PAIN MANAGEMENT AMONG ADULT PATIENTS WITH FRACTURES OF LONG BONES ATTENDED AT THE EMERGENCY DEPARTMENT OF MUHIMBILI ORTHOPEADIC INSTITUTE (MOI)

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Master of Medicine in Orthopaedics and Trauma Dissertation

Muhimbili University of Health and Allied Sciences

March, 2009

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A Dissertation submitted in Partial Fulfilment of the Requirements for the Degree of Master of Medicine in Orthopaedics/ Trauma Surgery of the Muhimbili University of Health and Allied Sciences

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March, 2009

CERTIFICATION

The Undersigned certifies that, he has read and hereby recommend for acceptance by Muhimbli University of Health and Allied Sciences a dissertation entitled: ***''Pain management among patients with fractures of long bones attended at Emergency Department, Muhimbili Orthopeadic Institute (MOI)''***.Submitted in partial fulfilment of requirement for degree of Master of Medicine in Orthopaedics and Trauma at Muhimbli University of Health and Allied Sciences

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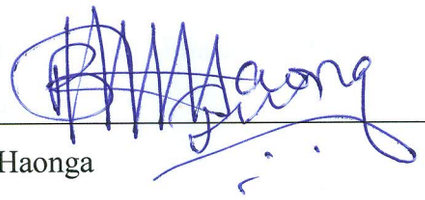
Date ....11th November 2009....

DECLARATION AND COPYRIGHT

I, **Billy T. Haonga** declare that this dissertation is my own original work and that it has not been presented and will no be presented to any other University for similar or any other degree award.

Signature 

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DEDICATION

This dissertation is dedicated to my beloved wife Jackline Makupa and my daughter Joan Billy Haonga for their love and commitment. Also my late father Thomson Raban Haonga who passed away at the beginning of my postgraduate studies

ABSTRACT

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Pain is one of the leading complaints in emergency departments (EDs). This study was carried out in order to determine pain management among patients with long bone fractures attended at the Emergency Department of Mumbili Orthopaedic Institute and to come up with recommendations for pain management strategies for the institute.

Descriptive Cross-sectional study design (Hospital based) was used. The study population was patients with fractures of long bones and aged 18 – 60 years old. All patients with long bones fractures seen at the ED, MOI during the study period were recruited until the sample size was achieved. A total of 250 patients were included in the study. Structured interview and observation guide were used to collect data. Verbal rating scale was used, to determine the intensity of pain. Analysis of the data included univariate analysis, P-values and 95% confidence intervals (CI) are provided in bivariate analysis. Chi-squire test was used when testing the relationships between variables.

The study shows that there is no documentation for pain assessment or reassessment at Emergency Department. The prevalence of analgesics administration before and after admission in at the ED was 40.4% (101) and 46% (115), respectively. A total of 54% (135/250) of patients were not given any analgesics. For those who received analgesics, the commonest analgesic given to was Diclofenac sodium (46%). No single patient was given opioids (pethedine/ morphine). These finding suggests that the phenomenon of oligoanalgesia is more widespread. It was also noted that there is a reluctance to use opioids in this setting. The rate of analgesics administration or splinting before and after admission to the ED did not differ between sex ($p=0.314$ versus $p= 0.230$) and ($p=0.314$ versus $p= 0.114$), respectively. Almost half (47.0%) of them spent >20 min to 1hr before the administration of analgesics. After administration of analgesia 76% of the patients continued to have severe to moderate pain. A total of 156 (62.4%) patients scored their pain as severe at the ED and among these, only 28 (17.9%) of patients received analgesia within 20 mins, 42 (26.9%) patients after 30min to 1hour, while 73 (46.8%) of patients were not given analgesics despite scoring severe pain.

Pain at ED is under treated; there was no documentation of pain assessment or reassessment of the pain resulting in inadequate dosage and delay to administer analgesia to relive pain. Opioids were not used to relive pain and majority patients with severe pain were not given analgesia at ED or prescription of analgesia after discharge.

