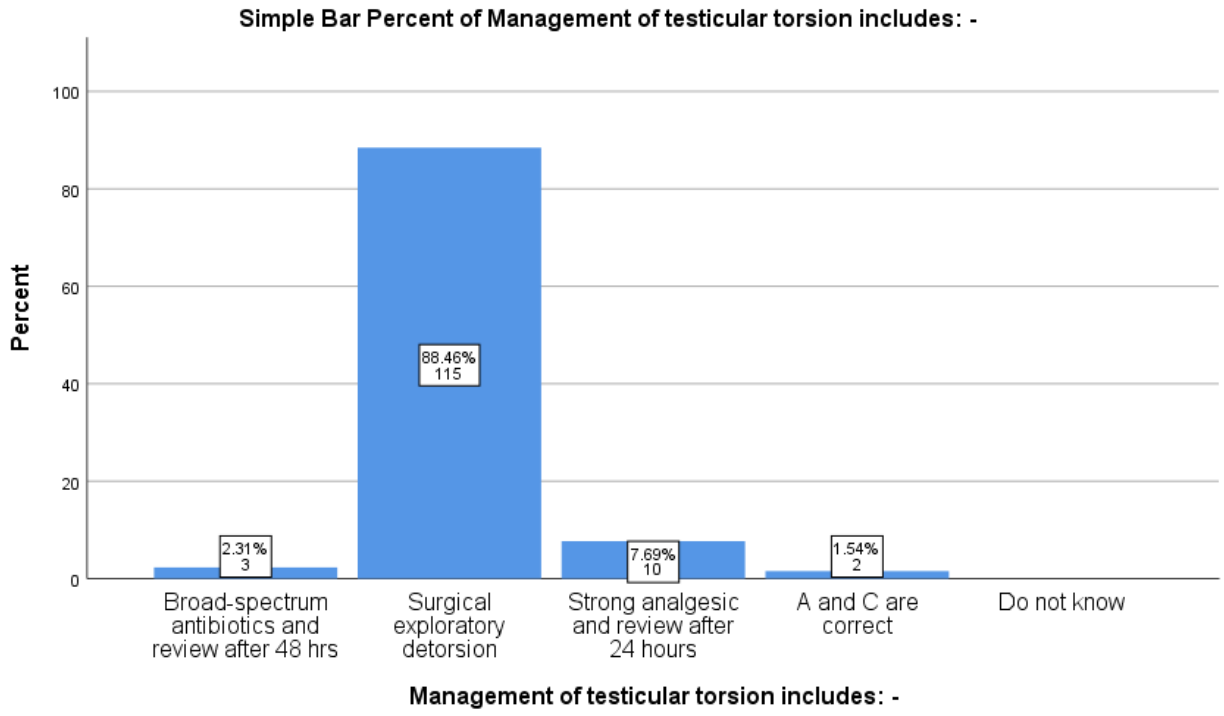


Figure 4. 3: Showing management interventions of testicular torsion

2.31% of the clinical officers of the view that broad-spectrum antibiotics and review after 48 hours is effective in the management of testicular torsion..69% of the clinical officers believe that strong analgesic and review after 24 hours improves testicular

torsion..54% are convinced that antibiotic and review after 48 hours and strong analgesic and review after 24 hours are effective management of TT. However, a considerable majority holds the view that surgical exploratory detorsion is the permanent remedy for the acute pain caused by testicular torsion. The study checked into the techniques that can help to manage the condition of the testicular torsion, one of the emergency conditions among the male teens. From the findings in figure 4.5 a section of COs (11.54%n=15) expressed less understanding of proper management of testicular torsion. They proposed broad-spectrum antibiotics and review after 48 hours as well as strong analgesic.

Case Management

Table 4.9 presents a situation whereby a young boy who presents with a sudden pain of the scrotum and the clinical officer suspect it to be testicular torsion. The researcher aimed to determine clinical officers preferred management.

Table 4. 5: Clinical officers' preferred intervention for sudden pain of the scrotum

Management strategy	Frequency	Percent
Refer for surgical exploratory detorsion after attempting Manual Detorsion	29	22.3
Manual detorsion is unethical	87	66.9
Broad-spectrum antibiotics and then refer for surgical intervention after 48 hrs.	3	2.3
Strong analgesics, elevation of testis, antibiotics and then refer after 48 years if no improvement	7	5.4
Do not know	4	3.1
Total	**130**	**100.0**

23% (n=29) of the clinical officers would recommend for a surgical exploratory detorsion after attempting manual detorsion. 66.9% n=87 view Manual Detorsion as unethical, 2.3% of the respondents suggest broad spectrum antibiotics and surgical interventions after 48 hours, 5.4% are for strong analgesics plus elevation of testis and then refer after 48 hours if no improvement.3.1% they do not know what to do. In regard to the

study, findings in table 4.9 majority of COs demonstrated low level of knowledge in testicular torsion case management. 66.9% of the COs denoted that manual detorsion is unethical. This is a bad attitude and is not factual. In addition, 7.7% of the COs preferred broad-spectrum antibiotics and strong analgesics followed by a review after a prescribed interval. However, such kind of interventions are not proper management strategies for testicular torsion. Only (22.3%n=29) had the right management strategy.

Testicular torsion condition is viewed as a medical emergency that ought to be managed within right period. Table 4.10 tabulate the level of agreement or disagreement on testicular torsion to be managed within 6 hours.

4.6 Knowledge of Testicular torsion

Table 4. 6: Showing likely impression of sudden acute scrotal pain on raising testis

Indicator	Frequency	Percent
Epididymitis	4	3.1
Orchitis	7	5.4
Testicular Torsion	95	73.1
Epididymoorchitis	22	16.9
Do not know	2	1.5
Total	**130**	**100.0**

Findings shows that 3.1% (n=4) of the clinicians attributed to the unbearable pain to epididymitis diagnosis, 5.6% (n=7) associated the pain to Orchitis condition while 73.1 %(n=95) and 16.9 %(n=22) linked the pain to testicular torsion and epididymitis respectively. The responses show testicular torsion as the main cause of worsening pain in teens with acute scrotal pain on raising the testis. Therefore, for the male individuals who experiences more pain on raising the scrotum, the condition is mostly likely testicular torsion, and the epididymitis as the differential diagnosis, which may have similar signs and / or symptoms. In as much as a great percentage of the respondents are able to relate the signs to testicular torsion(TT), there is still a section of clinical officers (26.9% n=35)

who have expressed low understanding of testicular torsion in relation to raising of the testis..

Clinical officer's awareness about Prehn's sign during or after training

Figure 4. 4: Showing Clinical officer's awareness about Prehn's sign during or after training

Figure 4.3 indicate that 36.93% (n=48) of the clinical officers are aware of pen's sign, 50.0% (n=65) indicated that they had no idea of Prehn's sign while 13.08% (n=17) said they do not know. Therefore, a greater portion of respondents (63%, n=82) demonstrated lack of knowledge on Prehn's sign. Clinical officers demonstrated low level of knowledge on the concept of Prehn's sign. This has been associated with lack of coverage of the concept during and after training.

Figure 4.4: Awareness about cremasteric reflex

Awareness of the respondents about cremasteric reflex either during or after training was tested. Figure 4.4 shows the results of awareness of cremasteric reflex by clinical officers.

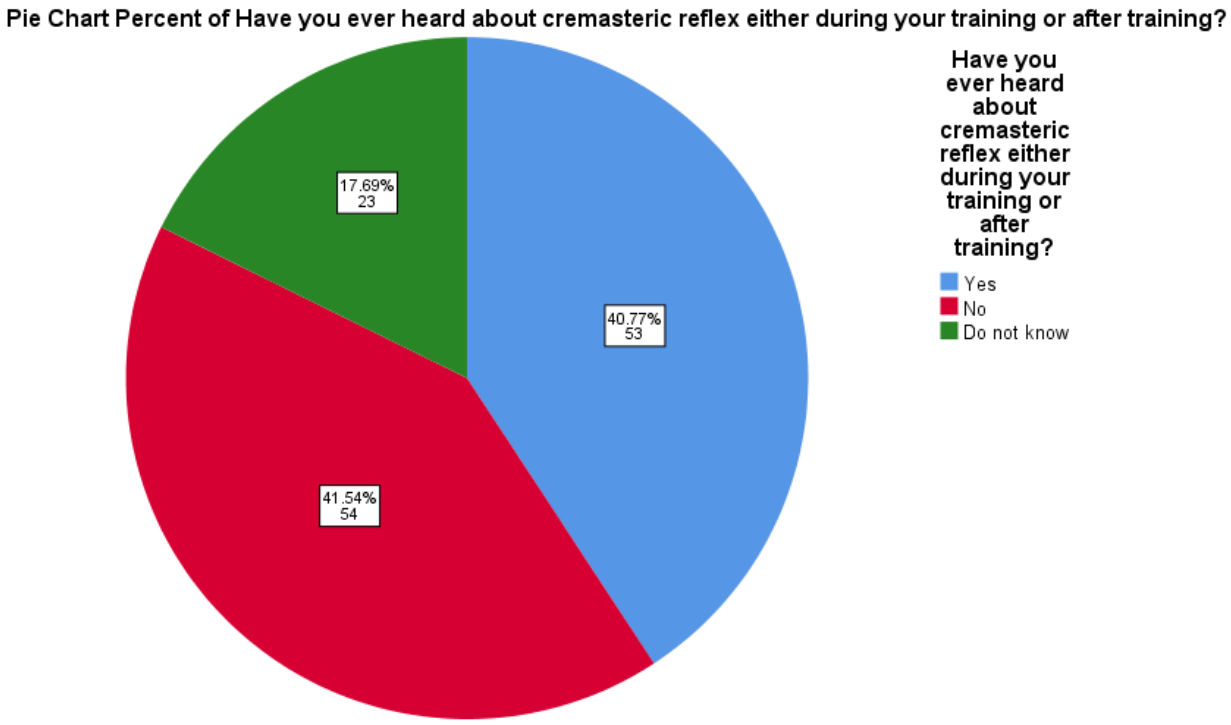


Figure 4. 5: Showing respondent's knowledge about cremasteric reflex either during or after training

