PREVALENCE OF PAIN AND ADEQUACY OF ANALGESIC PRESCRIPTION AMONG CHILDREN ADMITTED AT TRANS NZOIA COUNTY REFERRAL HOSPITAL, KENYA

BY

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DECLARATION

Student's declaration

This research thesis is my original work and has not been presented for a degree in any other university. No part may be reproduced without prior permission of the author or Moi University.

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DEDICATION

I would like to dedicate this study to my loving parents Mr. Joseph Onchong'a and Mrs. Florence Moraa Onchong'a for valuing education and shaping who I am today, for teaching me compassion and love for humanity. To my husband Wilfred Ombui Marube for being my greatest source of comfort in hard times. To my children Carol, Maxim, Enrico and Elvis for being patient with me throughout the journey. To Almighty God for this far I have come.

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LIST OF ABBREVIATIONS

AAP	American Academy of Pediatrics.
APS	American Pain Society.
AS	Analgesic Score.
AVPU	Alert, Voice, Pain, Unconscious
FGD	Focused Group Discussion.
FPS-R	Faces Pain Scale-Revised.
HCP	Healthcare Providers
IREC	Institutional Research and Ethics Committee
KII	Key Informant Interviews.
KNH	Kenyatta National Hospital.
MTRH	Moi Teaching and Referral Hospital
PI	Principal Investigator
PS	Pain Score
TCRH	Trans-Nzoia County Referral Hospital
WHO	World Health Organization

OPERATIONAL DEFINITIONS

Pain- this refers to what the patient reports after being asked about presence or absence of pain, existing where the patient says it does, associated with underlying illness, trauma or medical procedure.

Health Care Providers- this refers to personnel involved in the care of patients in the health facility: ranging from nurses, clinical officers, medical officers, and specialist consultants.

W.H.O Analgesic Ladder- World Health Organization recommended standards of pain management as per the severity of pain**.**

Procedural Pain- pain associated with clinical procedures or interventions e.g. intravenous cannulation, lumbar puncture, ascitic or pleural tapping.

Faces Pain Scale-Revised- a visual descriptor tool that is made up of 6 faces that indicate increasing severity of pain from a scale of 0-10.

Prescription Adequacy- the right choice of recommended drug as per W.H.O analgesic ladder considering the severity of pain. Obtained by subtracting the pain score from the analgesic score.

Consultants are medical doctors who hold a Master of Medicine degree in Child Health and Paediatrics as well as those who hold a Master of Medicine degree in Paediatric Surgery.

Medical Officers are medical doctors who hold Bachelor of Medicine and Bachelor of Surgery degree.

Medical Officer Interns are medical doctors who hold Bachelor of Medicine and Bachelor of Surgery degree and undergoing mandatory one- year training under supervision by consultants.

Clinical Officers are health care providers who hold a diploma in clinical medicine.

Clinical Officer Interns are health care providers who hold a Diploma in Clinical Medicine undergoing mandatory one- year training and supervision by Consultants.

Nursing Officers are healthcare providers who hold a Degree or Diploma in Nursing.

Paediatric Wards are inpatient centres for general and surgical patients less than 14 years of age.

Children refers to patients aged between 5 to 14 years.

Analgesic refers to medications given to a patient primarily to relief pain.

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ABSTRACT

Background: Pain is an unpleasant sensory experience associated with actual or potential tissue damage. There's a high prevalence of 78% established from a study at Kenyatta National Hospital. Undertreating pain has severe psychological and physiological consequences. Despite the high prevalence and established effects of pain, it is often inadequately managed. This study determined the prevalence of pain, adequacy of prescription as per WHO analgesic ladder and identified gaps in analgesia care whose utility can guide institution-based protocol development.

Objective: To determine the prevalence of pain and adequacy of analgesic prescription among children admitted at Trans-Nzoia County Referral Hospital (TCRH) pediatric wards.

Methods: A mixed method cross-sectional study at TCRH pediatric wards carried out between May 2019 to October 2019. A total of 928 children admitted to pediatric wards meeting inclusion criteria were enrolled and screened for presence of pain. Every second patient presenting with pain was systematically sampled for assessment of severity using the Faces Pain Scale-Revised and adequacy of analgesic prescription. A total of 384 children sampled. Treatment sheets were reviewed to check for prescribed analgesics and compared with WHO analgesic ladder to obtain the adequacy of prescription. Key Informant Interviews and Focused Group Discussions were conducted after completion of quantitative data collection. Descriptive statistics were used for continuous variables and frequency listings for categorical data. Logistic regression was used to examine for association of independent variables(age, pain score, cadre of staff, diagnosis and procedure) with prescription adequacy. Multivariate logistic regression was done to determine significant independent variables. A p-value of <0.05 was considered statistically significant at 95% confidence interval. Qualitative data was thematically analyzed.

Results: Pain observed in 764 (82.3%) children. Mild pain reported in 137(35.7%), moderate pain in 191(49.7%) and severe pain in 56(14.6%). Adequacy of prescription in dosing was found in 57(16.7%) with 117(34.2%) of prescriptions being underdose and 168(49.1%) overdose. Adequacy in choice of analgesia as per WHO analgesic ladder was found in 163(42.4%), 211(55%) being under-prescribed and 10(2.6%) overprescribed. Pain score was statistically significant in association with prescription adequacy (P-value < 0.001, AOR= 30.8 moderate pain and 69.8 severe pain, CI=5.175-183.07). Drug availability, staffing and knowledge on pediatric pain management were some of the factors determining drug prescription in the facility.

Conclusion: Prevalence of pain among children admitted at TCRH is very high, occurring in 4 out of 5 children. Most of the children reported moderate pain. There is low adequacy of analgesic prescription with majority of prescriptions being overdose. Severity of pain, drug availability, staffing and knowledge on pediatric pain management were the major factors associated with analgesic prescription.

Recommendation: Ensure availability of appropriate analgesics in the facility. Training of healthcare workers on pediatric pain management and development of pediatric pain management protocols should be advocated to ensure appropriate analgesic prescriptions are done.

CHAPTER ONE

1.1 Introduction

Pain is the primary symptom that is responsible for seeking of healthcare services in hospitals. The primary legal duty of a physician is to alleviate pain and suffering among their patients (Gray, Relief, Care, & Publication, 1999). Sub Saharan Africa bears a huge burden of disease and proportionately has a high burden of pain among its population (Walters, 2009). It has been established over the years that pain is undertreated across the world but with a higher burden in sub Saharan Africa due to: deficiency of culturally acceptable and validated pain assessment tools, lack of pain management education for clinicians, unavailability of opioids due to national drug policies, unreliable drug supply chains, under-prescribing of pain medication and difficulties in accessing healthcare (Walters, 2009).

Management of pain among the pediatric population has paused many challenges to majority of healthcare workers. This population needs close assessment and further research and understanding of the appropriate pain responses to be able to effectively address the analgesic needs of children (Walker, 2018). The pain response and pharmacokinetics of analgesic drugs differ depending on the age of the children and this has to be considered when titrating dosages for children.

The WHO developed an analgesic ladder defining the various levels of pain and the appropriate analgesic agent for the level of pain (Walker, 2018). For this to be adequately applied, initial step of pain assessment using appropriate validated pain assessment tools has to be done. In majority of healthcare centers in our setup pain assessment is not done resulting in underestimating the level of pain score and consequently pain undertreatment.

Acute pain is the most adverse stimuli experienced by children as a result of injury, illness, and necessary medical procedures. It is associated with increased anxiety, avoidance, somatic symptoms, and increased parent distress. Despite the magnitude of effects that acute pain can have on a child, it is often inadequately assessed and treated. Numerous myths, insufficient knowledge among caregivers, and inadequate application of knowledge contribute to the lack of effective management. The pediatric acute pain experience involves the interaction of physiologic, psychologic, behavioral, developmental, and situational factors. Pain is an inherently subjective multifactorial experience and should be assessed and treated as such. Pediatricians are responsible for eliminating or assuaging pain and suffering in children when possible. To accomplish this, pediatricians and other healthcare providers need to expand their knowledge, use appropriate assessment tools and techniques, anticipate painful experiences and intervene accordingly, use a multimodal approach to pain management, use a multidisciplinary approach when possible, involve families, and advocate for the use of effective pain management in children (Health, 2001).

This study aimed at determining the prevalence and severity of pain among children admitted at TCRH and evaluate the adequacy of analgesic prescriptions. This will inform development of protocols on pain assessment and management to guide adequate analgesic prescription among the pediatric patients.

1.2 Problem Statement

There's a high prevalence of pain among hospitalized pediatric patients in our set up, determined to be at 78% in a study done at Kenyatta National Hospital (Mate, 2014).

Pediatric pain has been reported to be highly neglected and mismanaged due to poor pain assessment skills and unavailability of proper tools for pain assessment (Mathews, 2011).

There are established psychological and physiological adverse effects of undertreating pain among children resulting in prolonged hospital stay and poor prognosis of primary illness (Loizzo, Loizzo, & Capasso, 2009). These include multi organ disruption that activates the sympathetic nervous system and release of catecholamines leading to tachycardia, elevated blood pressure and irritability etc. Pediatric pain research has not been routinely translated to daily clinical practice. A study done to validate the FPS-R in MTRH recommended dissemination and adoption of the tool for appropriate assessment of pediatric pain and guide in adequate relieve of pain and suffering but this is yet to translate to actual practice in our pediatric wards (Huang et al., 2012). Pain scores have been advocated to be part of vital signs to ensure adequate assessment, intervention and follow up of patients with pain (Education, 2014) but this is yet to be adopted in our set up.

Overtreatment of pain has been reported among oncological patients leading to toxicity of opioids due to failure of continuous pain assessment and stepping down the WHO analgesic ladder whenever the pain subsides in terms of severity (Paice & Von Roenn, 2014)

This study aimed at assessing the prevalence of pain, its severity and adequacy of analgesic prescription and identify gaps in analgesia care culminating to

recommendations that can inform development of institution-based protocols on pain assessment and treatment ultimately leading to improved analgesia for our pediatric patients in pain.

1.3 Justification

There's an established high prevalence of pain among the pediatric population that's highly neglected, unaddressed and mismanaged.

In order to inform development of proper pain management protocols in our wards, it's of paramount need that the gaps in analgesia care be established.

Pain assessment tool has not been adopted for use at Trans Nzoia County Referral Hospital pediatric wards and pain scores are not done as part of vital signs in assessment of progress of pediatric patients in the ward.

There is paucity of data regarding the prevalence of pain at TCRH among the pediatric population. The severity of pain and adequacy of analgesic prescription among children at TCRH is not known. There's further need to understand the factors that influence prescription of analgesics and pain management as a whole to be able to formulate the best intervention strategy that addresses the challenges faced at the facility.

This study was done to highlight the prevalence and gaps in pain management among our pediatric patients and advocate for adoption of pain assessment tools. The research-based evidence of all these factors will form basis for development of protocols and guidelines on analgesia care among pediatric patients in the facility.

1.4 Research Questions

1. What is the prevalence of pain among children admitted at Trans Nzoia County Referral Hospital pediatric wards?
2. What is the severity of pain and adequacy of analgesic prescription among children admitted at Trans Nzoia County Referral Hospital pediatric wards?

1.5 Objectives

1.5.1 Broad Objective

To determine the prevalence and adequacy of analgesic prescription among children admitted at Trans Nzoia County Referral Hospital.

1.5.2 Specific Objectives

1. To determine the prevalence of pain among children admitted at Trans Nzoia County Referral Hospital pediatric wards.
2. To determine the severity of pain among children admitted at Trans Nzoia County Referral Hospital pediatric wards.
3. To determine the adequacy of analgesic prescription among children admitted at Trans Nzoia County Referral Hospital pediatric wards.
4. To assess factors associated with analgesic prescription and administration among children admitted at Trans Nzoia County Referral Hospital pediatric wards.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 DEFINITION

The universally accepted definition of pain is the one used by The International Association for the Study of Pain. It defines pain as "An unpleasant sensory and emotional experience arising from actual or potential tissue damage or described in terms of such damage".

The American Academy of Pain Medicine defines pain as – *"An unpleasant sensation and emotional response to that sensation".*

The definition of pain that is most appropriate for use in clinical practice was given by Margo McCaffrey in 1968. He defined pain as *"whatever the experiencing person says it is, existing whenever he says it does*" (Mccaffery & Rey, 2018). This implies that pain is purely subjective rather than objective and the patient, not clinician, is the authority on the pain and that his/her self-report is the most reliable indicator of pain.

2.2 CLASSIFICATION OF PAIN

1. Based on duration- acute or chronic
2. Based on underlying mechanism- nociceptive pain or neuropathic pain
3. Based on situation e.g. breakthrough pain, incident pain, procedural pain (Knudsen et al., 2009)

ACUTE PAIN- Pain of predictable duration, often accompanied by anxiety and clinical signs of sympathetic over activity. It's due to a definable acute injury or illness. Treatment is focused on the acute illness or injury with short term use of analgesics.

CHRONIC PAIN- Chronic pain is any pain that lasts for more than three months. The pain can become progressively worse and reoccur intermittently, outlasting the usual healing process. After injured tissue heals, pain is expected to stop once the underlying cause is treated, according to conventional ideas of pain. However, chronic pain can persist after injuries heal for no apparent biological cause. The most common sources of chronic pain include low back pain, headache and arthritic pain. Chronic pain can cause significant psychological and emotional trauma and often limits an individual's ability to fully function.

Nociceptive Pain is caused by damage to body tissue and usually described as a sharp, aching, or throbbing pain. This kind of pain can be due to benign pathology; or by tumors or cancer cells that are growing larger and crowding other body parts near the cancer site. Nociceptive pain may also be caused by cancer spreading to the bones, muscles, or joints, or that causes the blockage of an organ or blood vessels.

Neuropathic Pain occurs when there is actual nerve damage. Nerves connect the spinal cord to the rest of the body and allow the brain to communicate with the skin, muscles and internal organs. Nutritional imbalance, alcoholism, toxins, infections or auto-immunity can all damage this pathway and cause pain. Neuropathic pain can also be caused by a cancer tumor pressing on a nerve or a group of nerves. People often describe this pain as a burning or heavy sensation, or numbness along the path of the affected nerve.

Breakthrough Pain; transitory exacerbation of pain that occurs on a background of otherwise controlled pain.

Incident Pain; occurs only in certain circumstances such as after a particular movement.

Procedural Pain; related to clinical procedures and interventions.