Study results indicate that only 40.77% (n =53) of the respondents were aware of cremasteric reflex, whether they covered during training and after training. Many of the clinical officers (59.23% n=77) are not aware of the cremasteric reflex. There is less than half of the respondents of up to 40.77% who had an idea or some knowledge about the cremasteric reflex. This points to lack of knowledge on cremasteric reflex by the clinical officers. This may be due to lack of coverage of the aspect of cremasteric reflex during their training programmes especially in relationship to TT.

Table 4.6 illustrates the results about relationship between Prehn's and testicular torsion.

Table 4. 7: Showing relationship between Prehn's sign and testicular torsion

Aspect	Frequency	Percent
Yes	20	15.4
No	3	2.3

Do not know	107	82.3
Total	130	100.0

From the table, 15 %(n=20) of the clinical officers demonstrated that there is a relationship between Prehn's sign and testicular torsion. However, majority of the COs had no idea. This particularly, explain the low of knowledge of TT conditions among COs.

Further, a study was done to establish whether clinical officers covered testicular torsion in their basic training. A greater portion of the respondents 85.4% (n =111) had covered concept of testicular torsion during their basic training. Nonetheless, about 14% said not to have covered the concept. Usually, ideas are bridged from what is obtained from the reading or research materials. Based on the findings, a bigger percentage of the COs (82.3%) could not comprehend the relations between Prehn's sign and testicular torsion. This is a worrying trend in the management of the testicular torsion.

Table 4. 8: Showing Testicular torsion coverage during basic training

	Frequency	**Percent**
Yes	111	85.4
No	11	8.5
Cannot remember	8	6.2
Total	**130**	**100.0**

Continuous medical education (CME) is essential because it helps the COs get updated knowledge and learn about current management of TT. Therefore, in the interest of the researcher to establish whether testicular torsion was covered during clinical officers' CMEs. Results as per table 4.7 COs basic training covered the concept of testicular torsion. Therefore, low level of knowledge of COs on testicular torsion could not be attributed to their basic training.

The researcher sought to determine whether CME programs are in place on testicular torsion. Table 4.8 tabulate the results.

Table 4. 9: Clinical officers' attendance of CME (Continuous Medical Education) on Testicular Torsion

Category	Frequency	Percent
Yes	65	50.0
No	55	42.3
Cannot remember	10	7.7
Total	**130**	**100.0**

From the table 50% have attended continuous medical education to further their understanding in torsion. 42 percent indicated that they have not attended any CME to sharpen their skills and understanding of testicular torsion cases. From the platforms of education, there are various policies to push forward and certain initiatives especially those touching on the health sector. Through the various programmes such as the continuous medical education, it is possible for professionals, i.e. clinical officers to get platforms to enhance their knowledge. In the study, a better fraction of the numbers of up to 50% had attended the continuous medical education on testicular torsion, thus implying that they had been subjected to knowledge. However, the remaining fraction (50%) of the population had not attended CMEs programmes. This explains their low level of comprehension of testicular torsion aspects.

4.7 Attitudes on Testicular Torsion

Table 4. 10: Testicular torsion is a medical emergency that will need be managed within 6 hrs.

	Frequency	Percent
Strongly disagree	8	6.2
Disagree somewhat	4	3.1
Not sure	7	5.4
Agree somewhat	29	22.3
Strongly agree	82	63.1
Total	**130**	**100.0**

Findings as per table 4.10 shows that 6.2% of the respondents strongly disagree with the statement, 3.1% of the respondents somewhat disagree, 5.4 percent were not sure the management of testicular torsion specified time, 22. 3% of the clinical officers somewhat agree that particular portion agency how to be managed within 6 hours, 63.1% strongly agree that testicular torsion is an emergency that must be managed within 6 hours. Testicular torsion is a serious condition that need to be given attention within the shortest time (within 6hrs) in order to salvage the testis. With reference to the study COs (9.3% n=12) do not consider Testicular torsion (TT) condition as an emergency and (5.4% n=7) are not sure. However, (85.4% n=111) consider TT to be an emergency that should be managed within 6hours.

The researcher sought to determine available options in an event a client is misdiagnosed and mismanaged having testicular torsion and ends up with orchiectomy.

One of the available options is the client may seek legal redress. Table 4.9 presents respondents level of agreement with the legal redress action.

Table 4. 11: **A patient /Client who was misdiagnosed with testicular torsion and ends up with orchiectomy may seek legal redress**

Level of Agreement	Frequency	Percent
Strongly disagree	3	2.3
Disagree somewhat	3	2.3
Not sure	22	16.9
Agree	63	48.5
Strongly agree	39	30.0
Total	130	100.0

In regard to table 4.11, indicate that 4.6% of the respondents contest the idea of instituting legal proceedings against the medical personnel. 16.9%- they do not know what can happen. 78.5% of the clinical officers support that a patient can seek legal redress in an event of misdiagnosis.

Another investigation was done to establish whether respondents have a clear understanding of testicular torsion.

This was sought through as respondents level of agreement with the statement "testicular torsion can be confused with epididymoorchitis (epididymitis) table 4.12 presents the findings.

Table 4. 12: **Testicular torsion can be confused with epididymoorchitis (Epididymitis)**

	Frequency	Percent
Strongly disagree	14	10.8
Disagree somewhat	19	14.6
Not sure	34	26.2
Agree	57	43.8
Strongly agree	6	4.6
Total	**130**	**100.0**

As per table 4.12 10.8% of the respondents strongly disagree that testicular torsion cannot be confused for epididymoorchitis, 14,6% somewhat disagree with the statement,

26.2% remained neutral on the matter 43.8% of the respondents showed a possibility of confusing testicular torsion to epididymitis. Averagely, depending on other factors, such as displaying similarity in symptoms there might be confusion. In a large context, the symptoms and signs of the various conditions may be more or less the same, this turns into confusion when telling the specific condition an individual is suffering. The same is replicated in the case of the testicular torsion and epididymitis, which shares a number of similar symptoms such as scrotal pain. The study checked into this and a large percentage constituting of 63 individuals (48.4%) agreed that there is confusion when it comes to differentiating between the two diseases. On the other hand, 6 respondents strongly agreed that there is some confusion when it comes diagnosis.

All male patients between ages 12-18 years with acute scrotal pain you must check Prehn's sign and Cremasteric reflex.

With respect to the statement, respondents were asked to indicate their level of agreement with statement. Table 4.13 shows the results.

Table 4. 13: All male patients between ages 12-18 years with acute scrotal pain you must check Prehn's sign and Cremasteric reflex

	Frequency	Percent
Strongly disagree	4	3.1
Disagree somewhat	11	8.5
Not sure	34	26.2
Agree	73	56.2
Strongly agree	8	6.2
Total	**130**	**100.0**

Findings in table 4.13 reveals that on average 11.6% of the clinical officer contest the statement. 26.2% they neither agreed nor disagreed. Most of the COs (62.4% n=81) agree that all male patients in the age bracket of 12-18 years showing signs of acute scrotal pain must be checked for Prehn's sign and cremasteric reflex.

The study sought to examine preferred investigation to confirm testicular torsion.

The results are as tabulated in table 4.14

Table 4. 14: Clinical officers preferred investigation to confirm testicular torsion

	Frequency	**Percent**
CT Scan	71	54.6
Doppler Ultra Sound	21	16.2
Radiograph of the testes	37	28.5
Do not know.	1	.8
Total	**130**	**100.0**

As per table 4.14, 54.6% of the respondents recommended CT scan as way of confirming the existing of testicular torsion, 16.2% of the respondents were in support pf Doppler Ultra sound and 28,5% of the respondents suggested Radiograph of the testes while 0.8 of the clinical officers did not know. CT scan is the most preferred investigation for the respondents. It should be noted that Doppler Ultra Sound is particularly important in accuracy in diagnosing testicular torsion because it reveals the compromised blood before necrosis of the testis has occurred (which only had 16.2 n=21) percent of the respondents)**.**

Table 4. 15: **Relation between Prehn's sign and testicular torsion**

	Frequency	**Percent**
Yes	20	15.4
No	3	2.3
Do not know	107	82.3
Total	**130**	**100.0**

From table 4.15 shows that 15.4% n=20 of the clinicians noted existence of relationship between testicular torsion and Prehn's sign. 2.3% of the respondents indicated that there is no relationship. While 82.3% n=107 of the respondents said that they do not know. This shows that the clinicians have low understanding of the

relationship between Prehn's sign and testicular torsion. It should be noted that Prehn's sign is very important in differentiating TT from acute epididimoorchitis.

The study aimed at establishing coverage of testicular torsion in basic training.

Table 4. 16: Coverage of testicular torsion during clinical officers' basic training

	Frequency	Percent
Yes	111	85.4
No	11	8.5
Cannot remember	8	6.2
Total	**130**	**100.0**

Figure 4.16. 85.5% n=111 of the respondents indicated they had covered testicular torsion in their basic training. This means that the lack or low knowledge of TT by the respondents cannot be attributed to lack of coverage in their basic training. However, 8.5% had said that they had not covered, while 6.2 % cannot remember. This may largely be attributed to low grasping of the concept covered.

Continuous Medical Education on Testicular Torsion.

Result on attendance of CME (Continuous Medical Education) on testicular torsion concept are as shown in figure 4.6.

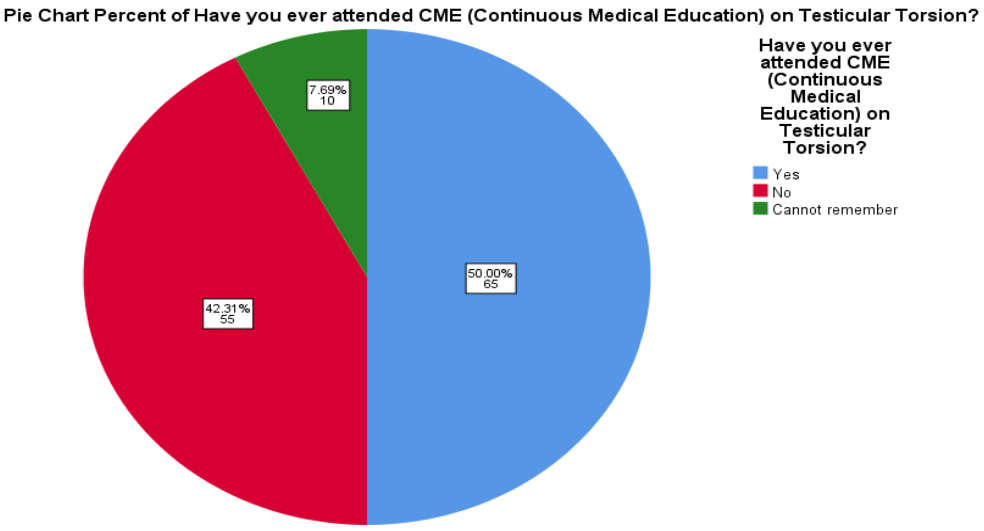


Figure 4. 6: Results of Clinical Officers attendance of CME on TT.

Figure 4.6 shows that 50% of the clinical officers had attended the CME, 42.31% of the respondents have never attended CME while 7.69% cannot remember. It can be concluded that the uptake of CME programs is still low and much is needed to be done. Further, the study to establish number of time attended.

Table 4. 17: Number of times attended CME by the Cos.

	Frequency	Percent
Below 5	54	83.1
Above 8	6	8.5
Between 5 and 8	5	8.5
Total	**65**	**100.0**

The results show that 83.1% of the respondents attended the CME less than 5 times, 8.5% of the clinical officer attended the CME above 8 times. The respondents who attended CMEs between 5 and 8 times were also 8.5%. It can be concluded that most of the COs (83.1%n=54) in the county have attended CME on TT less than 5times or none.

Existence of CME on Testicular Torsion in the facility.

Table 4. 18: Existence of CME program in the health-based facility

	Frequency	**Percent**
Yes	24	18.5
None	58	44.6
Do not know	48	36.9
Total	130	100.0

Table 4.18 shows that 18.5% of the respondents indicated there are CME in their facility, 44.6% indicated that there is no single CME program in their facility, while 36.9% do not know. With respect to CME, it is inferred that CME programs have not been in place in most of the facilities (81.5%). The low level of understanding of testicular torsion may largely be attributed to inadequate CMEs.

A follow-up investigation was done to determine the number of times CME training was attended by COs in 3years. Table 4.19 below shows the results

Table 4. 19: Number of times attended in past 3 years

	Frequency	Percent
Below 5	3	13.8
Between 5 and 10	1	.8
I do not know.	20	85.4
Total	**24**	**100.0**

Table 4.19 shows that 13.8% of the respondents said they attended below 5 times in 3years, 0.8 % said between 5 and 10 times, while 85.5% they do not know. As reflected in the table, despite the few health facilities having CME programs, they are less attended by the COs. 85.4% n=20 of the respondents indicated that they do not know.

4.7 Attitude

In addition, a deeper probe was done to determine whether it is important to include CME regularly on Testicular Torsion.

Table 4. 20: Showing the importance of having CME regularly on testicular torsion

	Frequency	Percent
Strongly disagree	8	6.2
Disagree somewhat	5	3.8
Not sure	7	5.4
Agree	83	63.8
Strongly agree	27	20.8
Total	**130**	**100.0**

Table 4.20 indicate that 6.2 % of the clinical officers strongly disagreed that it is not important to have CMEs regularly, 3.8% of the respondent somewhat disagreed, 5.4% were not sure. 84.6% n=110 of the respondents agreed that it is important to incorporate CMEs on testicular torsion. It can be inferred that CMEs on TT should be held regularly in all health facilities.

The researcher sought to establish whether manual detorsion is professional and ethical in young male child suspected to have testicular torsion before referral for surgical detorsion.

Table 4. 21: Showing whether Manual Detorsion of the testis is professional and ethical in young male suspected of testicular torsion.

	Frequency	Percent
Strongly disagree	25	19.2
Disagree somewhat	55	42.3
Not sure	18	13.8
Agree	27	20.8
Strongly agree	5	3.8
Total	**130**	**100.0**

Figure 4.21 shows that 19.2% of the respondents disagreed in totality that manual detorsion of the testis is professional and ethical in young male child suspected to have testicular torsion.42.3% n=55 of the Clinical Officers somewhat disagreed manual detorsion being professional and ethical. 13.8% of the respondents were undecided on the issue of manual detorsion, 20.8% of the respondents agreed that manual detorsion is ethical and professional. The scores of 61.5% n= 80 response rate strongly disagreed that manual detorsion is professional and ethical. This is a bad attitude and is not factual This calls for CMEs on TT management in all health facilities in the county.

Bell Clapper deformity

The study sought establish whether bell clapper deformity is a congenital deformity attributable to testicular torsion. Table 4.22 tabulates respondents' level of agreement with the association of bell clapper deformity to testicular torsion.

Table 4. 22: Bell clapper deformity is congenital deformity associated with Testicular Torsion:

	Frequency	**Percent**
Strongly disagree	11	8.5
Disagree somewhat	20	15.4
Not sure	36	27.7
Agree	50	38.5
Strongly agree	13	10.0
Total	**130**	**100.0**

Table 4.22 shows that 8.5% of the respondents strongly disagreed that bell clapper deformity is attributed to testicular torsion. 15.4% somewhat disagreed that bell clapper deformity associated with testicular torsion However, 48.5% of the respondents are of the opinion that bell clapper deformity is largely attributed to testicular torsion. Therefore, it can be inferred that most of the COs are aware that the bell clapper deformity is likely to cause testicular torsion (TT).

Table 4.23 indicates that most of the COs believe that manual detorsion is cruel to a young boy with acutely painful swollen scrotum. This is confirmed by 83.9% response rate agreement with the statement. This is not factual according to research literature review.

Table 4. 23: Clinical officers' opinion about manual detorsion in young boy with acutely swollen scrotum

	Frequency	**Percent**
Yes	109	83.8

No	17	13.1
Do not know	4	3.1
Total	**130**	**100.0**

83.8 % of the clinical officers expressed that manual detorsion to a young with an acutely painful swollen scrotum is cruel, while 13.1% and 3.1% of the officers said it's not cruel and do not know respectively. This calls for CMEs on TT management in all health facilities in the county.