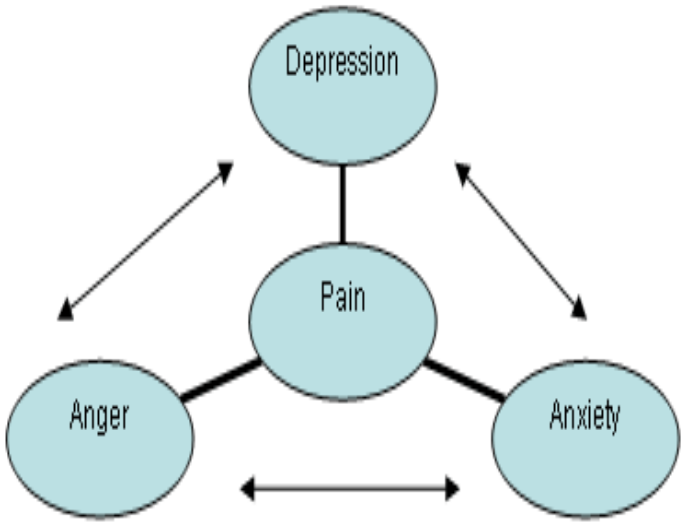
2.3. PHYSIOLOGICAL CONSEQUENCES OF PAIN

According to (Loizzo et al., 2009) there are various physiological consequences that result from pain and if pain is undertreated or unaddressed then there is a risk of prolonged hospital stay and poor prognosis of primary illness. This has been summarized below;

SYSTEM AFFECTED	**RESPONSE TO PAIN**	**POTENTIAL PHYSIOLOGICAL CONSEQUENCES**
Respiratory	Rapid shallow breathing Inadequate lung expansion Inadequate cough	Alkalosis Decreased oxygen saturation Retention of secretions
Neurological system	Increased sympathetic nervous system activity and release of catecholamines.	Tachycardia, elevated blood pressure, change in sleep patterns and irritability
Metabolic changes	Increased metabolic rate with increased perspiration, increased cortisol production	Increase fluid and electrolyte losses Increased cortisol and blood glucose levels
Immune system	Depressed immune and inflammatory responses	Increased risk of infection and delayed wound healing.
Gastrointestinal system	Increased intestinal secretions and smooth muscle sphincter tone, nausea, anorexia and vomiting.	Impaired gastrointestinal functioning, poor nutritional intake, ileus.
Altered pain response	Increased pain sensitivity	Hyperalgesia, decreased pain threshold, exaggerated memory of painful experiences.

2.4. PSYCHOLOGICAL CONSEQUENCES OF PAIN

This is a triad (Pasquale, Worker, & Center, 2011) that summarizes pain leading to depression, anger and anxiety.



These children having pain that is unaddressed and undertreated usually withdraw from play mates and have exaggerated memory of painful experiences.

An analysis by (Roth-Isigkeit, Thyen, Stöven, Schwarzenberger, & Schmucker, 2005) in Germany showed that 51.1% of children in pain developed eating disorders, 53.6% had sleep deprivation and 37.8% had anxiety disorders. There's a huge emotional impact of pain in a child to the parent or caregiver leading to distress and despair as determined by (Riva, Wirth, & Williams, 2011).

Some of the acute pain if not adequately addressed may lead to reduced pain threshold that results to hyperalgesia and increased memory of painful experiences. This increases cost of care as these children may require stronger pain medications in future to alleviate their pain that are more costly (McFarlane, 2010).

Anxiety and distress will worsen the physiological consequences of pain resulting in poor prognosis of underlying illness hence prolonged hospital stay for these children (Riva et al., 2011).

Looking at the above analysis; pain has adverse psychological consequences that are detrimental both for the child and the caregiver/ parent. Pediatric pain needs to be adequately managed and addressed to avoid and reduce this psychological suffering by children in pain.

2.5. PAIN ASSESSMENT

A commentary done by (Walters, 2009) on pain assessment in sub-Saharan Africa revealed an emotive experience on how African children have culturally been subjected to pain as its assumed to be a sign of weakness to express pain. It was also noted that in the healthcare systems of Africa minimal attention is given towards alleviating pain among the sick, especially children.

Assessment of pain should be an integral part in the care of sick children. This guides in gauging disease severity, progress during management and indicate recovery. The role of pain assessment rests both in the clinicians and the caregivers of this sick children (Gray et al., 1999).

The process of assessment can be summarized as follows; Question the patient • Use pain rating scales • Evaluate behavior & physiologic change • Secure parents' involvement • Take cause of pain into account • Take action & evaluate results (QUESTT). A qualitative research among children with an experience of pain revealed narrations of excess suffering during procedure pain especially cannulation and failure of healthcare workers to do proper psychological preparation of this children prior to the particular procedures (Rn, 1999).

There are a number of ways to assess pain in children:

1. Using observational scales
2. Using self-report scales.

OBSERVATIONAL SCALES- a frequent challenge in pediatrics is assessing pain in non-verbal children. Some of the children are not able to report location and degree of their pain because of age i.e. infant or toddler. Use of physiological parameters like heart rate, respiration rate, blood pressure, palmar sweating, cortisol and cortisone levels, oxygen levels, vagal tone and endorphin concentrations have been established as potential pain measures.

Example of a scale in this category is the FLACC (faces, legs, activity, cry and consolability) scale (Molyneux, 2012).

SELF REPORT SCALES- since pain is primarily an internal experience not directly accessible to others, children's self-report should be the primary source of information on pain intensity when possible, on the basis of age, cognitive and communication abilities and situational factor. Self-report has been approved as the Gold standard in assessment of pediatric pain intensity(Twycross, Voepel-Lewis, Vincent, Franck, & Von Baeyer, 2015).

The FPS-R is the widely accepted and validated tool for self-reporting of pain among children aged 5-14yrs. It consists of six images of faces with various expressions e.g. smiling, frowning, grimacing and the patient selects the face that is consistent with his or her current level of pain(Molyneux, 2012).

This tool has been validated for use in east Africa and a Kiswahili version has been developed to help in its utility across all Kiswahili and English speaking population without altering the primary design (Huang et al., 2012).

HOW TO USE FPS-R

The scale has the following instructions that the clinician assessing is supposed to give to the patient as they show them the scale. "*These faces show how much something can hurt. The face on the left shows no pain. The faces show more and more pain proceeding from left to right, up to the face on the right-it shows the most pain. Point to the face that shows how much you hurt right now."* The patient then selects the face that is representative of the pain they are experiencing.

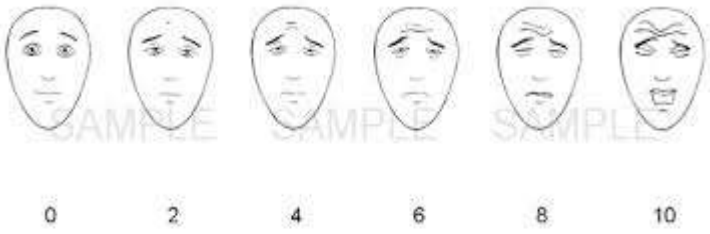
INTERPRETATION-

0- no pain (0)

2-4- mild discomfort (1)

6-8- moderate pain (2)

10-severe discomfort pain (3)



For the younger children, the caregiver will report the pain on behalf of the child as explained to them.

2.5.1 Factors affecting pain expression in children

There are multiple factors that affect how a child is going to express pain and consequently affect how the clinician will assess the pain. These include;

1. Cultural factors and ethnicity. According to (Bates, Edwards, & Anderson, 1993) on ethnocultural influences on variation in chronic pain perception, he reports that different ethnicities due to cultural variations express pain differently and some may express pain way after trauma had occurred.
2. Level of cognitive development. At different stages of growth and development children gain ability to express themselves and can explain their pain better to clinicians (Orzalesi, 2018)
3. Language expression. Hospital environment are distressing to children and can affect how they express themselves. Various words or emotional language expressed by children will influence how a clinician will perceive their pain (Albertyn, Rode, Millar, & Thomas, 2009).

2.6 PAIN TREATMENT

There are various modalities of managing pain in children

1. Pharmacological interventions.
2. Non-pharmacological interventions

Pharmacological involves use of analgesic drugs and this can be guided by four concepts.

Ladder, clock, appropriate route and individual child.

Ladder involves use of the WHO analgesic ladder that classifies pain as either mild, moderate or severe. For mild pain use of non-opioids like paracetamol, brufen,

diclofenac are advocated, a weak opioid like codeine for moderate pain and strong opioid like morphine for severe pain (Gray et al., 1999)

Appropriate route-medication should be given using the most convenient and appropriate route depending on severity of pain, ability of child to take medication orally or not, potency of drug being given.

Clock refers to administration of analgesics at regularly scheduled intervals throughout the day (around- the- clock dosing) e.g. two times a day, four times a day, three times a day etc.

Individual child- pediatric drugs dosages are individualized for each child depending on weight and response to analgesia.

Non-pharmacological modalities include supportive, cognitive, behavioral or physical. (Eccleston et al., 2016). Supportive includes family centered care, information, empathy, choices, play. Cognitive include distraction, music, imagery and hypnosis. Behavioral therapy involves deep breathing and relaxation. Physical modalities involve touch and transcutaneous electrical nerve stimulation (TENS) (Srouji, Ratnapalan, & Schneeweiss, 2010).

2.7 BARRIERS TO PEDIATRIC PAIN MANAGEMENT.

There are various barriers that have been established to affect pain management among children. A qualitative analysis done by(Namnabati, Abazari, & Talakoub, 2012) among Iranian children identified factors like understaffing, inappropriate pain assessment and reluctance of healthcare providers to prescribe opioid analgesics to children as the key barriers to adequate analgesia in that population.

Inadequate knowledge among healthcare providers on pain management in children has also been established to be a barrier to adequate analgesia (Bawa, Mahajan, Aggerwal, Sundaram, & Rao, 2015).

These barriers can be divided into:

1. Patient /Caretaker factors- this is a great challenge especially among younger children since they are not able to express their pain and have the ability to report to HCPs. Some children may mask pain for fear of medication. Caretakers of low level of education may not be informed enough to know what to do in case a child reports pain to them and hence this pain ends up unreported and unmanaged. (Bates et al., 1993)
2. HCPs factors- there are numerous myths surrounding pediatric pain management that influences how HCPs address this pain. They include the reluctance to use opioids in children for fear of addiction and side effects like respiratory distress. Majority of healthcare providers especially in sub Saharan Africa are inadequately trained in pain management and this has resulted to the high level of pain under treatment in our population (Orzalesi, 2018) and (Bawa et al., 2015).

   The belief that children do not remember pain and that children experience less pain than adults. HCPs urgently trying to save a life have no time to worry about pain control and they belief that they can accurately judge a child's pain experience rather than the child (Alotaibi, Higgins, Day, & Chan, 2018).

   (Rupp & Delaney, 2004) assessed inadequate analgesia in emergency medicine and reported that there is lack of educational emphasis on pain management programs that evaluate pain management. In addition, clinicians' attitude towards opioid analgesics becomes a barrier to appropriate pain management due to fear of the side effects.

3. System failures- provision of healthcare generally is poorly funded in sub-Saharan Africa and this has greatly influenced pain treatment. Inadequate supplies of drugs to health facilities leaves HCPs at no choice other than to use what is available to them at the time of prescription. (Beckett, Henderson, Parry, Stoddart, & Fletcher, 2016), (Albertyn et al., 2009).

2.8. PREVALENCE AND SEVERITY OF PAIN

INTERNATIONAL STUDIES

STUDY	**RESULTS**
Systematic analysis on prevalence of headache among children (Stovner et al., 2007).	60-65% had migraine, 40- 52% had tension type headache, 80% reported headache due to underlying illness.
Pain among hospitalized children in a Canadian pediatric teaching hospital(Taylor, Boyer, & Campbell, 2008a)	Prevalence of 27% among outpatients, prevalence among inpatients was 77%, 23% had moderate to severe pain at admission and 64% had moderate to severe pain in the course of admission. Only 27% had a pain score documented.
Pain assessment and intensity in hospitalized children in Canada(Stevens et al., 2012).	68.4% of children reported pain at least once in the 24-hour period of assessment. Mean pain intensity score was 2.6 out of 10 with 33% reporting either moderate or severe pain.
Prevalence of moderate to severe pain in hospitalized children in Mayo Eugenio Litta Children's hospital in the US(Groenewald, Rabbitts, Schroeder, & Harrison, 2012a).	23% of the participants reported moderate to severe pain, with surgical patients having a higher percentage (44%) compared to medical patients (13%).

REGIONAL STUDIES

STUDY	RESULTS
Palliative care in sub Saharan Africa (Harding & Higginson, 2005) .	Prevalence of pain > 80% due to high burden of disease.
Pain among children with sickle cell disease in sub Saharan Africa (Rahimy et al., 2003)	90% of children had moderate to severe pain. Only 40% of this had access to morphine.
Provision of pain and symptom relieving drugs for HIV/AIDS in sub Saharan Africa (Harding, Powell, Kiyange, Downing, & Mwangi-Powell, 2010) .	HIV/AIDS contributes to 40% of pain in sub Saharan Africa. 70% of children with HIV/AIDS have pain. Only 30% had access to adequate analgesia.
Treatment of cancer in sub-Saharan Africa (Kingham et al., 2013) .	81% of children with cancer have severe pain. Only 28% had access to morphine.
Frequency of dental pain among 11-14 years in Uganda (Masood, Hassan, Shahzad, & Patoli, 2016)	Prevalence of dental pain was noted to be 30.2% among males and 27.6% among females. The severity of mild to moderate pain in 41.4% of the children.
Acute coronary syndrome in children with SCA in Uganda (Ochaya et al., 2018)	22.7% of children with sickle cell anemia had acute coronary syndrome severe pain but only 60% had access to morphine.

LOCAL STUDIES.

STUDY	**RESULTS**
Prevalence and severity of pain among children admitted at Kenyatta National Hospital pediatric wards (Mate, 2014)	Prevalence of 78%, adequacy of management at 50%. Children with cancer, sickle cell disease, HIV/AIDS and surgical conditions had severe pain. Moderate pain was noted among children with pneumonia, abdominal illness and malaria.
Prevalence and correlates of pain and pain treatment in a western Kenya referral hospital (Owino et al., 2013) .	Determined a prevalence of 81% for ages 4-80 years. Had 400 participants, children were 110. Among the children adequacy of pain management was at 36%.
Musculoskeletal pain among school children in Nairobi county (Ogana, Osero, & Wachira, 2017)	73.6% had musculoskeletal pain. Low back pain was most prevalent at 25.1% followed by neck pain at 16.9%.