Table 4. 24: **A young boy with acutely painful swollen scrotum, will need inspection only and no physical examination because palpation will be cruel to the patient**

	Frequency	**Percent**
Strongly disagree	41	31.5
Disagree somewhat	61	46.9
Not sure	12	9.2
Agree somewhat	11	8.5
Strongly agree	5	3.8
Total	**130**	**100.0**

Regarding inspection of acutely painful swollen scrotum will only be necessitated and no physical examination since palpation might cruel to the patients. Table 4.24 indicated that 78.4% disagree that palpation is cruel.

4.8 Regression Analysis

A linear regression model was used to ascertain the correlation between independent variables (attitude, awareness) and dependent variable management practices. The results are shown in the model summary, one-way ANOVA and Coefficient Models. For regression, the study used questions: 16, 18, 19, 30, 31, 33 and 34.

Table 4. 25: Linear regression model

Model	R	R Square	Adjusted R Square
1	.720a	.646	.644

Regarding the results of calculation, the coefficient of determination of adjusted R Square (R^2=0.644). This shows that 64.4% of the variance is attributed to clinical officers' awareness and attitude towards testicular torsion while the remaining percentage (35.6%) could be explained by factors not covered in the study.

Table 4. 26: Regression Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.880	.316		9.122	.000
	Awareness	.081	.083	.086	.973	.332
	Attitude	-.026	.108	-.021	-.239	.811
a. Dependent Variable: Management						

Table 4.7 presents the coefficients used in determining testicular torsion management practices.

Model as shown below:

MP= 2.880+0.081A +-0.026AT + 0.316E

Where:

MP is management practices

A is awareness

AT is attitude

Based on the model, holding studied dynamics (awareness, attitude and management practices) at constant zero is at 2.880. In addition, the findings that holding all other independent variables at zero, a unit decrease in awareness would lead to a 0.081 decrease in awareness towards management of testicular torsion. a unit increase attitude will lead to a -0.026 increase in attitude towards management of testicular torsion.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Introduction

The main objective of the study is to establish the influence of knowledge, attitude, on management practices of testicular torsion among Clinical Officers in Tier Three (Level 4 and 5) Hospitals in Kiambu County, Kenya.

The conclusions from the data analysis are summarized in this chapter. The study yielded conclusions and recommendations that may aid in better understanding the degree of knowledge, attitude, and management practices of testicular torsion among clinical officers in tier three hospitals in Kiambu County, Kenya.

5.1 Summary

The sample comprised 130 clinical officers. The study achieved a 100% response rate as all the distributed questionnaires were duly filled and returned. The study established the following:

5.1.1 Knowledge Level

The knowledge level of the clinical officers was assessed on different aspects as far as management of testicular torsion is concerned. The first aspect test was a provisional diagnosis for a boy with high riding testes and horizontal lie acutely painful scrotum. Majority of the clinical officers expressed low knowledge on diagnosis of high riding and horizontal lie in acutely painful scrotum. The common diagnoses for boys who presents with acute scrotal pain, are testicular torsion and Epididymitis. Regarding the management of scrotal pain with absent cremasteric reflex, 59% of clinical officers said the scrotum to be elevated and 20% recommended broad-spectrum antibiotics while others suggest manual detorsion, prescription of analgesics and follow up to monitor progress. However, more than half the COs (59.2% n=77) recommendations are not the proper management of TT. Testicular torsion is serious condition that would need immediate surgical intervention in case manual detorsion fails. This is a reflection low knowledge of TT presenting signs. This eventually leads to poor management of the patient. This calls for CMEs on TT management in all health facilities in the county.

The study findings correspond to those of (Nasr et...al., 2020) which notes that acute scrotal excruciating pain is common in young boys. Scrotal pain can be caused by a variety of conditions, including testicular torsion, infection, trauma, and even less common reasons such malignancies. Because testicular torsion is a leading cause of testicular infarction, prompt evaluation is essential to save the testis within 12 hours after diagnosis and confirmation.

A question “in a young boy with sudden acute scrotal pain, on raising the testis makes it worse, likely impression is?” the majority of the respondents indicated that could be signs of testicular torsion. This expresses their average understanding of the testicular torsion condition in male teens.

An elevation to determine the cause of testicular pain is known as Prehn's sign. It is usually performed by lifting the scrotum and evaluating the changes in pain. In respect to this aspect, 50% of the clinical officers expressed a low level of knowledge about Prehn's sign. This is further confirmed by respondents noting that they do not know about the relationship between Prehn's sign and testicular torsion.

On cremasteric reflex, (59.23% n=77) of the clinical officers said to have not heard about the cremasteric reflex. This is largely attributed to a lack of coverage of the concept during or after training. Thus the low level of understanding TT.

5.1.2 Management Practices of Testicular Torsion

Testicular torsion is a delicate condition that causes excruciating pain in the scrotum in young boys. There are several diagnoses to confirm the kind of scrotal condition they be suffering from. In the study findings, (68% response rate) surgical exploratory detorsion is the most preferable treatment of testicular torsion. Others were of the thought that broad-spectrum antibiotics, strong analgesics plus a review after 48 hours This particular management leads to delay in the specific management of TT which is surgical exploratory detorsion. Others studies tend to agrees that broad-spectrum antibiotics and use of analgesics are improper treatment interventions for testicular torsion (TT). Gordan and Nejad's (2015) study on scrotum pain: examination and therapy produced similar results by considering testicular torsion as serious condition that need to be handled as a surgical emergency. According to the study, testicular torsion is a medical emergency that

necessitates immediate surgical treatment because the testicle is at risk. Testicular torsion, according to Gordan & Nejad, necessitates prompt surgical intervention, including scrotal exploratory detorsion, and orchidopexy.

In an event where the teen patient presents sudden pain of the scrotum and the clinical officer suspects it to be testicular pain, the respondents would manage the situation by referring the teen for surgical exploration detorsion and attempting manual detorsion. Others would recommend broad-spectrum antibiotics with follow-up if no improvement after 48hrs then the boy would be referred for surgery. This a serious mismanagement because after 48hrs salvage of the testis will not be possible. The study findings concur with those of Quds's, & Mahmud, (2011) which puts Torsion of the testes as a surgical emergency because it causes gonadal blood supply constriction, which results in testicular necrosis and atrophy. Unless the tests are shown to be negative, acute scrotal edema in children indicates TT.

Testicular torsion is a serious urologic emergency, and failure to diagnose and treat it quickly might result in testicle loss. The history and physical examination are enough to provide a correct diagnosis in about two-thirds of patients possible. In adolescent males, testicular torsion is the most frequent cause of testicle loss.

Epididymitis is an inflammation of the epididymis and is a relatively common condition that is likely to be confused with testicular torsion. This is the root cause of misdiagnoses of patients who display testicular torsion-like conditions which in reality is a different disorder but displaying the characteristic of testicular torsion. It is worth noting that, respondents agree that the patient has a right to seek legal redress in case they are misdiagnosed. Therefore, the clinical officer should ensure proper assessment of scrotum pain to be certain of the ailment they intend to manage. Thus avoiding legal proceedings.

Cremasteric reflexes are considered to have an important role in the treatment of testicular torsion. When the inner part of a man's thigh is stroked, the cremaster muscle contracts, raising the testis. When the testicles move at least 0.5 cm, it is considered a positive cremasteric reflex. The clinical importance of the cremasteric reflex, according to Mellick, Mowery, and Al-Dhahir (2021), is that it is useful in providing objective proof of effective anesthesia, and so it is part of evaluating acute scrotal pain to assess evidence of testicular torsion. The lack of a cremasteric reflex in large numbers of teens of all ages

would have a substantial impact on the specificity of this reflex in the diagnosis of testicular torsion (TT).

As discussed earlier, the lifting of the scrotum and assessing the change in pain is what is called Prehn's sign, which is a significant finding in helping clinicians determine whether testicular pain is caused, by epididymitis or testicular torsion (TT). Concerning the study, the clinician expressed a lack of understanding of the relationship between Prehn's and testicular torsion. However, a few (15.4%) who indicated that understanding noted that when the scrotum is elevated and there is a positive Prehn's sign it is indicative of inflammation of the testes (epididymitis) whereas a negative sign indicates testicular torsion, which is not true.

On suspicion of testicular torsion thorough physical examination, it is prudent to involve other methods to confirm that it is testicular torsion so that relevant treatment may be recommended. The most preferred investigation according to the responses was CT scan other methods included Doppler Ultrasound and radiograph of the testes. Radiographs of the testes and Doppler ultrasound are less preferred owing to reasons that may not be known to this study. These underscore the results of a study conducted by Oval et…al., (2009), Which describes a scrotal CT scan as a quantitative evaluation regardless of the investigator's expertise. Additionally, it prevents testicular loss or unnecessary surgery. It should be noted that Doppler ultra sound, which reveals compromised blood supply, is the preferred investigation for any suspected TT. Doppler ultra sound had 16.2% of the respondents (Table 4. 1). This calls for CMEs on TT management in all health facilities in the county.