2.9 ADEQUACY OF ANALGESIC PRESCRIPTION.

There is paucity of research that addresses the adequacy of analgesic prescription in the pediatric population. The available studies mostly report that pediatric pain is largely undertreated but, in few cases, especially in surgical and cancer patients the adequacy is higher due to pain control being a major concern in these populations. An analysis by (Kozlowski et al., 2014) reported adequacy among surgical patients to be at 72% in comparison to medical patients at 39%.

The adequacy determined at Kenyatta National Hospital by (Mate, 2014) is at 50% while (Owino et al., 2013) reported pediatric adequacy at MTRH to be 36%. Both studies were cross sectional surveys of children admitted to the pediatric wards.

2.9.1 Factors influencing analgesic prescription and administration.

a) **Severity of pain** has been shown to be the leading factor influencing healthcare workers' choice of analgesic to be prescribed(A Heins, 2006).

b) **The underlying diagnosis** also influences whether one will be given analgesic or not (Ross, Bush, & Crummette, 1991) and (Pomerleau, Schrager, & Morgan, 2016).

c) **Gender of the patient** has also been shown to inform need for analgesia as expressed in a gender perspective analysis by (Dexter, 2012), where female patients were more likely to be given analgesics compared to male patients. An observational cross-sectional survey of emergency department in the united kingdom by (Pomerleau et al., 2016), determined various factors that informed HCPs on prescribing opioids. These included; patient's opioid prescription history, patient's history of substance abuse/ dependence, underlying diagnosis, clinical gestalt, and provider's concern

about unsafe use of the medication. These findings were echoed by (A Heins, 2006) at a hospital in Germany.

Patient's self-request of analgesia was noted to negatively influence whether the drug would be given or not (Tamayo-Sarver, Dawson, Cydulka, Wigton, & Baker, 2004).

d) **Cadre of prescribing clinician** has been established to influence the accuracy of analgesic prescription both in the dosing and choice of analgesic for the various levels of severity of pain. In an analysis by (Probst, Lyons, Leonard, & Esposito, 2005) assessing the factors affecting analgesic prescription in an emergency department, the consultants and doctors had a higher level of knowledge in pediatric analgesia compared to the nurses and other emergency department staff.

e) **Type of procedure-** for procedural pain, the nature of the procedure highly determines if one will consider providing analgesia or not and the type of analgesia to be given. A contextual analysis on needle pain in children by(Walco, 2008) reports that healthcare workers view venipuncture or intravenous catheter insertions as quick, routine and relatively painless but data showed that children consider such procedures to have clinically significant pain hence needing analgesia.

In post-operative pain management, the type of operation the patient undergoes will determine the type of analgesic given postoperatively. There was substantial variability in analgesic prescribing at the level of the procedure performed, both in terms of the probability of receiving a prescription and in which drugs were prescribed in a study by(Tamayo-Sarver et al., 2004) in USA.

CHAPTER THREE

3.0 RESEARCH METHODS

3.1 Study Design

Mixed methods cross sectional design was used. The type of mixed methods used was Sequential Explanatory Design method. This method is a two-phase design where the quantitative data was collected first followed by qualitative data collection. The purpose was to use the qualitative results to further explain and interpret the findings from the quantitative phase.

Phase I: cross sectional hospital-based descriptive study

Phase II: Qualitative data was sought by use of key informant interviews and focused group discussions.

3.2 Study Area

The study was carried out at the pediatric wards of Trans-Nzoia County Referral Hospital (TCRH). It is located in Trans Nzoia County Sabaoti Constituency, Kibomet Location Naisambu Sublocation. It offers both inpatient and outpatient services and has a bed capacity of 250, it is 380 kilometers North West of Nairobi. It has a mixed urban, peri-urban and rural population of varying economic power (Survey, 2014).

TCRH is ranked as a tier 4 health facility by the Ministry of Health serving as a teaching hospital for Kitale campus of Kenya Medical Training College. The pediatric wing has 80 beds. Services provided range from primary to specialized care.

The pediatric department is run by a multidisciplinary team consisting of pediatricians, medical officers, medical officer interns, nurses, clinical officers and other non-clinical staff.

Nurse at triage directs patients to the clinician’s room, patients are assessed and the very sick are attended to at emergency area awaiting admission. Once the admission process at outpatient is completed patients are transferred to the respective pediatric

ward depending on primary diagnosis. There are two pediatric wards, the medical pediatric ward and the surgical pediatric ward.

Average daily staffing at outpatient includes 2 nurses, 3 clinical officers, 1 medical officer and a consultant on call. Staffing in the wards has an average of 2 nurses per ward per shift, 2 clinical officers per ward, a medical officer intern and a medical officer per ward. There are three consultants, a general surgeon who sees the surgical pediatric cases and two pediatricians who sees the medical pediatric cases. The average pediatric medical cases per day are 10 patients translating to approximately 300 patients per month.

Patients for admission are first seen at outpatient, primary clinicians assess and give the presumptive diagnosis at admission and prescribe initial treatment. The outpatient nurse gets the prescribed drugs from the hospital pharmacy and escorts the patient to the respective ward. She/ he hands over the patient to the ward nurse and doctor who reviews patient, admits and confirms prescription then the patient continues with treatment.

3.3 Study period

The study was carried out between May 2019 and October 2019.

3.4 Target population

Children admitted to the pediatric wards (surgical and medical) at TCRH.

Healthcare providers (HCPs) at TCRH.

Facility managers and procurement officers at TCRH.

3.5 Study population

Children aged 5-14 years admitted at TCRH.

HCPs actively involved in care of pediatric patients at TCRH.

The hospital managers, nursing officer in charges, pharmacists and procurement officers at TCRH.

3.6 Eligibility Criteria

3.6.1 Inclusion criteria

Children aged 5-14 years admitted to pediatric wards at TCRH.

The children should have been alert as per the AVPU pediatric scale for assessment of level of consciousness and able to utilize the FPS-R scale.

HCPs who were actively involved in prescription and administration of pain medication to patients. These included, clinical officers, clinical officer interns, medical officer interns, medical officers and consultants.

Nurses involved in day to day administration of analgesics to children in the pediatric wards.

The medical superintendent, nursing officer in charge, pharmacist responsible for ordering drugs and the hospital procurement officer.

3.6.2Exclusion criteria

Critically ill children with AVPU scale score <A without the ability to assent for the study or utilize the pain scoring tool.

Children with sensory neurological deficits without ability to perceive pain.

The managers in the facility who had not worked in the facility for more than 3 months were excluded as they hadn’t had enough experience to understand the underlying challenges.

3.7 Sample Size Calculation

Prevalence was obtained through a census of all children fulfilling inclusion criteria admitted during the study period and assessed for presence or absence of pain. The prevalence was computed using the total number of children interviewed for presence or absence of pain as the denominator, those who reported to have pain formed the numerator.

Sample size for objectives 2 to 4 was based on their aim; to determine the severity and adequacy of analgesic prescription. Using a study done at a similar set up at Kenyatta national hospital assessing prevalence of pediatric pain, found prescription adequacy at 50% (Mate, 2014).

Based on this study using Fisher's formula;

$$N = \frac{Z_{\propto}^{2pq}}{d^2}$$

z =1.96 for 95% confidence interval

p = is 50%

q =1-p

d = is 0.05, the precision or margin error.

$= 1.96*1.96*0.5\ (1-0.5)/0.05^2$

=384.

3.8 Sampling Procedure

Using a sampling frame of the approximate number of children admitted with pain over a period of 6 months at TCRH pediatric wards, systematic sampling was done.

Average number of children admitted to the pediatric wards per month was 160 translating to 960 patients over a period of 6 months. Using a prevalence of pain of 78% (Mate, 2014)sampling frame is 749.

Formula of N/n to get the K^{th} number

749/384=1.95

K^{th} number was 2

The initial patient was randomly selected then subsequently every 2^{nd} patient who presented to the pediatric wards with pain was sampled until the sample size was achieved.

3.9 Study Procedure

Quantitative

Sensitization of staff at TCRH pediatric wards on the study and its objectives was done. Enrollment of three research assistants, one medical officer and 2 clinicians at TCRH but not based in the pediatric wards during the study period. They were trained on the study objectives, procedure and utilization of the FPS-R pain scoring tool.

The point of entry for execution of the study was at the point of admission of the children to the pediatric wards. They were assessed for fulfilment of inclusion criteria, consent and assent sought and interviewed for presence or absence of pain.

All children admitted meeting inclusion criteria had consent taken from caretakers and assent for those more than 7 years old. Their demographic details were obtained

and assessed for presence or absence of pain. Prevalence was computed from the total number found to have pain out of the total number admitted over the study period. These children were only asked about demographics and presence or absence of pain.

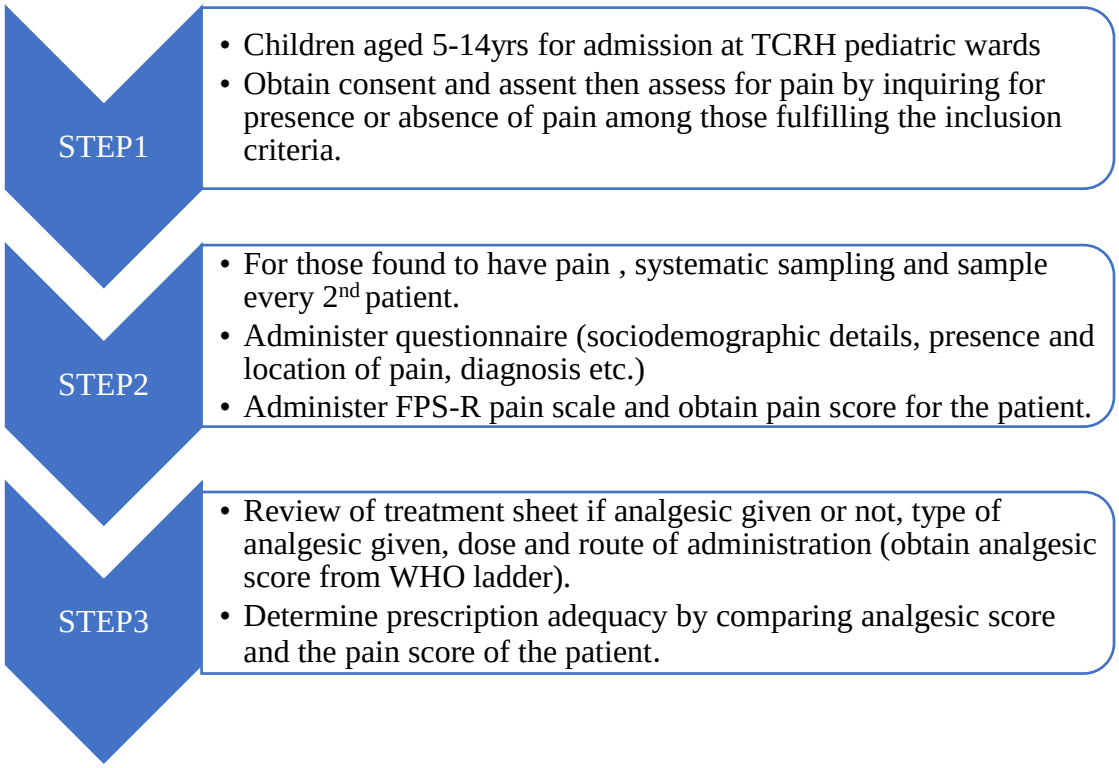
Those identified to have pain were accorded a sticker in their files to avoid duplication. First participant was randomly selected and subsequently every second patient found to have pain was sampled. After the completion of admission process and prescription of initial management by the primary clinician, the PI/ research assistant administered the structured questionnaire to the child and caretaker. FPS-R scale was administered by explaining to the caretaker/parent on what the scale means for ages 5-7 years and the caretaker/parent was able to interact with the child and ascertain the level of pain which was denoted as the pain score (0-3). For older children of ages 8-14 years, they were explained to about the pain scale and allowed to score the pain experienced. Patients were allowed to proceed to the wards (pediatric surgery or general pediatric wards) and ward clinician/ doctor allowed to review treatment and admit patient in the ward.

Cross checking of the treatment sheet and nursing notes to obtain information if analgesia was administered or not, type of analgesia given, dosage and route of administration and frequency was done. This was compared with WHO analgesic ladder and analgesic score obtained (0-3).

The patient's pain score was compared with the analgesic score and adequacy of prescription determined. If the pain score was higher than analgesic score then the patient was determined to be under prescribed for pain as per WHO recommendation. If the pain score was lower than analgesic score then the patient was determined to be

over prescribed for pain. Analgesic score that equals pain score indicated adequate prescription. The study was done daily Monday to Sunday for a period of 6 months.

SUMMARY FLOW CHART



PHASE 2.

Part 2 of the study was the key informant interviews and the focused group discussions. Sensitization of staff was done and informed consent obtained and these were the staff assessed during quantitative data collection. Purposive sampling was done to ensure good representation from all the cadres of HCPs and also guided by the gaps that were identified during quantitative data collection.

Key informant interviews were conducted using interview guide to the facility medical superintendent, pediatric wards consultants, nurse in charge, pharmacist in

charge and procurement officer. The procurement officer gave insight on the challenges faced in procuring the required analgesics for the facility. Pediatric consultants being the team leaders explained further on the underlying challenges in terms of staff training on the subject matter and availability of pain assessment tools and pain management protocols in the facility.

Focused group discussions targeting clinicians, nurses and medical officers were conducted, each comprising of 8 members. There was an average of 5 nurses covering all pediatric wards at a given shift, five clinical officers and four medical officers. We had two focused group discussions, one involving 8 nurses and another with the clinical officers and medical officers. The areas explored included training on pain management, barriers encountered in assessing pain and analgesic prescription. The FGD guide (appendix 9) had a set of open-ended questions and the responses were audio taped, transcribed and organized into themes using NVivo.

3.10 Data Collection Tools

1. Structured Questionnaire

The questionnaire (appendix 7) was divided into 3 parts;

Part 1- pain self-reported by the children aged 8-14 years of age

Part 2- pain reported by caregiver for children ages 5-7 years of age

Part 3- assessment of treatment sheet and nursing notes, calculation of pain management index.

The data collected included; sociodemographic details of the children and caregivers, type of pain experienced (primary illness related or procedural pain), whether analgesia given or not and how was it reported. Assessment of treatment sheet to

check on analgesic score and determine adequacy of prescription as per the pain score. The structured questionnaire was pre-tested at MTRH to assess its validity in obtaining the targeted information to achieve the study objectives.

2. Key informant interview guide.

This was an interviewer administered guide (appendix 8) with a series of open-ended questions to the hospital medical superintendent, the procurement officer, pharmacist in charge, nursing officer in charge and the ward consultant.