5.1.3 Attitude

Testicular torsion to a bigger percentage of COs TT was a not new concept. Figure 4.16 reveals that 85.5% of the respondents indicated they had covered testicular torsion in their basic training. However, 14.7% of the concept was relatively new concept. Figure 4.21 shows that 42.3% n=55 of the Clinical Officers somewhat disagreed manual detorsion being professional and ethical and 19.2% of the respondents disagreed in totality

that manual detorsion of the testis is professional and ethical in young male child suspected to have testicular torsion.

Table 4.23 shows that 83.8 % of the clinical officers expressed that manual detorsion to a young with an acutely painful swollen scrotum is cruel, while 13.1% and 3.1% of the officers said it's not cruel and do not know respectively.This is a reflection of attitude rather than facts. It should be noted that manual detorsion should be done professionally in primary settings with poor resources. This becomes even more important and urgent when no surgeon is available to do exploratory detorsion within 6 hours. This calls for CMEs on manual detorsion as part of TT management in all primary health facilities in the county.

Continues Medical Education is meant to enhance what clinical officers acquired while in their basic training before practice. Such conditions as epididymitis, testicular torsion, Orchitis among other conditions that influence teen males ought to have been covered in the basic training.

50% of the sampled population have never bothered to attend CME programs while working at the health facilities. This particularly contributes to forgetting some important management practices for all health conditions, subsequently explaining why some had difficulties understanding testicular torsion as well as its specific management practices.

Of those who were able to attend, the majority (83.1%) of them attended less than 5 times although it was better than those did not attend any. CME programs keeps health care workers updated on the new concepts of specific management of ailments. Additionally, clinical officers become well informed of certain health conditions, and hence the prevalence of misdiagnoses drops and improves morale among the practitioners.

One reason most of the sampled respondents have not been able to attend CME programs is that the health facilities do not have such programs and thus wouldn't know much about testicular torsion conditions. Those with such programs do it for less than five times in a year while the vast majority of COs said they do not know, meaning the CMEs may not be scheduled especially on TT. However, a majority (86%) hold the view that such programs would be of great impact on the management of testicular torsion among other diseases as well as change clinical officers' and other health workers' attitudes towards the management of theTT conditions if done regularly.

Regarding manual detorsion of the testis, a vast majority of COs (61.5% n= 80, Table 4. 2) view manual detorsion as unprofessional and unethical. The suspected pain experienced by the young male teen could be detected during palpation while doing manual detorsion. However, the reviewed past literature, described manual detorsion as an appropriate procedure or part of the physical examination of the testes to check for signs of testicular torsion. Therefore, it is not unprofessional and unethical. This is supported by Demirbas, et.al., (2017) by adding that manual detorsion is an efficient and reliable procedure when applied together with orchiopexy as part of the treatment. 48% of the respondents believe that bell clapper is a congenital deformity associated with testicular torsion. The findings are consistent with a study conducted by Taghavi, et.al. (2021) which notes that bell clapper deformity is among the cause of testicular torsion. This calls for CMEs on TT management in all health facilities in the county.

5.2 Conclusions

Based on the study findings the following conclusions are made; all the hospitals sampled admitted at least a case of testicular torsion during the time of the study. This calls for CMEs on TT in order to salvage the testis within 6hours after onset scrotal pain in male teens. Regarding knowledge, sample clinical officers had at least a diploma in clinical medicine, which is a minimum requirement for being a practitioner. However, it can be concluded that knowledge on various aspects of testicular torsion varies from low to average as some expressed less knowledge of some signs of testicular torsion. It is worth noting that the level of knowledge is much significant in specific management of testicular torsion cases. On the management of testicular torsion by COs in Kiambu County can be inferred to be average despite a lack of understanding of signs related to scrotal pain in young teens. Continuous Medical Education (CME) on testicular torsion will update COs in the specific management of testicular torsion and avoid legal redress emanating from misdiagnoses. Clinical officers' attitude is largely determined by the understanding of the scrotal pain cases among teens in the communities. The percentage that expressed understanding of the cases were positive about the management of testicular torsion, unlike the other section that said Manual detorsion procedure is cruel and unethical.

5.3 Recommendations

Regarding the findings of the study, the following recommendations are put forth:

1. Majority of the COs (86%) hold the view that CMEs programs would be of great impact on the management of testicular torsion among other diseases as well as change clinical officers' and other health workers' attitudes towards the management of the TT conditions if done regularly.

   Mastery of skills relieves organizations (health care providers) of costs that may accrue due to lawsuits in the event of a clinical officer wrongly misdiagnosing a patient with TT. Therefore, Continuous Medical Education on testicular torsion condition is recommended.
2. In some cases, epididymitis displays similar characteristics like testicular torsion that may result in the misdiagnosis of the patients. Therefore, it is essential that after detailed physical examination of any teen with acute scrotal pain, Doppler ultra sound scan should be requested to ascertain the real cause of the condition before administration of any drug. Additionally, this will go a long way in improving clinical officers' testicular torsion management practices leading to the expected outcome of restoration of blood supply to the testis and correction of bell clapper deformity.
3. Awareness creation is vital in the management of scrotal pain affecting young males, as it would help them come and seek medical attention before it is too late. Therefore, community outreach programs ought to be put in place to enhance awareness in the community on prevention of delay of scrotal pain and seeking medical advice urgently before necrosis of the testis has occurred leading to orchiectomy.
4. Manual detorsion should be taught and encouraged to be done by COs in the most professional way in any suspected TT in case surgical exploratory detorsion is not immediately possible (within 6hrs). This will restore the compromised blood supply temporarily and then refer the male teen for surgical intervention to permanently correct bell clapper deformity and untwist the testis surgically to restore blood supply.

5.4 Areas for Further Research

From the study findings, the study recommends a further study be conducted on the prevalence of testicular torsion cases in the county. Also, a study to be conducted on the effect of community outreach on the management of conditions that affect the scrotum in young boys.

REFERENCES

Afsarlar CE, Sheila L R , Edward D , , Beth J , Bartha C , Jason A , Gene O H , Edmond T G , Nicolette J , Duong Tu , Abhishek S , David R , Chester J Koh (2016)Standardized Process to Improve Patient Flow From the Emergency Room to the Operating Room for Pediatric Patients With Testicular Torsion. Journal of paediatric urology, Aug.2016 DOI: 10.1016/j.jpurol.2019.04.019

Arevalo MK, Sheth KR, Menon VS, Ostrov L, Hennes H, Singla N, Koral K, Schlomer BJ, Baker LA. (2018). Straight to the Operating Room: An Emergent Surgery Track for Acute Testicular Torsion Transfers. J Pediatr. 2018 Jan;192:178-183. DOI: 10.1016/j.jpeds.2019.09.009. PubMed.

Sadeghi, N., Erfani-Majd, N., Tavalaee, M., Tabandeh, M. R., Drevet, J. R., & Nasr-Esfahani, M. H. (2020). Signs of ROS-associated autophagy in testis and sperm in a rat model of varicocele. Oxidative medicine and cellular longevity, 2020.

Gordan and Nejad's (2015) Scrotal pain: evaluation and management: 10.4111/kju.2015.56.1.3. PubMed.

Quds's, M. B., & Mahmud, S. M. (2011). Testicular torsion: a diagnosis not to be missed. JPMA-Journal of the Pakistan Medical Association, 61(4), 391.

Mellick, L. B., Mowery, M. L., & Al-Dhahir, M. A. (2021). Cremasteric Reflex. In StatPearls [Internet]. StatPearls Publishing.

Taghavi, K., Dumble, C., Hutson, J. M., Mushtaq, I., & Mirjalili, S. A. (2021). The bell-clapper deformity of the testis: the definitive pathological anatomy. Journal of Pediatric Surgery, 56(8), 1405-1410.

Demirbas, A., Demir, D. O., Ersoy, E., Kabar, M., Ozcan, S., Karagoz, M. A., ... & Doluoglu, O. G. (2017). Should manual detorsion be a routine part of treatment in testicular torsion? BMC urology, 17(1), 1-4.

Barbosa JA, Tiseo BC, Barayan GA, Rosman BM, Torricelli FC, Passerotti CC, Srougi M, Retik AB, Nguyen HT. (2013). Development and Initial Validation of a Scoring System to Diagnose Testicular Torsion in Children, The Journal of Urology-Pediatric Urology, Volume 189, Issue 5, May 2013, Pages 1859-1864, Retrieved from: DOI: 10.1016/j.juro.2019.10.056. Epub 2019 Oct 24.

Bello, O. J. (2018). Burden and seasonality of testicular torsion in tropical Africa: Analysis of incident cases in a Nigerian community. African Journal of Urology, Retrieved from: https://doi.org/10.1016/j.afju.2019.10.001

Binita, R. S., Lucchesi, M. (2006). Atlas of Pediatric Emergency Medicine, McGraw Hill, New York, U.S.A.