The focus of the discussion was to find out if HCPs had undergone training on pediatric pain management, challenges in provision of appropriate analgesics in the facility, procurement challenges, availability of pain assessment tools and if the facility had any guidelines or protocols guiding pediatric pain management.

3. Focused Group Discussion Guide

This had a set of rules and regulations guiding the discussions and a set of questions developed from the findings from quantitative data collection phase (appendix 9).

The purpose was to get an in-depth understanding of the gaps in analgesic care observed during quantitative data collection, challenges faced by HCPs in the care of children in pain and the barriers to adequate analgesic prescription.

The participants for FGDs were purposively sampled to include only those who participated during the quantitative phase. This was done to ensure quality of the collected data, linking the quantitative findings and the qualitative data to the same study population.

4. Faces Pain Scale- Revised. The pain assessment tool validated locally for use include the FPS-R that was validated for use for East African population by (Huang et

al., 2012) and this is what we adopted in this study. It's a self-report pain scale that utilizes visual descriptors depicting the severity of the pain experienced by the patient and has been shown to be appropriate from ages of 5 years to 14 years of age.

3.11 Data Management

The data collected using the structured questionnaire, key informant interviews and FGDs was entered into an electronic database.

Backups were created to safeguard against loss of information. The data entered was de-identified and the database password protected.

This password was available to the principal investigator and later to the statistician for analysis.

The questionnaires were kept in a safe cabinet under lock after completion of data entry and cleaning. The key was kept by the principal investigator.

3.12 Data Analysis

Data collected was entered and stored using Microsoft Access database. Verification was done continuously in the course of the study. Data was imported, coded, cleaned and analyzed using STATA version 13 SE.

Descriptive statistics were applied to summarize the data. For categorical (binary/nominal/ordinal) data frequencies and proportions were tabulated and graphs (bar, pie) plotted to show the distribution. For numeric (continuous/discrete) data, measures of central tendency (mean/median) and dispersion (standard deviation/inter-quartile range) were computed where appropriate.

The main outcomes were the prevalence of pain, severity and adequacy of prescription determined by analgesic score and pain score. The proportion of patients receiving adequate analgesia prescription were determined. At bivariate level, Chi-

square test of association and Fishers exact test were done to check for associations in the various determinants of analgesia. Multiple logistic regression was done to determine factors independently associated with severity of pain and adequacy of analgesia prescription. The study was conducted at 0.05 α-level of significance. Qualitative data collected using KII and FGDs was entered into NVivo 12, analyzed through themes and results reported in prose form.

3.13 Ethical Consideration

Approval was sought from IREC (Moi University- MTRH).

Permission to proceed with study was granted by Trans Nzoia County Ministry of Health and TCRH management.

No incentives or coercion was done for study participants; participation was voluntary.

Information gathered during the research was kept highly confidential.

3.14 Dissemination of Results

The results of this study will be disseminated through a written thesis and an oral defense in a forum that shall be convened by the Moi University, School of Medicine.

The findings of the study will be made known to the TCRH administration and the staff at the pediatric wards.

The PI will give feedback to the participants after conclusion of the study and offer training on pain assessment and management to HCPs in the facility if need arises.

The results will also be presented in national or international research meetings and published in peer reviewed journals.

The findings will be made known to the policy makers at the Ministry of Health to influence policies targeting pediatric pain management.

CHAPTER FOUR

4.0 FINDINGS

4.1 Introduction

This chapter details the analysis, presentation and interpretation of collected data. The data collection was done between May 2019 to October 2019 among children aged 5-14 years admitted to the pediatric wards at TCRH. There were 928 children who were screened for pain, of which 764(82.3%) reported to be in pain and thus constituted the study population where 384 patients were sampled and included in the assessment of severity and adequacy of analgesic prescription. Their age ranged from 5 to 14 years with a mean of 8.8 ±2.9years.

Table 1. Prevalence of pain.

Variable	Category	Frequency	Percentage
Screened (n=928)	No pain	164	17.67
	Have pain	764	82.33
Gender (928)	Female	422	45.47
	Male	506	54.53

Patient's demographics

The gender composition of the sampled population was; female 160(41.7%) and male 224(58.3%). While their age ranged from 5 to 14 years with a mean of 8.8 ±3.0 years. Both gender and age composition of the sampled population was similar to the screened population. About 42% (n=161) were 5 – 7 years while the rest 58% (n=223) were aged 8 – 14 years.

Table 2: Caretakers' demographics.

Variable	Category	Frequency	Percentage
Relationship with the child (n=161)	Mother/Father	135	83.85
	Grand parent	15	9.32
	Aunt/Uncle	6	3.73
	Sibling	2	1.24
	Guardian	2	1.24
	Cousin	1	0.62
Age in years (n=160)	Mean (SD)	34.3 (9.6)	
Caretaker gender (n=161)	Female	115	71.43
	Male	46	28.57
Education level (n=161)	No formal education	20	12.42
	Primary	42	26.09
	Secondary	66	40.99
	College	33	20.50
Occupation (n=161)	Non-working	68	42.24
	Trade/business	47	29.19
	Skilled manual worker	26	16.15
	Professional	11	6.83
	Unskilled manual worker	9	5.59

About 161(42%) of the children were between 5 to 7 years hence the caretaker were the ones interviewed. Those between 8 to 14 years self-reported the pain scores and caretakers were not included. Majority of the caretakers, 135(83.9%) were child's parent (mother/father), with an average age of 34.3 years. Their highest attained education level was secondary for most of them 66(41%), and 47(29.2%) were engaged in business while 68(42.2%) were non-working.

Table 3: How caretaker knew the child was in pain.

Category	Frequency	Percentage
Child reports of pain	122	75.78
Child is crying	94	58.38
Child holding the painful area	27	16.77
Child is restless	30	18.63
Refused to feed	13	8.18

When asked how they knew the child was in pain, majority 122(75.8%) said the children reported of pain to their caretakers, but a good percentage 94(58.4%) the caretaker knew the child was in pain when they cried, or became restless 30(18.6%) or as they held the painful area 27(16.8%). In rare cases, 13(8.2%) the child may refuse to eat hence the caretaker knew they were in pain.

4.2 Severity of pain.

Table 4: Pain related to underlying illness (n=382)

Variable	Category	Child's self-report (n=223) n (%)	Caretaker report (n=159) n (%)
Severity of pain	Mild pain	62 (27.8)	74 (46.5)
	Moderate pain	116 (52.0)	35 (22.0)
	Severe pain	45 (20.2)	50 (31.5)
Location of pain	Head	133 (59.6)	99 (62.3)
	Chest	41 (18.4)	35 (22.0)
	Abdomen	82 (36.8)	78 (49.1)
	Hand	38 (17.0)	13 (8.2)
	Leg	40 (17.9)	17 (10.7)
	Others	32 (14.3)	13 (8.2)
Informed healthcare	No	5 (2.2)	4 (2.5)
Worker	Yes	218 (97.8)	155 (97.5)
Received pain	No	33 (14.8)	36 (22.8)
Medication	Yes	190 (85.2)	122 (77.2)

According to the child's self-report; all 223(100%) patients reported pain to be associated with the admission diagnosis, where most 116(52%) said pain was moderate, while 63(27.8%) reported pain to be mild. Majority of the patients reported pain in the head 133(59.6%) or abdomen 82(36.8%).

As per the caretakers' report; only two respondents said the pain was not related to the admission diagnosis. Majority 74(46.5%) graded child's pain as mild, for most it was the head that was painful 99(62.3%) or abdomen 78(49.1%). Majority 155(97.5%) informed the health care worker about the child's pain however only 122(77.2%) reported the child to have received pain medication.

Table 5: Pain related to a procedure at admission (n=89)

Variable	Category	Child's self-report (n=50) n (%)	Caretaker report (n=35) n (%)
Pain severity	Mild pain	16 (32)	14 (40)
	Moderate pain	18 (36)	13 (37.1)
	Severe pain	16 (32)	8 (22.9)
Location of Pain	Hand	35 (70)	21 (60)
	Leg	12 (25)	11 (31.4)
	Others	15 (30)	14 (35.9)
Invasive procedure	IV-line insertion	28 (59.6)	25 (71.4)
Done	Blood sample Collection	23 (47.9)	16 (45.7)
	I.V/ I.M Injection	6 (12.5)	4 (11.4)
	Lumbar puncture	3 (6.4)	1 (2.9)
	Wound cleaning	13 (26)	6 (17.1)
	others	5 (10)	6 (17.1)
Received pain	No	48 (96)	33 (94.3)
Medication	Yes	2 (4)	2 (5.7)

Child's report: As per the patients' self-report, pain related to a procedure done during admission was reported by 50 patients, of which majority reported the pain to be either mild 16(32%) or moderate 18(36%). Majorly, the pain was on the hand 35(70%) or leg 12(25%) probably because most of the invasive procedures reported were peripheral IV-line insertion 28(59.6%) or blood sample collection 23(47.9%). However only 2(4%) patients reported to have received pain medication.

Caretakers report: 39 (24.2%) reported child's pain to be related to a procedure at admission, where majority classified the pain to be mild 14(40%) or moderate 13(37.1%). Similar to report by the self-reported pain, most of the caretakers reported pain to be on the hand in 21(60%) and the leg in 11(31.4%) children. Peripheral IV-line insertion and blood sample collection were the most frequent reported invasive procedures at 25(71.4%) and 16(45.7%) respectively. Only 2(5.7%) caretakers reported that the patient received pain medication.

Table 6: Severity as per diagnosis.

Clinical diagnosis	Pain score			Total
	Mild pain	Moderate pain	Severe pain	
Severe malaria	57(54.3)	45(42.9)	3(2.8)	105
Surgical conditions	2(2.3)	57(64.8)	29(32.9)	88
Respiratory tract infections	40(57.1)	27(38.6)	3(4.3)	70
Meningitis	2(6.7)	21(70.0)	7(23.3)	30
Sickle cell disease	3(12.0)	11(44.0)	11(44.0)	25
Gastroenteritis	10(47.6)	10(47.6)	1(4.8)	21
Other non-infectious diseases	21(53.8)	16(41.0)	2(5.1)	39
Oncology conditions	2(33.3)	4(66.7)	0(0)	6

Sickle cell disease, surgical cases and meningitis had higher proportions of patients with severe pain reported by 44%(n=11), 33%(n=29) and 23.3% (n=7) respectively.

4.3 Prescription Adequacy.

Table 7: Appropriateness of dosage given.

Variable	Category	Frequency	Percentage
Pain management records on treatment sheet(n=384)	No	42	10.94
	Yes	342	89.06
Dosaging (n=342)	Appropriate	57	16.67
	Under-dose	117	34.2
	Over-dose	168	49.1
Cadre of clinician writing Prescription (n=340)	Clinical officer intern	163	47.94
	Medical officer intern	75	22.06
	Medical officer	71	20.88
	Clinical officer	27	7.94
	Consultant	4	1.18
Administration of pain medication (n=383)	No	71	18.54
	Yes	312	81.46

There were 342(89.1%) records on pain management on the patient's treatment sheet, however there were 312(81.5%) records on administration of pain medication in the patient's treatment sheet/nurse's chart. There were 19.6% patients (67/342) who had two types of analgesics and only one with 3 types of analgesics prescribed. 57(16.7%) had adequate dosing in all the drugs, 117(34.2%) were underdosed and 168(49.1%) had overdose. Most 163(47.9%) of the prescriptions were written by clinical officer interns, followed by medical officer interns 75(22.1%) and medical officers 71(20.9%).

Table 8: Adequacy in the choice of analgesia versus the WHO analgesic ladder.

Variable	Category	Frequency	Percentage
Pain score (n=384)	Mild pain	137	35.68
	Moderate pain	191	49.74
	Severe pain	56	14.58
Analgesic score (n=384)	No analgesic	42	10.94
	Non-opioid analgesic	262	68.23
	Weak opioid	56	14.58
	Strong opioid	24	6.25
Adequacy of prescription (n=384)	Adequate prescription	163	42.45
	Under prescription	211	54.95
	Over prescription	10	2.60

The overall pain scores were mild for 137(35.7%) patients, moderate for 191(49.7%) and severe for 56(14.6%). The prescription was grouped in terms of analgesic score where majority 262(68.2%) were given non-opioid analgesia and strong opioids given to only 24(6.3%) of the patients. Comparing the pain score and the analgesic given, only 163(42.5%) had adequate prescription whereas most 211(55%) were under prescribed and 10(2.6%) were over prescribed.

4.4 Factors Associated with Prescription Adequacy.

Table 9: Factors associated with prescription adequacy (bivariate analysis).

		Prescription adequacy		
Variable	**Category**	**OR**	**p-value**	**95% CI**
Age	5 -7 years	1		
	8 – 14 years	1.17	0.444	0.77 – 1.76
Sex	Female	1		
	Male	1.00	0.989	0.66 – 1.51
Pain score	Mild pain	1		
	Moderate pain	18.64	<0.001	10.62 -32.73
	Severe pain	13.44	<0.001	6.38 – 28.28
Cadre	Clinical officer intern	1		
	Clinical officer	0.91	0.837	0.40 – 2.07
	Medical officer intern	1.02	0.922	0.59 – 1.77
	Medical officer	0.87	0.644	0.50 – 1.53
Peripheral	No	1		
IV-line insertion	Yes	0.34	0.020	0.14 – 0.84
Blood sample	No	1		
Collection	Yes	0.58	0.212	0.25 – 1.35
I.V/ I.M Injection	No	1		
	Yes	0.59	0.441	0.15 – 2.22
Malaria	No	1		
	Yes	0.54	0.009	0.34 – 0.85
Surgical conditions	No	1		
	Yes	1.68	0.041	1.02 – 2.77
Respiratory tract	No	1		
infections	Yes	0.79	0.380	0.47 – 1.33
Meningitis	No	1		
	Yes	4.03	0.005	1.50 -10.76
Sickle cell disease	No	1		
	Yes	0.66	0.320	0.29 – 1.49
Gastroenteritis	No	1		
	Yes	0.65	0.347	0.27 – 1.58
Non-infectious	No	1		
Diseases	Yes	1.03	0.956	0.32 – 3.31
logistic regression				

Table 10: Factors associated with prescription adequacy (multivariate analysis).