Boettcher, M., Krebs, T., Bergholz, R., Wenke, K., Aronson, D., and Reinshagen, K. (2013). Clinical and sonographic features predict testicular torsion in children: a prospective study Retrieved from: https://doi.org/10.1111/bju.122294.Brunicardi,C. F., Dana, K. A., Billiar, R. T., 5. Dunn, L. D., Hunter, J.G., Jeffrey, B.M., Pollock, R. (2015). (10 Ed.) Schwartz's Principles of Surgery, McGraw Hill, New York, U.S.A.

Brunicardi, F. Charles, Dana K., Anderson, Timothy R., Billiar, David L Dunn, John G. Hunter, Jeffrey B. Mathews, Raphael Pollock. (2015), Schwartz's principles of surgery 10th edition, McGraw Hill Education, New York U.S.A.

Chao, Y., Bin, S., Tan, J., Xin, L., and Guang-hui Wei. (2011). Research Article: Testicular torsion in Children: A 20-Year Retrospective Study in a Single Institution, The Scientific World Journal, Volume 11, Pages 362-368, Retrieved from: http://dx.doi.org/10.1100/tsw.2011.39.

Ciftci, Senocak, Tanyel, and Büyükpamukçu (2004), Clinical predictors for differential diagnosis of acute scrotum. Eur J Pediatric Surg

Cost, G. C., Bush, C. N., Barber, D. T., Huang, R., and Linda A. Baker, A. Testicular. (2011). Torsion pediatric testicular torsion: Demographics of National Orchiopexy Versus Orchiectomy Rates. Retrieved from: https://doi.org/10.1016/j.juro.2020.01.016'Daniel DaJusta, MD,

Creagh TA, McDermott TE, McLean PA, Walsh A. Intermittent torsion of the testis. BMJ 1988; 297:525-6.

Donabedian, A (2005) Evaluating the Quality of Medical Care, The Milbank Quarterly, 83(4):691-729

Demirbas A, Demur DO, Eros E, Akbar M, Oscan S, Maragos MA, Demibras O, Doluoglu OG (2017). Should manual detorsion be a routine part of treatment in testicular torsion? PubMed sept

Dreger, A.D., Chase, C. Sousa, A., Gruppuso, P.A. and Frader, J. (2011). Changing the Nomenclature/Taxonomy for Intersex: A Scientific and Clinical Rationale, Journal of Pediatric Endocrinology and Metabolism Retrieved from: Journal of Pediatric Urology, Volume 7, Issue 4, August 2011, Pages 475

Eardley Ian (2013), Testis and scrotum, Bailey and Loves Short Practice of surgery 26th edition, CRC Press, Taylor and Francis group London U.K.

Baruga1 E, Munabi I, Guyton, Jan (2013). Case series on testicular torsion: an educational emergency for sub-Saharan Africa. Pan African Medical Journal. 2013; 14:18. Doi: 10.11604/pamj.2019.14.18.1736.

Barbosa JA, Tiseo BC, Barayan GA, Rosman BM, Torricelli FC, Passerotti CC, Srougi M, Retik AB, Nguyen HT. Development and initial validation of a scoring system to diagnose testicular torsion in children. (2013) The Journal of urology. 189 (5): 1859-64. doi:10.1016/j.juro.2012.10.056 - Pubmed

Feher AM, Zoltan B. A. (2016) Review of Main Controversial Aspects of Acute Testicular Torsion. Journal of Acute Disease; 5(1):1-8

Goldman, M., Beni –Israel, T., Shmual, B. C., and Kozer, E., (2010). Clinical predictors for testicular torsion as seen in Pediatric Emergency Department. The American Journal of Emergency Medicine. Retrieved from: D01:https:11do1.org/10.1016/j.ajem.2020.03.025

Glabeke, Van. K. Larroquent, M., & AudryGruner, M. (1999). Pediatric Surg.int

1999 Jul, 15 (5-6) 353-7 PubMed. Acute scrotal pain in children-results of 543 surgical Explorations.

DaJusta, D. G., Granberg, C. F., Villanueva, C., & Baker, L. A. (2013). Contemporary review of testicular torsion: new concepts, emerging technologies and potential therapeutics. Journal of pediatric urology, 9(6), 723-730

Headway Paul John M Reynard. (2013). the six-hour rule for testis fixation in testicular torsion: Is it history? Journal of clinical urology vol.6 no.2 84-88. https://doi.org/10.1177/2051415812472676

Howe Adam S. Vinaya Vasudevan, Kongnyuy Michael, Rychik Kevin, Lisa A. Thomas, Matuskova Maria, Friedman Steven C, Gitlin Jordan S., Edward F. Reda., Lane S. Palmer. (2017) Degree of twisting and duration of symptoms are prognostic factors

of testis salvage during episodes of testicular torsion. Transl Androl Urol. 2017 Dec; 6(6): 1159–1166. DOI: 10.21037/tau.2019.09.10

Karanja Lawrence Mwangi (2012). Ethiopian Journal of Health Science. Patients' ratings of the quality of their outpatient visit to Clinical Officers in Kenya.

Kavoussi PK, Costabile RA(2013). Orchialgia and the chronic pelvic pain syndrome. World J Urol. 2013; 31:773–778. [PubMed] [Google Scholar]

Kiambu County Health Records. (2019)

Kuremu. R. T. May (2004). Testicular Torsion: Case Report. East African Medical Journal Vol. 81 No. 5.

Lautz T. B, Zhao, L. C, llmeeks, M Maizels (2011). The journal of urology 2011-jurology.com

Mansbach J M. Forbes P, Peters, Craig (2005) Risk factors for testicular loss due to testicular torsion, Arch Pediatric Adolescent Med. 2005;159(12):1167-1171. DOI: 10.1001/archpedi.159.12.1167.pubmed.

Maranya G. A, Mwero B.J, Kinyanjui G. M, Al-Ammary A. Y and Maganga H. M (2011). Dismal salvage of testicular torsion: A call to action! • Volume 8 • the E Annals of African Surgery

Marcozzi, D. and Suner, S. (2001). The non-traumatic, acute scrotum. Retrieved from: https://www.ncbi.nlm.nih.gov/pubmed/11554275

Margaret E. Kruk, A W, Naboth M, Khady Ndao-Brumblay, Renee Y, Moses G, Sam L (2010). Human Resource and Funding Constraints for Essential Surgery in District Hospitals in Africa: A Retrospective Cross-Sectional Survey. African Journal of Urology, Volume 24, Issue 1, March 2018, Pages 79-82. Retrieved from, https://doi.org/10.1371/journal.pmed.1000242.

Patrick Mbindyo, Duane B and Mike E, Human Resources for Health (2013), the role of Clinical Officers in the Kenyan health system: a question of perspective. http://www.human-resources-health.com/content/11/1/32

Preece J Christina C, Katelyn Y , Venkata J , Daryl M , Seth A , Daniel D. Indicators and Outcomes of Transfer to Tertiary Pediatric Hospitals for Patients with Testicular Torsion. Journal of Paediatric Urology Aug.2017 Doi: 10.1016/J.Jul.2017.03.034

Mutea, R., (2015a) Powerful Project, Powerful Presentation. Meru, Eureka Publishers.

Mutea, R., (2015b), Social Research Methods, A Complete Guide. Meru, Eureka Publishers.

Mutea, R., (2016), Statistics Can Be Fan, Nairobi, Signal Press Limited.

Mutea, R., (2017), Snapshot view of Social Research. Nairobi, Signal Press Limited.

Murithi John, Abidan Mwachi, Ramadhani Abdalla, Sundeep Chavda (2017) Management and Outcome of Testicular Torsion. The Annals of African Surgery, Volume 14 Issue 2, 104

Mugello EL (2016), case reports in Eldoret, Kenya by published by East and Central African Journal of Surgery. December 2016; Vol. 21 (3): Manual Detorsion of Testicular Torsion: A Primary Care Intervention Procedure. DOI

Mwituria S. M., (2012), Quantitative and Qualitative Research Methods Simplified, University of Nairobi publishers, Kenya.

Nevo A, Mano R, Sivan B, et al. (2017) ... Missed Torsion of the Spermatic Cord: A Common Yet Underreported Event. Urology. 102: 202-206

Okarska-Napierała, M., Wasilewska, A. And Kuchar, E. (2017). Urinary tract infection in children: Diagnosis, treatment, imaging - Comparison of current guidelines. Retrieved from: https://doi.org/10.1016/j.jpurol.2019.12.010Get rights and content

Obi AO (2017). Intermittent Testicular Torsion, Nigerian journal of clinical practice. volume20, issue10.J Clin Pract 2017; 20: 1273-6.ppu Published by warters Kluwer-medknow.