Variable	Category	AOR	p-value	95% CI
Age	Year	0.962	0.709	0.787 – 1.175
Sex	Female	1		
	Male	0.861	0.794	0.279 – 2.651
Pain score	Mild pain(Reference)	1		
	Moderate pain	32.097	<0.001	5.163 – 199.512
	Severe pain	69.898	<0.001	7.417 – 658.667
Peripheral IV-line insertion	No	1		
	Yes	0.519	0.345	0.133 – 2.025
Malaria	No	1		
	Yes	1.624	0.598	0.267 – 9.865
Surgical conditions	No	1		
	Yes	0.289	0.143	0.055 – 1.518
Meningitis	No	1		
	Yes	1.414	0.783	0.120 – 16.554

On multivariate level, only pain score was statistically associated with analgesic prescription adequacy. Those who had higher pain scores were more likely to have inadequate analgesics. The odds of having inadequate analgesia increased by 30 folds among those who reported moderate pain and 70 folds for severe pain compared to those who reported mild pain while holding other factors in the model constant. However, those who had peripheral line inserted and those suffering from surgical conditions were more likely to have adequate analgesic prescriptions.

4.5 Results from The Focused Group Discussions.

1. CHALLENGES FACED IN PROVISION OF ADEQUATE ANALGESIA.

The focused group discussions held among nurses and clinicians brought out a range of challenges encountered in the effort to provide appropriate and adequate analgesia care for the pediatric patients in the facility.

a) Unavailability of analgesics.

The clinicians reported that as much as they can identify the various levels of severity of pain, they have limited supply of analgesics recommended for use in the WHO analgesic ladder for the various levels of pain. As a result, they have no choice but to prescribe what is available and mostly it is the non-opioid analgesics.

The common analgesic in the facility was reported to be paracetamol, one of the clinical officers reported '*we only have paracetamol in the facility, for a child in severe pain we lack the appropriate analgesics to give so we just give what is available'*. The nurses confirmed the same, in the event that the clinician has prescribed a particular analgesic appropriate for the severity level of pain but they do not find it in the facility and the caretaker is not able to purchase, they just give what is available '*we only have paracetamol; our options are limited'* reported one of the nursing officers. This explained the findings in table 8.

b) **Inadequate knowledge on pediatric pain management**.

There was demonstrable poor understanding on the uniqueness of management of pain in the pediatric population. Majority of the participants confirmed that they have never attended a training on pain management in children, some confirmed the theoretical myths about children being able to tolerate pain hence may not require analgesia and the fear of opioid use in this population.

A clinical officer reported; *'we have heard numerous stories in the media on children dying as a result of morphine overdose, sometimes we are not comfortable to prescribe such drugs for fear of the side effects unless the ward consultant prescribes it, we may not even know what the right dose is so we avoid it'*. A nurse added that '*some of us are not aware of what is expected in terms of caring for children in pain, a training on the same could be helpful'.* Some assume that children can bear pain for as long as the underlying condition is treated, as a result minimal attention is given to analgesia and the clinician concentrate on treating the underlying condition. A clinical officer stated that '*we rarely think of pain in common infectious conditions like malaria and pneumonia, for this we will institute the appropriate management for the diagnosis without considering pain, but for surgical conditions where we anticipate pain as the major complaint, it's likely that we will institute analgesia'*.

Majority of the clinicians and nurses reported that they are not aware about any form of grading of severity of pain, assessment tools for the pediatric group or pain scores as part of vital signs. '*we do not classify pain; we just start with any painkiller available and check if the baby responds'* reported a medical officer intern.

c) Understaffing.

There is a large number of patients admitted to the facility. The number of clinicians and nurses compared to the number of admissions is very small. This leads to drugs being missed, given at the wrong timings or poor response to the concerns of caretakers who report pain hence goes unattended. Two nurses reported '*we are overwhelmed, a child or caregiver may report of pain to a nurse on duty but because of a lot of work the nurse ends up forgetting and not giving the required analgesia or alerting the clinician on duty'. 'due to the large pool of patients, it's not easy to give all patients drugs at the appropriate time ending up in delay in administration or in few cases no administration at all'.*

d) Caretaker or parental interference.

It was also noted that some parents or caretakers may demand for higher level of analgesia even when the clinician deems it unnecessary, others might purchase the desired analgesics and administer to their child without informing the clinicians or nurses. Summing up with the rampant use of over the counter analgesics prior to reporting to hospital, the grading of the severity of pain at admission might be masked. '*caretaker interference in management, fixed mind on choice of analgesia they want, caregivers can be having painkillers that they give to the patients without knowledge of healthcare workers',*

'abuse of analgesics from home, that affects the grading of severity', reported two clinicians.

2. DETERMINANTS OF CHOICE OF ANALGESIA.

a) **Age of the patient-** older children are more likely to be prescribed opioid analgesics compared to the younger children.' *younger children are feared to have more side effects compared to older children and hence less likely to have opioid analgesics prescribed,* 'reported a medical officer.

b) **Drug availability-** what is available in the facility was noted to inform the clinicians on the analgesia to prescribe. A clinical officer reported that '*we first consider what is available in the hospital then choose from the options that we have'.*

c) **Chronicity of underlying illness-** the clinicians reported that sometimes they consider how long the patient is likely to use the analgesics and chose a drug with minimal side effects with long-term use as quoted '*chronicity of illness- you have to choose a drug with minimal side effects considering the length of use for that patient.'*

d) **Severity of pain-** in the likelihood of adequate options of analgesia available, the level of pain will determine the choice of analgesia with those with severe pain getting the opioid analgesics and mild pain getting the non-opioid analgesia**.**

e) **Underlying comorbidities for the patient-** there are some medical conditions that may limit the use of some analgesics due to worsening of the underlying disease e.g. a patient with peptic ulcer disease will not tolerate the non-steroidal anti-inflammatory drugs. This came out as a consideration when prescribing analgesia to these children' *other underlying comorbidities that may have some drug contraindications'* reported a medical officer intern.

3. SUGGESTIONS ON AREAS OF IMPROVEMENT FOR THE FACILITY

a) Training of healthcare workers on pediatric pain management.

Majority of the participants in the focused group discussion unanimously agreed that there is a huge gap on training in this particular subject. An effort to be made to empower the workers with the knowledge on pediatric pain management, pediatric pain assessment tools and if possible, have clear protocols available in the wards to provide guidance in care. One of the medical officers reported '*introduce charts or scales in the pediatric wards to guide clinicians on assessment and appropriate analgesia for each level of severity.'* A nursing officer added that '*invest on training of all healthcare cadres directly involved in care of children on pain management and available assessment tools in children.'*

b) Improve staffing.

Understaffing came out as a major challenge in the facility and the suggestion on improving the number of nurses and clinicians will not only improve the care of pediatric patients in pain but it will ensure overall good management of all patients.

The nursing officer in charge suggested that *'improve on staffing of nursing personnel to ensure drugs are administered appropriately on the right time*.'

c) Streamlining procurement systems

Poor procurement system results in either drug outages or failure to prioritize the essential drugs in the facility. This leads to constant drug unavailability that hinders proper analgesia care to the patients. A clinician noted that if this is improved then it will tremendously impact on the care of the patients '*streamlining of procurement system to ensure supply of all essential analgesics in the facility.'*

d) **improve national budget allocation for health**.

It was noted that the ills facing the facility may stem all the way from the poor national health budgetary allocation that leaves hospitals with erratic and inadequate supply of essential drugs. This directly leads to the inadequate management witnessed as a result of drug unavailability. '*the government to increase budgetary allocations for health to enable adequate supply of all needed drugs to the facilities*. 'noted a nursing officer.

e) Introduction of pain assessment tools.

Most of the nurses and clinicians concluded that if the pediatric pain assessment tools were availed together with the training, then pain scores will be continually done subsequently leading to better assessment and management of pain. '*advocate for introduction of pain assessment tools in our pediatric wards to guide on who needs which level of analgesia,*' suggested a medical officer intern. A nursing officer added that '*provide us with the tools used for assessment of pain so that we can routinely assess for pain in children just the same way as we do for other vital signs.'*

4.6 Results from the Key Informant Interviews.

a) Drug Availability.

The medical superintendent confirmed that the arising challenges from the focused group discussions were true. He noted the extent that the erratic drug supply has generally affected management of all patients in the facility. '*the only concern brought to my attention is the erratic supply of drugs- this affects all the drugs for the facility ranging from the analgesics, antibiotics etc.'* He also added that *'we are in discussion with the approved government medical supplier KEMSA to ensure prompt supply of required drugs.'*

The nursing officer in charge noted the gaps in pediatric analgesia care in the facility. '*we mostly only have paracetamol tablets; the other stronger analgesics are on and off and this makes it difficult to give good analgesia for children in severe pain.'*

The pharmacist noted that there was limited supply of morphine and tramadol but also added that the general pediatric wards rarely request for the opioid analgesics unless for a patient with sickle cell disease. The surgical wards had a higher consumption of the opioid analgesics '*most of the requisitions I get for opioid analgesics are from the surgical wards, the general pediatric wards rarely make such requests unless they admit a child with sickle cell disease.'* He added that the excessive delays in supplies by KEMSA is the major reasons for the frequent drug outages in the facility.

The procurement officer also added that the procurement system is so long, needing a series of approvals that makes it cumbersome and also time wasting. The average length of time since requisition and supply can be as long as 6 months and this leads to the erratic drug supplies in the facility. '*I try to push for the supplies as fast as I can*

but the process is long and this leads to delays, we can request with stock for 3 months but still that time elapses before we get the supplies.'

b) Staff Training.

In terms of staff training the medical superintendent noted that the relevant heads responsible for presenting training requests hadn't addressed this particular area. '*The facility has not organized any CME or training for staff on pain management in children. The topic and the area of pain management hasn't been brought for discussion on training probably because of assumption that people know what should be done.'* He promised to follow up and facilitate where necessary to have such regular trainings in the facility. '*I have recognized the need for urgent training of the staff in the pediatric wards and will follow up on that.'*

c) Understaffing.

The number of nurses in the wards is not adequate however the nursing officer in charge noted that those available are still doing their best in attending to children in pain. She added that '*we need to keep following up to ensure adequate supply of the required analgesics and improve on staffing.'* The assessment of pain is majorly done by inquiring from the patient or caretaker but no assessment tools available '*we just rely on the report by the child or caretaker but we have no assessment tools nor do we document the severity in our records.'*

d) Determinants of choice of analgesic.

The consultant in charge of the pediatric wards gave more insight on the challenges faced in the facility hindering proper analgesia care among the pediatric population. She noted that most healthcare providers were only familiar with the pharmacological analgesic care and the non-pharmacological practices like distraction, play therapy, counselling and parental comfort

were rarely practiced.' *Unavailability of the required drugs and patients have to be asked to buy.'*

The determinant for choice of analgesia mostly is the patient's diagnosis, '*diagnosis of the patient- e.g. rheumatic pain or inflammatory disorders one will go for non-steroidal anti-inflammatory drugs, sickle cell disease one does a combination of paracetamol and morphine etc.'* she added that in an ideal setting pain scores should be done as part of the vital signs to inform on upgrading or downgrading the analgesics. At the facility there are no pain assessment tools availed making this difficult. '*we have no pediatric pain assessment tools hence no pain scores documented, not able to objectively go up the ladder of analgesia or downgrade depending on the patient response.'*

CHAPTER FIVE.

5.0 DISCUSSION

5.1: Prevalence of Pain

Our study sought out to screen the pediatric admissions at TCRH for complaints of pain at admission and compute the prevalence of pain, severity, and adequacy of analgesic prescription. The prevalence was high with 4 out of 5 children presenting with complaints of pain. The findings are similar to (Mate, 2014) with a prevalence of 4 out of 5 children, at Kenyatta National Hospital. Internationally, the prevalence in a Canadian study among pediatric inpatients by(Kozlowski et al., 2014) found a prevalence of 9 in 10 patients, with almost all surgical patients reporting pain than medical patients at two thirds . This is consistent with our findings where almost all of surgical patients reported pain and two thirds of medical patients reported pain.

The high prevalence noted in our study can be attributed to the region, sub-Saharan belt, with a high prevalence of diseases like pneumonia, HIV/AIDs and poor road networks predisposing to risk of road traffic accidents.

In a study in the united states by (Shomaker, Dutton, & Mark, 2015), the prevalence was slightly lower at two thirds. This study differs from our study in its methodology, the study population was way lower, being a cross sectional survey of all admissions in a single day. The prevalence was higher in a study done by(Birnie et al., 2014) who reported that 94% of pediatric inpatients experienced some level of pain in the course of the admission. This study differed from our study in that; it was a prospective study that screened admitted patients for pain four hourly until discharge hence it was able to document all sources of pain (procedural and medical) explaining the high prevalence.

In another study in Canada by (Taylor, Boyer, & Campbell, 2008b), that assessed both outpatient and inpatient pediatric pain, the outpatient prevalence was at a third with inpatient prevalence at 77%. Our study focused on inpatients hence could not comment on outpatient prevalence.

5.2: Socio-Demographic Characteristics

There was an equal distribution of the study participants in each age category (5-7 years and 8-14yrs). There were more males than females at a ratio of 1.2:1, similar to a study done at Kenyatta National Hospital by(Mate, 2014), however her study population differed in age where she included patients from 0-14 years of age versus ours of 5-14 years.

The caretaker demographics were similar with a Canadian study by(Kozlowski et al., 2014) where majority were the parents(mother or father). However this differed from the MTRH study by (Huang et al., 2012) that reported majority of caretakers to be first degree relative but this can be explained by the variation in population involving both children and adults.

5.3. Severity of Pain

Majority of the reviewed studies agree on the ranges of severity of pain but quite a number differ in the documentation of the pain scores and use of the scores to determine analgesia choice. The overall severity of pain associated with admission diagnosis for our study was determined to be a third, half and a quarter for mild, moderate and severe pain respectively. However, there was notable difference in the severity among the two age groups. The self-reported group (8-14 years) had a higher percentage of moderate pain at half the population and quarter for mild pain compared to the caretaker reported age group (5-7 years) who had majority reporting mild pain at almost half with only a quarter reporting moderate pain.

The severity of pain as a result of procedures done at admission, mild, moderate and severe pain reported similar proportion of patients. There was no significant difference in procedural pain severity in the two age groups.

This differs slightly to the KNH study by (Mate, 2014) that had an overall severity of two thirds with moderate pain and 1 in 20 reported severe pain. However, the findings on higher prevalence of mild pain in the younger age group was similar to our study. The ranges for procedural pain were reported at a quarter, a third and none for mild, moderate and severe respectively. The methodological differences in the two studies was on the recruitment period and the age of the study population. KNH study gave an allowance of 24 hours after admission, this could give room for more ward procedures to be done hence had a higher sample for procedural pain (n=212) as opposed to our study (n=85). This study also included the 0-12 years using both the FLACC scale and FPS-R scale and this can explain the differences noted in the severity ranges.