Pakmanesh H, Alinejad M- Turkish journal of urology (2018). A case of bilateral perinatal testicular torsion that presented with unilateral torsion; necessity of contralateral testis exploration

Pogorelic, Z., (2013). Do not forget to include testicular torsion in differential diagnosis of lower acute abdominal pain in young males. Journal of Pediatric Urology Company. Retrieved from: https://www.ncbi.nlm.nih.gov/pubmed/23743132

Ringdahl E, Teague L, Am Fam Physician(2006). Testicular torsion, PubMed 2006 Nov 15; 74(10):1739-43

Robert, M. K., Bonita, F.S., St. Geme III, W. J., Schor, F. N., Behrman, E., R. (2016). (20Ed.) Nelson Textbook of pediatrics. Elsevier, Philadelphia, U.S.A, Vol.2.

Sharp, Victoria. Angela M Arlen, Kathleen Kieran, (2013). Testicular Torsion: Diagnosis, Evaluation, and Management. American family physician

Shawiza, Vera (2018). Game of Numbers: Kenya's Ailing Health Sector Compared to Other Countries.

Sheth KR, Keays M, Grimsby GM, Granberg CF, Menon VS, DaJusta DG, Ostrov L, Hill M, Sanchez E, Kuppermann D, Harrison CB, Jacobs MA, Huang R, Burgu B, Hennes H, Schlomer BJ, Baker LA. Diagnosing Testicular Torsion before Urological Consultation and Imaging: Validation of the TWIST Score. (2016) The Journal of urology. 195 (6): 1870-6. doi:10.1016/j.juro.2016.01.101 - Pubmed

Srinivasan, A., Cinman, N., Feber, M. K., Gitlin, J., and Palmer, S. L., (2011) Commentary to "History and physical examination findings predictive of testicular torsion: An attempt to promote clinical diagnosis by house staff," Journal of Pediatric Urology, Volume 7, Issue 4, August 2011, Pages 475.

Sriram, B. M. (2Ed.). (2015). Clinical Methods in Surgery, Jaypee Brothers Medical Publishers, New Delhi, India.

Sun, J., Liu, G., Zhao, H., and Chi, C., (2006). Long term influence of prepubertal testicular torsion on spermatogenesis. International Journal of Urology, 2006; 77 (3):275-

Ugwumba F O, Okoh A D, Echetabu K N. (2016) Acute and intermittent testicular torsion: Analysis of presentation, management, and outcome in South East, Nigeria. Niger J Clin Pract [serial online] 2016 [cited 2019 May 15]; 19:407-10. Available from: http://www.njcponline.com/text.asp?2019/19/3/407/179291

Wang, F., & Mo, Z. (2019). Clinical evaluation of testicular torsion presenting with acute abdominal pain in young males. Asian journal of urology, 6(4), 368-372.

Yang, C., Song, B., Tan, J., Liu, X., and Wei, G.-H. (2011) Testicular torsion in children: a 20-year retrospective study in a single institution. TheScientificWorldJOURNAL: TSW Urology **11**, 362–368. DOI 10.1100/tsw.2019.39.

APPENDICES

Appendix I: Letter of Introduction

Samuel Munyiri Irungu
P.O. BOX 342 -1000
Thika

Dear Sir/Madam

I am a student at Mount Kenya University doing a Masters in clinical medicine. I am doing a research on Determination of Knowledge Level, Management practices and Attitude for Testicular Torsion among Clinical Officers in Tier Three Hospitals in Kiambu County, Kenya.

I would appreciate if you could participate in filling out this questionnaire.

The data will provide important information that will help in the research to identify best practices for diagnosis and management of testicular torsion in health centers. However, the data from you will be confidential and shall be used only for research purposes and for improvement of Management practices in Kiambu County. Kindly do not include your name in questionnaire.

Thanks

Yours faithfully

Samuel Munyiri Irungu

Appendix II: Consent Letter

From: Samuel Munyiri Irungu

To: County Hospital Officer in charge,

Subject: Permission to Use Hospital records as secondary research data collection and tier three Hospitals

I am writing to ask you to allow me to use tier-three hospital records as a secondary resource data and General Clinical Officers for primary source data of testicular torsion diagnosis and management. I am a masters student at MKU. I will be conducting a research on knowledge, attitude and management of TT. I will be using tier three hospitals in Kiambu County. I will highly appreciate if you give me permission to use the questionnaires to collect data.

Thank you in advance.

Sincerely

Samuel Munyiri.

Appendix III: Consent Letter

Name of Researcher: Samuel Munyiri Irungu,
Title of Study: Determination of Knowledge Level, Management and Attitude for Testicular Torsion among Clinical Officers in Tier Three Hospitals in Kiambu County, Kenya

Kindly read this questionnaire carefully and answer the questions. If you want to participate in this study, tick the suitable answers. Finally append your signature and date the statement. If you do not understand any question, kindly feel free to contact me.

Purpose: The purpose of this research is to determine Knowledge Level, Management practices and Attitude for Testicular Torsion among General Clinical Officers in Tier Three Hospitals in Kiambu County, Kenya.

Benefits: The investigation will assist the General Clinical Officers to improve in their diagnosis and management practices of testicular torsion in health facilities.

- The study has clearly been explained to me in verbal/written by researcher and any questions on the research have been answered [YES|NO]
- I have been explained that the study will concern the above-mentioned title [YES|NO]
- I am aware that I may freely opt out from the research at any time without explanation [YES|NO]
- I am aware that any data about me will be kept in strictest confidentiality and that my name will not be included in any way [YES|NO]

I have freely agreed to participate in this study, and I will be given a copy of this questionnaire for my future reference.

Signature… Day/Date:

For more information, you can contact the Chairman Ethics and Review Committee (ERC), P.O. Box 342 – 01000, Thika.

Samuel Munyiri

Appendix IV: Questionnaires for Clinical Officers

1. What is your highest qualification?

a) Diploma in Clinical Medicine……

b) Higher National Diploma in Clinical Medicine…….

c) Degree in Clinical Medicine……

2. What is the name and the level of the facility you work in? Specify

…….

3. How many cases of scrotal pain in young boys do you see per month approximately? Specify…….

4. Young boys with acute painful scrotum who present to your health facility does so after how many hours since onset of pain?

a) 0hour- 6hours

b) 7hours-13hours

c) 14hours-20hours

d) Above 21 hours

e) Do not know

5. What will be your provisional diagnosis in a young boy with high riding testes and Horizontal lie with acutely painful scrotum?

a) Epididymitis…….

b) Orchitis…….

c) Testicular Torsion ……

d) Epididymoorchitis……

e) Do not know…….

6. What will be your management of a young boy with acute onset of scrotal pain with absent cremasteric reflex?

a) Broad-Spectrum Antibiotics…….

b) Attempt manual Detorsion……

c) Prescribe analgesics and tell the patient to come back after 2 days if no improvement…

d) Apply scrotal support to elevate the testis……..

e) Do not know…….

7. In a young boy with sudden acute scrotal pain, on raising the testis makes it worse, likely impression is:

a) Epididymitis…….
b) Orchitis…….
c) Epididymoorchitis…….
d) Testicular torsion…….
e) Do not know……

8. Have you ever heard about prehn's sign either during your training or after training?

a) Yes
b) No.
c) Do not know

9.If above is Yes, kindly explain.

……

10. Have you ever heard about cremasteric reflex either during your training or after training?

a) Yes
b) No
c) Do not know

11. Is there any relationship between cremasteric reflex and testicular torsion?

a) Yes
b) No
c) Do not Know

12.If above is YES kindly Explain in a sentence……

13. If the no.11 is NO, kindly briefly explain……...

14. Management of testicular torsion includes: -

a) Broad-spectrum antibiotics and review after 48 hrs. ……
b) Surgical exploratory detorsion …….
c) Strong analgesic and review after 24 hours……
d) A and C are correct…….
e) Do not know……

15. If a young boy who presents with a sudden pain of the scrotum, and you suspected to have testicular torsion, the following will be your preferred management: -

a) Refer for surgical exploratory detorsion after attempting Manual Detorsion
b) Manual detorsion is unethical.
c) Broad-spectrum antibiotics and then refer for surgical intervention after 48 hrs.
d) Strong analgesics, elevation of testis, antibiotics and then refer after 48 years if no improvement…….
e) Do not know…….

16. Testicular torsion is a medical emergency that will need be managed within 6 hrs.

a) Strongly disagree……
b) Disagree somewhat……
c) Not sure…….
d) Agree somewhat…….
e) Strongly agree……

17. A patient /Client who was misdiagnosed with testicular torsion and ends up with orchiectomy may seek legal redress: -

a) Strongly disagree……
b) disagree somewhat……
c) Not sure…….

d) Agree…….

e) Strongly agree…….

18. Testicular torsion can be confused with epididymoorchitis (Epididymitis)

a) Strongly disagree……

b) Disagree somewhat……

c) Not sure…….

d) Agree…….

e) Strongly agree…….

19. All male patients between ages 12-18 years with acute scrotal pain you must check prehn's sign and Cremasteric reflex

a) Strongly disagree……

b) Disagree somewhat……

c) Not sure…….

d) Agree…….

e) Strongly agree…….

20. The most preferred investigation to confirm testicular torsion is: -

a) CT Scan

b) Full Haemogram

c) Doppler Ultra Sound

d) Radiograph of the testes

e) Do not know.

21. Is there any relationship between Prehns sign and testicular torsion?

a) Yes

b) No

c) Do not know

22. If the above is YES kindly briefly explain……

23. If no.17 is NO, kindly briefly explain…….

24. Did you cover testicular torsion during your basic training?

a) Yes

b) No

c) Cannot remember

25. Have you ever attended CME (Continuous Medical Education) on Testicular Torsion?

a) No

b) Yes

c) Cannot remember

26. If the above is YES, how many times in the last 3years?

a) Below 5

b) Above 8

c) Between 5 and 8

d) Above 8

27. In the facility you are working in have any CME been done on Testicular Torsion?

a) None

b) Yes

c) I do not know.

28. If the above is YES, how many in the last 3 years?

a) Below 5

b) Above 5

c) Between 5 and 10

d) Above 10

e) I do not know.

29. Is it important to have CMEs regularly on Testicular Torsion?

a) Strongly disagree

b) Disagree

c) Not sure

d) agree

e) Strongly agree

30. Is Manual Detorsion of the testis professional and ethical in young male child suspected to have testicular torsion before referral for surgical detorsion?

a) Strongly disagree
b) Disagree
c) Not sure
d) Agree
e) Strongly Agree

31. Bell clapper deformity is congenital deformity associated with Testicular Torsion:

a) Strongly disagree
b) Disagree
c) Not sure
d) Agree
e) Strongly Agree

32. Is it cruel to do Manual Detorsion to a young boy with an acutely painful swollen scrotum?

a) No
b) Yes
c) Do not know

33. A young boy with acutely painful swollen scrotum will need inspection only on physical examination because palpation will be cruel to the patient:

a) Strongly disagree
b) Disagree
c) Not sure
d) Agree
e) Strongly agree

34. A young boy presenting with an acutely painful swollen scrotum can still wait in the queue because nothing will go wrong even after 6 hours:

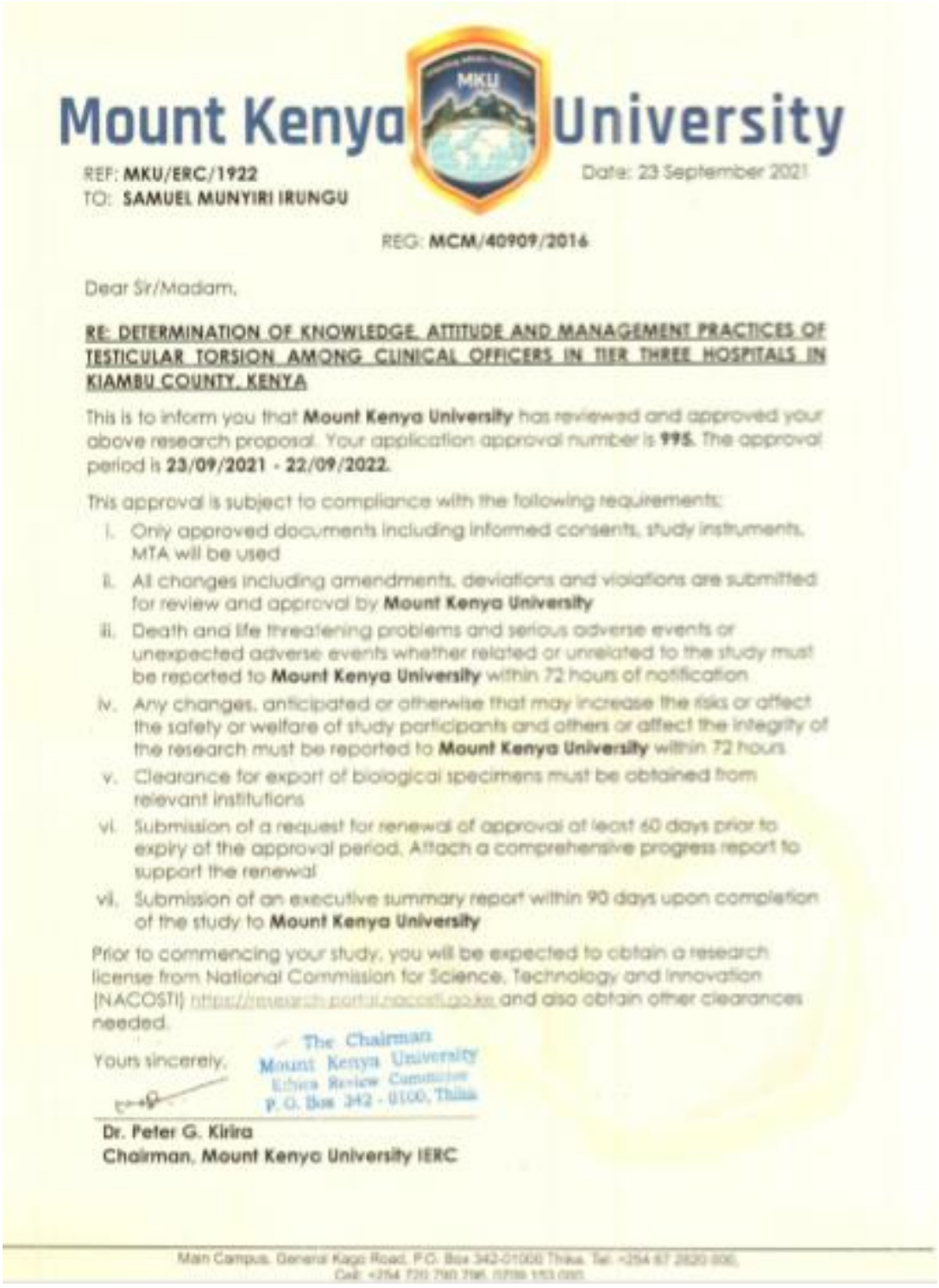
a) Strongly disagree
b) Disagree

c) Not sure

d) Agree

e) Strongly Agree

Appendix V: Ethical Clearance Letter



Mount Kenya University

REF: **MKU/ERC/1922**
TO: **SAMUEL MUNYIRI IRUNGU**

Date: 23 September 2021

REG: **MCM/40909/2016**

Dear Sir/Madam,

RE: DETERMINATION OF KNOWLEDGE, ATTITUDE AND MANAGEMENT PRACTICES OF TESTICULAR TORSION AMONG CLINICAL OFFICERS IN TIER THREE HOSPITALS IN KIAMBU COUNTY, KENYA

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **995**. The approval period is **23/09/2021 - 22/09/2022.**

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 - 0100, Thika

Dr. Peter G. Kirira
Chairman, Mount Kenya University IERC

Main Campus, General Kago Road, P.O. Box 342-01000 Thika, Tel: +254 67 2620 000,
Cell: +254 720 760 796, 0709 153 000,

Appendix VI: Research Permit from NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **241264**

Date of Issue: **28/October/2021**

RESEARCH LICENSE

This is to Certify that Mr.. Samuel Munyiri of Mount Kenya University, has been licensed to conduct research in Kiambu on the topic: DETERMINATION OF KNOWLEDGE, ATTITUDE AND MANAGEMENT PRACTICES OF TESTICULAR TORSION AMONG CLINICAL OFFICERS IN TIER THREE HOSPITALS IN KIAMBU COUNTY, KENYA for the period ending : 28/October/2022.

License No: **NACOSTI/P/21/13708**

241264

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.

Appendix VII: Clearance letter from Kiambu County

COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES

All correspondence should be addressed to HEAD
HRDU – HEALTH DEPARTMENT
Email address: mndicine@gmail.com
mkwasa@live.com
Tel. Nos: 0721641516
0721974655

HEALTH RESEARCH AND DEVELOPMENT
UNIT
P. O. BOX 2344 – 00900
KIAMBU

Ref. No.: KIAMBU/HRDU/21/11/05/RA_MUNYIRI Date: 5th Nov 2021

TO WHOM IT MAY CONCERN

RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY

Kindly note that we have received a request by Mr. Samuel Munyiri of Mount Kenya University to carry out research in Kiambu County, the research topic being on **"Determination Of Knowledge, Attitude And Management Practices Of Testicular Torsion Among Clinical Officers In Tier Three Hospitals In Kiambu County, Kenya"**

We have duly inspected his documents and found that he has been cleared by NACOSTI to carry out the research for a period ending **28th October 2022**. He thus does not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the institution where he is carrying out research to ensure that he receives adequate supervision during the process of conducting the research. This note also accords him the duty to provide a feedback on his research to the county at the conclusion of his research.

DR. MWANCHA KWASA
COUNTY CLINICAL RESEARCH OFFICER
KIAMBU COUNTY

Appendix VIII: Map of Kiambu County