A Canadian study by (Taylor et al., 2008b) reported a severity of a quarter for moderate to severe pain at admission and 4 in 5 in the course of admission. This study is different from our study as it was a prospective study that followed the admitted children up to discharge hence had the opportunity to get the varied intensities of pain in the course of admission. However, there were reported similarities in the severity among various admission diagnoses where surgical conditions, meningitis and sickle cell disease had the highest levels of severe pain, similar to our study.

Our study had no record of pain scores in the patient's file. This is similar to both (Mate, 2014) and (Huang et al., 2012) which are local studies that also reported that in our set up there is no pain assessment done and no documentation done for pain

scores in the patient's files. Contrary to our findings, (Birnie et al., 2014) found that a quarter of the admitted children with pain had pain scores documented over the initial 24 hours of admission at four hourly intervals. (Taylor et al., 2008b) in Canada indicated that only a third of patients had any pain score documented.

(Kozlowski et al., 2014) reported that surgical patients reported pain more frequently when enrolled than did medical patients. This is similar to our findings where majority of patients with surgical diagnosis reported various ranges of severity of pain and medical diagnosis were at three quarters.

5.4 Adequacy of Analgesic Prescription.

Internationally there is consensus that pain among children has been perennially undertreated. This has been demonstrated in a number of studies focused in pain management in children. Our study sought to find research-based evidence for this in our set up. The adequacy was analyzed in two steps: the dosage of the analgesic prescribed and the choice of analgesia using the WHO analgesic ladder for the various degrees of pain. Our study reports the adequacy in dosing to be at a fifth with 4 fifths having either overdose or underdose in one or both of the analgesics. Half of the prescriptions were done by clinical officer interns followed by medical officer interns at a quarter. Adequacy in terms of choice of analgesia versus the level of severity was determined at two fifths with more than half being under prescribed and a very small proportion being over prescribed.

This findings are similar to (Mate, 2014) who reported prescription adequacy at half based on WHO analgesic ladder but did not report adequacy in terms of the dosage prescribed. A study done at MTRH by (Owino et al., 2013) assessing pain in both adults and children reported adequacy among the pediatric population to be about two

fifths. This study had a sample size of 110 children versus our study with 384 children, this can explain the difference in the adequacy of prescription. A study among children with cancer (McFARLANE, 2010) in South Africa reported adequacy at 4 fifths with a fifth having suboptimal analgesia, the higher level of adequacy can be explained by the study population being mainly cancer patients whose palliative care mainly involves pain control hence the likelihood of being adequately managed. Among children requiring morphine in an analysis by(Groenewald, Rabbitts, Schroeder, & Harrison, 2012b) ,only a third had access to it.

In an assessment of pain among children with cancer in sub Saharan Africa by (Kingham et al., 2013), 4 fifths had severe pain but only a third had adequate access to morphine. This finding is similar to our study where only a fifth had access to opioid analgesia. Another study by (Harding et al., 2010) assessing pain among children with HIV/AIDS found that about two thirds of children with HIV/AIDS suffer from pain but only a third had access to analgesics indicating the level of pediatric pain that remains untreated.

5.5 Factors Associated with Analgesic Prescription and Administration.

From the quantitative analysis only **pain score and underlying diagnosis** showed statistical significance in determining prescription adequacy. The odds of having inadequate analgesics increased by 30 folds among those with moderate to severe pain compared to those with mild pain. This was qualitatively explained by the unavailability of analgesics whereby the facility only had paracetamol regularly available hence those with mild pain would get the recommended analgesia but those with moderate to severe pain would still get the paracetamol which is considered inadequate. Patients with surgical diagnosis, malaria and meningitis had likelihood of

having adequate analgesia compared to other diagnosis like respiratory tract infections.

These findings are similar to an analysis by (Ross et al., 1991) among nurses in a United States pediatric hospital where they reported that the major determinants for administration of analgesic medication was the severity of pain, and underlying medical illness i.e. the very sick were more likely to be administered with analgesics.

Our study showed no statistical significance for sex as a determinant contrary to what (A Heins, 2006) analyzed in a gender perspective epidemiology that showed that female were more likely to be prescribed analgesics compared to the male.

Other factors reported in another study by (Pomerleau et al., 2016) that specifically set out to determine factors affecting opioid analgesic prescription decisions were: underlying diagnosis, provider's concern about unsafe use of the medication, patient's history of substance abuse/ dependence. This is similar to our study where underlying diagnosis e.g. sickle cell disease was more likely to get opioid prescription and fear of side effects could hinder opioid prescription in other instances. Substance abuse/ dependence wasn't determined in our study.

A survey at Illinois hospital by (Probst et al., 2005) reported that use of pain assessment scales in children was limited hence affecting decisions on analgesic prescription. This finding is similar to our study that determined absolute absence of pain assessment tools in the facility and no documentation of pain scores done hence affecting prescription decisions as this is done without considering the severity level. Another study by (Tamayo-Sarver et al., 2004) determined other factors like patient's request to influence physician's decision on analgesic prescription negatively, reduces the chances of the requested drug being administered. In our study this was

determined as caretaker interference where caretakers to the patients will demand higher level of analgesia even where the clinician has deemed it unnecessary.

On **drug unavailability**, similar findings were reported by (Albertyn et al., 2009) who assessed pediatric analgesia challenges in sub-Saharan Africa and reported that unavailability of drugs especially the opioids greatly hindered analgesia care among children with moderate to severe pain. Inadequate healthcare financing and corrupt procurement systems were also determined as the major challenges ailing sub Saharan Africa. From our qualitative analysis, this came out as a strong theme that affects analgesia care among children in pain at TCRH. In the united kingdom,(Beckett et al., 2016) also reported that poor healthcare financing leads to limited supply of analgesics especially opioids indicating that drug unavailability is a universal concern and not a challenge limited to sub-Saharan Africa.

Knowledge of the healthcare workers is a key determinant of the choice of analgesia that a clinician will prescribe. This finding was similar to (Orzalesi, 2018) who reported that majority of healthcare providers especially in sub Saharan Africa are inadequately trained in pain management. Majority of the participants in our focused group discussion reported not to have had any training on pediatric pain management.

The myths surrounding pediatric pain management as reported by (Bawa et al., 2015) including the fear of opioid addiction, increased side effects in children and the belief that children do not experience as much pain as adults, greatly determines prescription and administration of opioids. In our qualitative analysis, the fear of side effects was noted to be the major concern among clinicians in the facility.

CHAPTER SIX

6.0 STUDY LIMITATIONS, CONCLUSION AND RECOMMENDATIONS

6.1: Study Limitation

The study being a cross sectional survey done at the point of admission limited the ability to evaluate procedural pain for procedures done in the ward in the course of admission hence the small sample for procedural pain and the limited type of procedures observed.

We were not able to assess the response to the analgesics prescribed due to the study design that did not provide for follow up of the participants.

6.2: Conclusion

1. The prevalence of pain among children admitted to TCRH pediatric wards (surgical and medical) is very high with 4 out of 5 children presenting with pain symptom.
2. Majority of the children reported moderate pain with surgical patients having higher prevalence of severe pain compared to medical patients.
3. The adequacy of prescription at TCRH is below average with only 2 out of 5 children getting the appropriate drug as per W.H.O analgesic ladder.
4. Pain score, drug availability, understaffing and knowledge of healthcare providers on pediatric pain management were the major factors associated with analgesic prescription and administration at TCRH.

6.3: Recommendations

1. Improve procurement processes to ensure adequate drug supplies to the facility hence ensuring appropriate analgesics are available in the facility.
2. Training of healthcare workers on the principles of pediatric pain management.
3. Introduction of pediatric pain assessment scales and pediatric pain management protocols to the TCRH pediatric wards and empower the healthcare workers on the utility of pain scores as a vital sign.
4. Deployment of senior cadre of staff to handle patients at admission to improve on prescription adequacy and better patient care.

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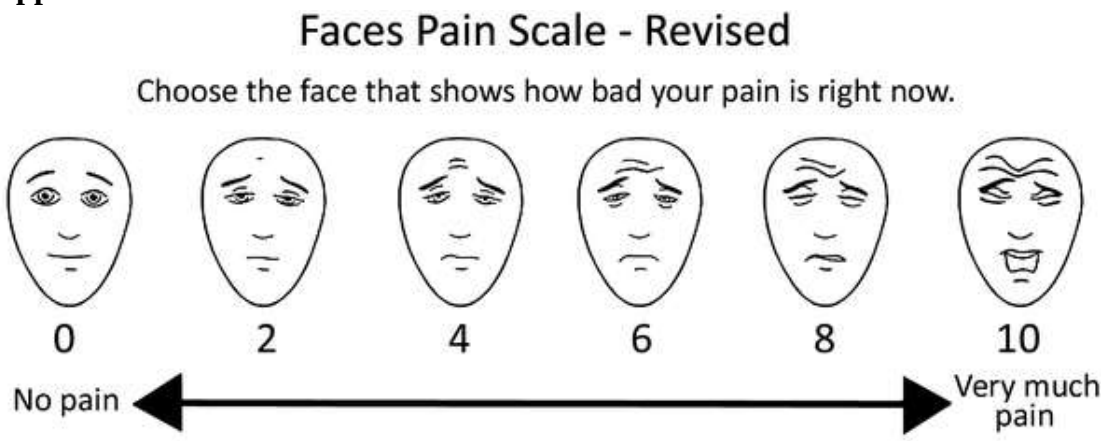
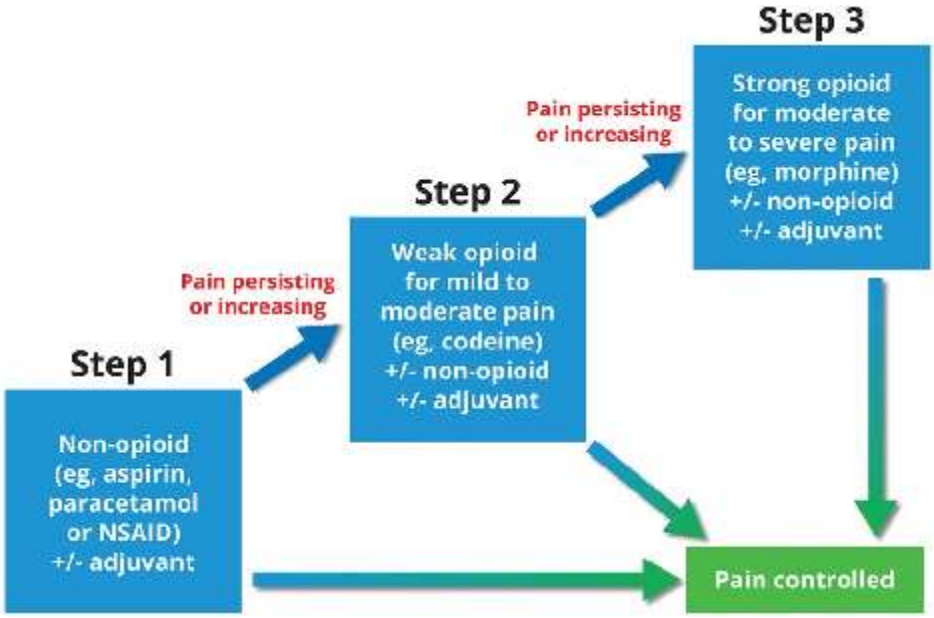
APPENDICES

Appendix 1: Faces Pain Scale Revised



From Hicks CL. von Baeyer CL, Spafford P, van Korlaar I, Goodenough B.
Faces Pain Scale-Revised: Toward a Common Metric in Pediatric Pain Maeasurement. PAIN 2001; 93:173-183. This Figure has been reproduced with permission of the International Association for the Study of Pain* (ISAP*). The figure may not be reproduced for any other purpose without permission.

Appendix 2: WHO Analgesic Ladder



Appendix 3: Consent Form

Study No.…… Hospital No……

Study Title: PREVALENCE OF PAIN AND ADEQUACY OF ANALGESIC PRESCRIPTION AMONG CHILDREN ADMITTED AT TRANS NZOIA COUNTY REFERRAL HOSPITAL.

Investigator: Dr Caroline Nyamisa Onchong'a (Resident in Paediatrics and child Health) Tel Number: - 0720-811099.

Supervisors: Prof. Winstone Nyandiko

Dr Esther Nabakwe

Introduction: The purpose of this study is to estimate the prevalence and severity of pain among children admitted in the TCRH paediatric wards. This study also seeks to establish the adequacy of prescription as per the severity of pain. Procedures to be undertaken in this study are: A structured questionnaire administered to the patient and/or guardian to establish prevalence of pain. Age appropriate pain scale to establish severity of pain FPS-R (Ages 5 – 14 years). A review of the patient 's treatment sheet and nursing charts to establish the initial pain management administered to the patient. The information gathered will be used to improve the pain management of children admitted in the TCRH pediatric wards.

Risks: There will be no risks to you or your child during the study. There will be no invasive procedures carried out in the study that may harm your child. Refusal to participate will in no way jeopardize the treatment of your child in any way.

Voluntariness: The study will be fully voluntary. There will be no financial rewards to you for participating in the study. One is free to participate or withdraw from the study at any point. Refusal to participate will not compromise your child 's care.

Confidentiality: The information obtained about you, your child and your family will be kept in strict confidence. No specific information regarding you, your child or your family will be released to any person without your written permission. We will, however, discuss general overall findings regarding all children assessed but nothing specific will be discussed regarding your child ‘s condition. We will also, not reveal the identity of you or your child in these discussions.

Problems or Questions: If you ever have any questions about the study or about the use of the results you can contact the principal investigator, Dr Caroline N. Onchong’a on Tel No.0720-811099.

Questions about your rights as a research subject: You may contact Institutional Review Ethics Committee (IREC) 053 33471 Ext.3008. IREC is a committee that reviews studies for safety and to protect the rights of study subjects.

I ……having received adequate information regarding the study research, risks hereby AGREE / DISAGREE (Cross out as appropriate) to participate/ for my child to participate in the study. I understand that our participation is fully voluntary and that I am free to withdraw at any time. I have been given adequate opportunity to ask questions and seek clarification on the study and these have been addressed satisfactorily.

Participant /Guardian ‘s Signature: …… Date…….

I ……declare that I have adequately explained to the above participant/ guardian, the study procedure, risk and given him /her time to ask questions and seek clarification regarding the study. I have answered all the questions raised to the best of my ability.

Investigator ‘s Signature…… Date……...

Appendix 4: Translated consent form

Nambari ya Utafiti…….. Nambari ya Hospitali……

SWALA KUU LA UTAFITI: Kuchunguza kiasi cha watoto wanaoungua uchungu na kiasi cha uchungu pamoja na uhalali wa matibabu katika watoto ambao wamelazwa kwa vyumba vya watoto katika hospitali ya TCRH.

Mpelelezi mkuu: Dkt Caroline Onchong'a Department of Paediatrics and Child health, Moi University.

Wasaidizi wakuu: Prof. Winstone Nyandiko

Dr Esther Nabakwe

Lengo la utafiti huu ni kuweza kutambua kiasi cha watoto wanaougua uchungu na kiasi cha uchungu kati ya watoto ambao wamelazwa kwa vyumba vya watoto katika hospitali ya TCRH. Zaidi ni kuangalia aina ya matibabu ya uchungu ambayo watoto wanapatiwa wakiwa wamelazwa katika hospitali ya TCRH.

Mgonjwa ama mlinzi atajibu maswali kuhusu uchungu wa mgonjwa aliyelazwa katika chumba cha watoto katika hospitali ya TCRH. Utafiti huu utatumia mbinu moja ya kuchunguza kiasi cha uchungu wa mgonjwa. FPS-R kwa watoto wa miaka 5– 14.

Karatasi za matibabu za mgonjwa zitaangaliwa kuona kama mgonjwa amepata matibabu yoyote ya uchungu.

Umuhimu.

Umuhimu wa utafiti huu ni kuboresha uchunguzi na matibabu ya watoto wanaougua uchungu wakati wamelazwa katika hospitali ya TCRH.

Madhara na manufaa ya kushiriki:

Hakuna madhara yoyote ambayo yatatokana na utafiti huu kwa afya ya mtoto. Hakuna gharama yoyote zaidi itakayotokana kwa ajili ya kushiriki katika utafiti huu.

Baada ya utafiti hakuna malipo yoyote utakayopata bali shukrani kwa kukubali kushiriki katika utafiti huu.

Kushiriki kwa utafiti huu ni kwa hiari ya mgonjwa ama mlinzi na mgonjwa hawezi kushurutishwa. Mgonjwa atahudumiwa hata akikataa kuhusika kwa utafiti huu. Mgonjwa ama mlinzi ana uhuru kutamatisha kuhusika wakati wowote bila madhara yoyote.Habari yoyote utakayotoa itawekwa kwa siri na jina la mgonjwa halitachapishwa popote.

Ikiwa ungetaka kupata maelezozaidi,tafadhali wasilianana mpelelezi mkuu kupitia nambari ya simu:0720-811099.

Mimi……. nimeelewa maana na jinsi utafiti huu utakavyofanywa na nimepatiana idhini yangu/ ya mtoto wangu/mtoto nimemsimamia kushiriki.

Sahihi…… Tarehe…….

Sahidi…… Sahihi…….

Appendix 5: Assent Form: (For the participants aged less than eighteen years)

Study Title: Prevalence of pain and adequacy of analgesic prescription among children admitted at Trans Nzoia County Referral Hospital.

Introduction:

My name is Dr. Onchong'a Caroline. I am a post-graduate student in the department of Child Health and Paediatrics at Moi University. As part of my post-graduate studies, I am required to carry out a research project. My research study is aimed at establishing the prevalence of pain among children admitted to TCRH pediatric wards. I will also look at severity of pain and adequacy of analgesic prescription among this population

Study Procedure:

If you agree to participate in this study you will be asked questions to establish if you've pain or not, there will be a tool that will be shown to you so that you can classify the level of pain you're experiencing.

Benefits of the study:

There is no direct benefit to the participants but the study will contribute to evidence-base, to inform policy makers on strengths and weaknesses in the analgesia care of the pediatric patients. No payments will be made for participating in the study.

Harm of the study:

There will be no risks to you during the study. There will be no invasive procedures carried out in the study that may harm you. Refusal to participate will in no way jeopardize your treatment.

Confidentiality:

All information obtained from you will be kept strictly confidential and used only for research purposes. Your name will not appear on the data collection tools. All papers

and computer records will be kept under lock and key and security codes respectively. The questionnaires will be filled in a room/place deemed private by the researchers after being identified prior to the study with assistance from the staff in the facility. Your responses will not be shared by your guardian/parent.

Rights to refuse or withdraw from study:

Participation is entirely voluntary. You are free to withdraw from the study at any point

In case of any question regarding the study, you can contact Dr. Onchong'a Caroline on mobile phone 0720 811099

Contact persons:

NAME:	TITLE:	CONTACT
DrOnchong'a Caroline	Principal Investigator	Tel: 0720811099
Prof.Winstone Nyandiko	Supervisor	Tel: 0722735448
Dr Esther Nabakwe	Supervisor	Tel: 0722998603

Having read and been explained to the above:

I ……..

with knowledge that this study is voluntary, do hereby give my assent to participate in the study.

I understand that I can withdraw from the study at any time without any penalty or harm.

Participant's signature…….. Date …….

Principal investigator's signature …… Date …….

Appendix 6: Translated Assent Form:

Kichwa cha utafiti: Kuchunguza kiasi cha watoto wanaoungua uchungu na kiasi cha uchungu pamoja na uhalali wa matibabu katika watoto ambao wamelazwa kwa vyumba vya watoto katika hospitali ya TCRH.

Utangulizi:

Kwa majina ni daktari Caroline Onchong'a. Mimi ni mwanafunzi katika chuo kikuu cha Moi. Nasomea taaluma ya udaktari wa watoto. Katika masomo yangu, nahitajika kufanya utafiti. Lengo la utafiti huu ni kuweza kutambua kiasi cha watoto wanaougua uchungu na kiasi cha uchungu kati ya watoto ambao wamelazwa kwa vyumba vya watoto katika hospitali ya TCRH. Zaidi ni kuangalia aina ya matibabu ya uchungu ambayo watoto wanapatiwa wakiwa wamelazwa katika hospitali ya TCRH.

Utaratibu wa utafiti: Mgonjwa atajibu maswali kuhusu uchungu wa mgonjwa aliyelazwa katika chumba cha watoto katika hospitali ya TCRH. Utafiti huu utatumia mbinu moja ya kuchunguza kiasi cha uchungu wa mgonjwa. FPS-R kwa watoto wa miaka 5– 14.

Karatasi za matibabu za mgonjwa zitaangaliwa kuona kama mgonjwa amepata matibabu yoyote ya uchungu.

Faida ya kushiriki:

Hakuna malipo yoyote yatakayotolewa kwa kushiriki katika utafiti huu. Walakini, matokeo ya utafiti huu yatatumiwa na washika dau kuimarisha huduma kwa watoto wanaopata uchungu wakiwa wagonjwa.

Madhara ya kushiriki:

Hakuna madhara yoyote ambayo yatatokana na utafiti huu kwa afya ya mtoto. Hakuna gharama yoyote zaidi itakayotokana kwa ajili ya kushiriki katika utafiti huu. Baada ya utafiti hakuna malipo yoyote utakayopata bali shukrani kwa kukubali kushiriki katika utafiti huu.

Siri:

Mambo ya utafiti huu yatatunzwa kwa siri na kutumika katika utafiti tu. Utambulisho wako hautawekwa bayana katika makaratasi yoyote. Makaratasi yote yatawekwa katika kabati lililofungwa na kifunguu kuwekwa na mtafiti mkuu. Tarakilishi

itatumika kuimarisha siri. Maswali ya dodoso yatajibiwa katika chumba ambacho kitakuwa kimetafutwa na mtafiti kwa usaidizi wa wahudumu wa afya kitachoshughulukia mambo ya siri. Majibu yako hayatapatiwa kwa mzazi/mlezi wako.

Uhuru:

Kushiriki katika utafiti huu ni kwa hiari. Unaruhusiwa kutoka katika utafiti wakati wowote bila madhara yoyote.

Iwapo una swali lolote kuhusu utafiti huu, unaweza kuwasiliana na Daktari Caroline Onchong'a kupitia numbari ya simu ya rununu 0720811099.

Pia, waweza kuwasiliana na wafuatao:

JINA	CHEO	KUWASILIANA
Dr. Caroline Onchong'a	Mtafiti mkuu	Nambari ya simu: 0722-971501
Prof. Winstone Nyandiko	Msimamizi	Nambari ya simu: 0722735448
Dr. Esther Nabakwe	Msimamizi	Nambari ya simu: 0722998603

Baada ya kusoma na kuelezwa kwa kina mambo yanayohusiana na utafiti huu;

Mimi……natoa idhini yangu kushiriki katika utafiti huu. Nafahamu kuwa naweza kusitisha kushiriki kwangu katika utafiti huu wakati wowote bila madhara yoyote.

Sahihi ya mshiriki……Tarehe……..

Sahihi ya mtafiti mkuu ……Tarehe…….

Appendix 7: Questionnaire (5 – 14 Years)
STUDY TITLE: PREVALENCE OF PAIN AND ADEQUACY OF ANALGESIC PRESCRIPTION AMONG CHILDREN ADMITTED AT TRANS NZOIA COUNTY REFERRAL HOSPITAL.

SECTION A: SCREENING FOR PAIN

1. **Patient's Demographics.**

Study Number:	
Age (years):	
Sex: - **Male** - **Female**	
Date/Time of Admission: **Date/Time of Recruitment:**	
(As indicated in the patients File) **Clinical Diagnosis at admission:** **Differential Diagnosis:**	

2. **Are you in any pain at this moment?**

Yes ☐
No ☐

If yes proceed to section B.

SECTION B:

1. CHILD'S SELF-REPORT OF PAIN (AGES 8 -14 YEARS).

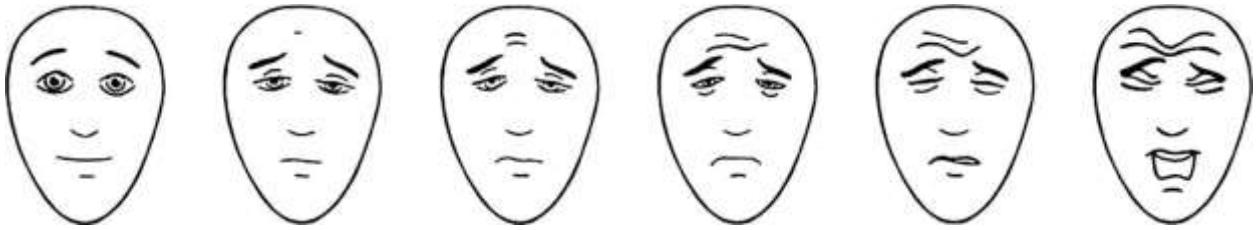
A) Is the pain associated with:

1. **Admission diagnosis?**

Yes ☐

No ☐ (Skip to Question 2)

i. **If Yes, how severe is the Pain?** *(Select one option on the pain scale below).*



0 **2** **4** **6** **8** **10.**

ii. **Where did you feel the pain?** (Tick all applicable sections)

a. Head & Neck ☐
b. Chest ☐
c. Abdomen ☐
d. Upper limbs ☐
e. Lower limbs ☐
f. Groin ☐
g. Buttocks. ☐
h. Other……. (Specify).

iii. **Have you told any healthcare worker that you feel pain?**

Yes ☐
No ☐

iv. **Have you received any pain medication?**

Yes ☐

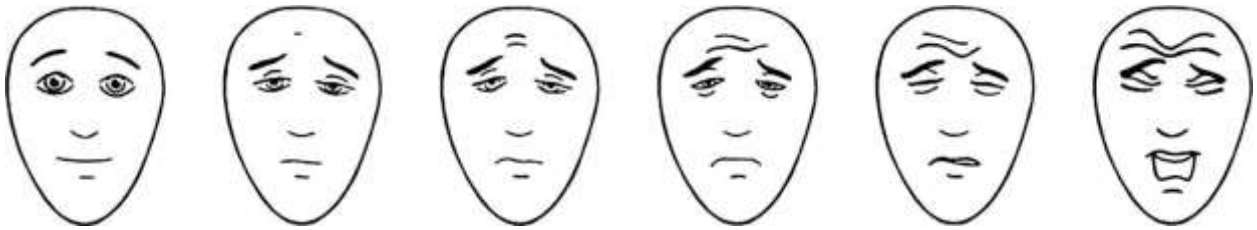
No ☐

2. **Procedure done at admission?**

Yes ☐

No ☐

If Yes, how severe is the Pain? *(Select one option on the pain scale below)*



0 **2** **4** **6** **8** **10.**

Where do you feel the pain? (Tick all applicable sections)

a. Head & Neck ☐

b. Chest ☐

c. Abdomen ☐

d. Upper limbs ☐

e. Lower limbs ☐

f. Groin ☐

g. Buttocks. ☐

h. Other……. (Specify) ☐

Which invasive procedure(s) have you undergone? (Tick all applicable).

a. Peripheral IV-line insertion ☐

b. Blood sample Collection. ☐

c. I.V/ I.M Injection ☐

d. Nasogastric tube Insertion. ☐

e. Lumbar puncture ☐

f. Insertion of urinary catheter ☐

g. Chest tube Insertion ☐

h. Other……. (Specify). ☐

Was pain medication provided for any invasive procedure(s) done?

Yes ☐ No ☐

2.PRIMARY CAREGIVERS' REPORT OF CHILD'S PAIN (AGES 5-7 YEARS).

1. **Primary Caregiver:**

Mother ☐

Father ☐

Other……Specify

2. **Caregiver's Demographics.**

Age: ☐

Sex: ☐

Level of Education

No education ☐

Primary ☐

Secondary ☐

College ☐

Occupation

Non-working ☐

Unskilled manual worker ☐

Skilled manual worker ☐

Trades/ Business ☐

Professional ☐

3. **Is the child in any pain?**

Yes ☐ No ☐

3.1. **If yes, how do you know that the patient is suffering from pain?**

Child reports of pain. ☐

Child is crying. ☐

Child holding the painful area. ☐

Child is restless ☐

Refused to feed ☐ Other. ☐

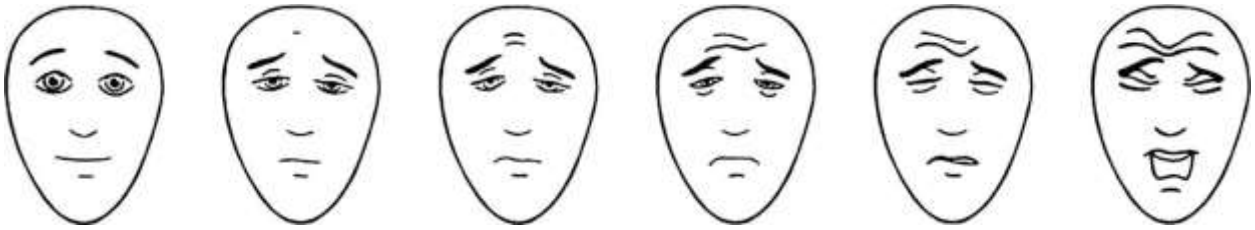
4. **Is the pain associated with:**

4.1. **Admission diagnosis?**

Yes. ☐

No (Skip to Question 5) ☐

4.1.1. **If Yes, how severe is the Pain?** *(Select one option on the pain scale below).*



1 **2** **4** **6** **8** **10.**

4.1.2. **Where is the patient feeling the pain?** (Tick all applicable sections)

a. Head & Neck ☐
b. Chest ☐
c. Abdomen ☐
d. Upper limbs ☐
e. Lower limbs ☐
f. Groin ☐
g. Buttocks. ☐
h. Other……. (Specify). ☐

4.1.3. **Have you told any healthcare worker that the patient is feeling pain?**

Yes ☐

No ☐

4.1.4. **Has the patient received any pain medication?**

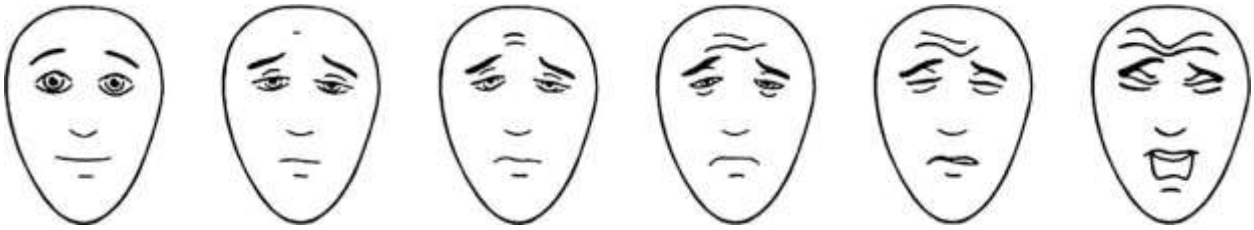
Yes ☐ No ☐

5. Procedure done at admission

Yes ☐

No ☐

5.1 If Yes, how severe is the pain? *(Select one option on the pain scale below)*



0 **2** **4** **6** **8** **10.**

5.2 Where did the patient feel the pain? (Tick all applicable sections)

a. Head & Neck ☐
b. Chest ☐
c. Abdomen ☐
d. Upper limbs ☐
e. Lower limbs ☐
f. Groin ☐
g. Buttocks. ☐
h. Other……. (Specify) ☐

5.3 Which invasive procedure(s) has the patient undergone? (Tick all applicable).

Peripheral IV-line insertion ☐
Central line Insertion ☐
Blood sample Collection. ☐
I.V/ I.M Injection ☐
Nasogastric tube Insertion. ☐
Lumbar puncture ☐
Insertion of urinary catheter ☐
Chest tube Insertion ☐
Bone Marrow Aspirate. ☐
Other……. (Specify). ☐

5.4 Was pain medication provided for any invasive procedures done?

Yes ☐ No ☐

3.TREATMENT SHEET AND NURSE CHART/RECORDS ANALYSIS.

1. **Is there any record on pain management on the patient's treatment sheet?**

Yes ☐

No ☐

1.1. **If yes, what kind of prescription was made?**

a. Pharmacological prescription. ☐
b. Non-Pharmacological prescription. ☐
c. Other…… (Specify)

1.2. **For a pharmacologic prescription fill in the table below.**

	Patients Age	**Patients Weight**	**Name of Drug prescribed**	**Dose**	**Route**	**Frequency**	**(**To be filled by P.I)		
							Under-dose	Over-dose	Adequate Dosing.
1.									
2.									
3.									

1.3 Prescribed by:

a) Consultant ☐

b) Medical officer ☐

c) Medical officer intern ☐

d) Clinical officer ☐

e) Clinical officer intern ☐

2. **Is there any record on administration of pain medication in the patient's treatment sheet/ nurse's chart?**

Yes ☐

No ☐

PRESCRIPTION ADEQUACY. ***(****To be done by the primary investigator)*

1. **Indicate patient's pain score below.**
   - 0 = No pain,
   - 1= Mild pain,
   - 2= Moderate pain,
   - 3= Severe pain.
2. **Indicate patient's analgesic score.**
   - 0 = no analgesic
   - 1 = WHO I (non-opioid analgesia)
   - 2 = WHO II (weak opioid),
   - 3 = WHO III (strong opioid)
3. **Calculate patient's prescription adequacy by subtracting PS from AS ……...**
   - Negative score = Under-prescription
   - Positive score = over-prescription
   - AS=PS= adequate prescription

Appendix 8: Key Informant Interview Guide
TITLE: PREVALENCE OF PAIN AND ADEQUACY OF ANALGESIC PRESCRIPTION AMONG CHILDREN ADMITTED AT TRANS NZOIA COUNTY REFERRAL HOSPITAL.

Introduction

I want to thank you for taking the time to meet with me today. My name is Dr Caroline Nyamisa Onchong'a and I would like to talk to you about pain management of pediatric patients in our wards. I am assessing prevalence and severity of pain and adequacy of analgesia prescription and identify the determinants of choice of analgesia and the barriers to pain management in the pediatric wards. The interview will take 10-20minutes. I will be taking notes during the session and record our conversation. Be sure to speak up so that I don't miss your comments. All responses will be kept confidential under lock and key and ensure that any information given in the report does not identify you as the respondent. Remember you don't have to talk about anything you don't want to and you may end the interview at any time.

Are there any questions about what I have just explained? Are you willing to participate in this interview?

Key informant initials ……Signature……. Date ……

Researcher name……Signature……Date ……

Interview Questions

SECTION A: GENERAL

I would like to collect information about you.

How old are you?

Please tell me your cadre and how long you worked in casualty/ pediatric wards.

SECTION B: KNOWLEGDE AND TRAINING ON PAIN MANAGEMENT (consultants in the pediatric wards)

1. What is your understanding of pain?

2. Have you undergone any training on pain management?

3. How many forms of pain management do you know? Explain?

Probe: pharmacological and non-pharmacological modalities of pain management.

4. What determines the choice of pain management modality you choose and the type of analgesic drug to give?

5. What are the barriers you face in the attempt to provide adequate analgesia to the pediatric patients in our wards?

Probe: drugs availability, understaffing, poor pain report by patient/caretaker.

SECTION C: PROCUREMENT OF ANALGESICS (addressed by procurement officer).

1. What is the procedure of procuring drugs for the facility?
2. Does the time lapse between receiving the order and receiving the drugs ensure there is enough stock to take care of the patients?
3. Any challenges faced in an attempt to procure the required analgesics for the facility?
4. Any areas that you think needs improvement to reduce on the challenges faced in 3 above?

SECTION D: UNAVAILABILITY OF PAIN ASSESSMENT TOOLS AND AVENUES FOR CONTINUOUS TRAINING OF STAFF (addressed by medical superintendent and nursing officer in charge).

1. Does the facility have any tool that guides staff in assessing severity of pain among pediatric patients?
2. Is there any program that ensures continuous medical education of staff to ensure optimum knowledge on pain management in children?
3. What are the challenges faced by the facility in the attempt to have adequate analgesia care among pediatric patients in the facility?
4. Which areas do you think needs improvement to achieve the above?

APPENDIX 9. Focused Group Discussion Guide
CONSENT FORM

TITLE OF STUDY: PREVALENCE OF PAIN AND ADEQUACY OF ANALGESIC PRESCRIPTION AMONG CHILDREN ADMITTED AT TRANS NZOIA COUNTY REFERRAL HOSPITAL.

Principal investigator: Dr Onchong'a Caroline phone no: 0720811099

Supervisors: Professor Winstone Nyandiko phone no: 0722735448

Dr Esther Nabakwe phone no: 0722998603

Thank you for agreeing to participate. We are very interested to hear your valuable input on your experience in pain assessment and management among the pediatric population, challenges faced in providing adequate analgesia to children and any input on measures that can be put in place to ensure proper analgesia for pediatric population.

- The information you give us is completely confidential, and we will not associate your name with anything you say in the focus group.
- We would like to tape the focus groups so that we can make sure to capture the thoughts, opinions, and ideas we hear from the group. No names will be attached to the focus groups and the tapes will be destroyed as soon as they are transcribed.
- You may refuse to answer any question or withdraw from the study at any time.
- We understand how important it is that this information is kept private and confidential. We will ask participants to respect each other's confidentiality.
- If you have any questions now or after you have completed the focus group, you can always contact a study team member like me, or you can call the project team leaders whose names and phone numbers are on this form.

INITIALS OF PARTICIPANT…….

SIGNATURE……DATE…….

Introduction: schedule

1. Welcome

   Introduce yourself and the notetaker and send the Sign-In Sheet with a few quick demographic questions (age, gender, level of education, duration of follow up at this facility) around to the group while you are introducing the focus group.

   Review the following:

   - Who we are and what we're trying to do.
   - What will be done with this information
   - Why we asked you to participate
   - If you are a supervisor, we would like to excuse you at this time

2. Explanation of the process

   Ask the group if anyone has participated in a focus group before. Explain that focus groups are being used more and more often in health and human services research.

   About focus groups

   - We learn from you (positive and negative)
   - Not trying to achieve consensus, we're gathering information
   - No virtue in long lists: we're looking for priorities
   - In this project, we are doing both questionnaires and focus group discussions. The reason for using both of these tools is that we can get more in-depth information from a smaller group of people in focus groups. This allows us to understand the context behind the answers given in the written survey and helps us explore topics in more detail than we can do in a written survey.

   Logistics

   - Focus group will last about one hour
   - Feel free to move around
   - Where is the bathroom? Exit?
   - Help yourself to refreshments

3. Ground Rules

   Ask the group to suggest some ground rules. After they brainstorm some, make sure the following are on the list.

   - Everyone should participate.
   - Information provided in the focus group must be kept confidential
   - Stay with the group and please don't have side conversations
   - Turn off cell phones if possible
   - Have fun

4. **Turn on Tape Recorder**
5. Ask the group if there are any questions before we get started and address those questions.
6. Introductions
   - Go around table: where you were born, age, how long have you worked in the hospital and at the pediatric wards.

   Discussion begins, make sure to give people time to think before answering the questions and don't move too quickly. Use the probes to make sure that all issues are addressed but move on when you feel you are starting to hear repetitive information.

Questions:

1. Let's start the discussion by talking about what we understand by PAIN?
2. How do you assess for pain among children in the facility?
3. How do you classify severity of pain?
4. Which diagnoses mostly managed in the facility are associated with mild, moderate and severe pain?
5. What determines the choice of analgesic prescribed to children in the facility?
6. What challenges do you face in the attempt to provide adequate analgesia to the pediatric patients?
7. Do you have any suggestions to the health facility managers on how you can be facilitated to ensure you adequately manage pain in children?

Other questions will be added depending on the gaps identified during quantitative data collection phase.

Appendix 10: IREC Approval

MU/MTRH-INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET

Reference: IREC/2018/218
Approval Number: 0003172

6th December, 2018

Dr. Caroline Nyamisa Onchong'a,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
16 DEC 2018
APPROVED
P.O. Box 4606-30100 ELDORET

Dear Dr. Onchong'a,

RE: FORMAL APPROVAL

The MU/MTRH- Institutional Research and Ethics Committee has reviewed your research proposal titled: -

"Prevalence of Pain and Adequacy of Analgesic Prescription among Children Admitted at Trans-Nzoia County Referral Hospital".

Your proposal has been granted a Formal Approval Number: ***FAN: IREC 3172*** on 6th December, 2018. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; hence will expire on 5th December, 2019. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date. You will be required to submit progress report(s) on application for continuation, at the end of the study and any other times as may be recommended by the Committee.

Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. You will also be required to seek further clearance from any other regulatory body/authority that may be appropriate and applicable to the conduct of this study.

Sincerely,

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH Dean - SOP Dean - SOM
Principal - CHS Dean - SON Dean - SOD

Appendix 11: Trans-Nzoia County Approval

REPUBLIC OF KENYA

COUNTY GOVERNMENT OF TRANS NZOIA
STATE DEPARTMENT OF HEALTH
HEALTH CORPORATE SERVICES

Office of the Director (H.C.S.)
health-corporate-services@outlook.com

P.O. Box 4211-30200, Kitale
Tel: +254-722-540-959

21st May, 2019

To: Dr. Caroline Nyamisa Onchonga,
Moi University,
School of Medicine,
Department of Child Health and Paediatrics.

Dear Sir / Madam,

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on the topic ***"Prevalence of Pain and Adequacy of Analgesic Prescription among Children Admitted at Trans Nzoia County Referral Hospital"***, I am pleased to inform you that the authority is hereby granted.

Please note that the authority granted is only administrative and is subject to the following requirements:

i. Approval from a competent Institutional Ethics Review Committee (IERC);
ii. Approval from the National Commission for Science, Technology and Innovation (where applicable);
iii. Approval from the health facility at which the research is to be conducted (the host institution).

Please ensure that your research is conducted within the time stipulated in your application. Any extensions shall require fresh endorsement.

With Best Wishes.

Sincerely,

DIRECTOR HEALTH CORPORATE SERVICES
21 MAY 2019
COUNTY GOVERNMENT OF TRANS NZOIA
P.O. Box 4211-30200, KITALE

Dr. Masibo Boaz
Director - Health Corporate Services,
County Government of Trans Nzoia.

Vision: A Healthy and Nationally Competitive County

Appendix 12: Budget

ITEM	QUANTITY	UNIT COST (Ksh)	TOTAL (Ksh)
Photocopy papers (A4 box with 500 sheets)	2	2,000	4000
Stationery (pencils, pens and erasers)	20, 20, 5 respectively	20, 10, 10, respectively	650
Commuter costs	6	5000 per month	30000
Research assistants	2	5,000 per month	90,000
Thesis writing	-	30,000	30,000
Internet access	6 months	3000 per month	18,000
Photocopy charges	-	50000	50,000
Biostatician fee	-	50000	50,000
Refreshments (FGDs)	-	10,000	10,000
Miscellaneous	-	30,000	30,000
		GRAND TOTAL = KSH 312,650	

Appendix 13: Time Frame

ACTIVITY	START	COMPLETE
Proposal Concept Development	August 2018	September 2018
Proposal Writing	September 2018	October 2018
IREC approval	November 2018	December 2019
Preparation for Data Collection	January 2019	March 2019
Data Collection	April 2019	September 2019
Data Analysis	October 2019	December 2019
Thesis Writing	February 2020	April 2020
Thesis Defense	June 2020	