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ABBREVIATIONS

ED	Emergency Department
ICU	Intensive care unit
JCAHO	Joint Commission on the Accreditation of Healthcare Organizations
NRS,	Numerical Rating Scale
NSAID	Non steroid ant-inflammatory drugs
MOI.	Muhimbili Orthopaedic Institute
MUHAS	Muhimbili University of Health and Allied Siences
VAS	Visual Analogue Scale,
VRS	Verbal Rating Scale
EMD	Emergency Medicine Department

CHAPTER ONE

1.0 INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. In other words, pain is a complex symptom. There is neurologic, endocrinologic, psychologic, and immunologic modulation of both the perceived noxious stimulus and the subsequent behavioural response (Fields HL 1999). Relief of pain in medical practice has since been by use of analgesia for temporary or permanent interruption of nocioceptive impulses.

The history of pain relief is as old as medicine itself. Opium and alcohol had long been used as analgesics. (Shah K, et al 2002) . People who lived during the beginning of the Christian era mentioned that the root of Atrop Mandagora (mandarake) deeped in wine was given to patients before facing the knife. Patients undergoing surgery were given a sponge which was socked in opium, mandagora and hyoscalamine (henbane) to sniff and inhale before surgery to provide analgesia (Porter R 1997)

1.2 BACKGROUND INFORMATION

Pain is one of the leading complaints in emergency departments (EDs) and numerous studies have demonstrated that it is often undertreated (Lewis LM, *et al*, 1994, Wendel TD, 2001). Despite agreement by investigators and clinicians that certain painful conditions, such as long bone fracture, invariably merit pain medication, studies have shown that as many as 70% of patients with acute painful conditions do not receive any pain medications in the ED (Lewis LM, *et al*, 1994, and Wendel TD, 2001,) Several factors contribute to undertreatment of pain. These include; improper reporting, poor communication, inadequate education of health providers, and misconceptions on the part of both patients and health care providers. Though the Joint Commission on Accreditation of Healthcare

Organizations in the USA, has set up standards for pain management, the implementation appears to be slow (Eder SC, *et al,* 2003)

1.2.1 Guideline of pain Management

- One of the primary duties in medicine is to treat pain. Historically this duty has been fulfilled poorly, especially in the emergency departments. To choose the best pain management regimen, physicians need to understand what they are treating. The British Association of Accidents and emergency (A&E) Medicine has produced guidelines for management of pain in the A&E department (Shah K, et al 2002). According to these guidelines:
- Patients in severe pain (pain score 7 to 10) should receive appropriate analgesia within 20 minutes of arrival or triage whichever is the earliest.
- Patients with moderate pain (pain score 4 to 6) should be offered analgesia at triage.
- Ninety percent (90%) of patients with severe pain should have documented evidence of re-evaluation and action within 30 minutes of receiving the first dose of analgesic.
- Seventy five percent (75%) of patients with moderate pain should have documented evidence of re-evaluation and action within 60 minutes of receiving the first dose of analgesic. (Shah K, et al 2002)

Emergency clinicians, educators, and researchers have begun to address the under treatment of pain as well as the long-standing challenges concerning pain treatment. The control of pain is a major concern for orthopaedic surgeons. Good pain control is not only more pleasant for the patient but can also lead to earlier mobilization, faster rehabilitation, improved patient satisfaction, and possibly earlier discharge from the hospital (Bourne MH. 2004, Maheshwari AV, et al 2006, Peters CL, et al 2006, Busch CA, et al 2006 and RitsemaTS. at el 2006). However effects of undertreatment of pain results in various physiologic changes that have important effects on the patient's clinical course. Unrelieved pain is likely to cause adverse effects on more than one body system, particularly in high-risk surgical patients. It can also lead to chronic pain. For example, severe pain and increased levels of sympathetic activity may cause reductions in arterial inflow and venous

emptying. In a patient who is relatively immobilized because of pain, a hypercoagulable state can lead to venous thrombosis and pulmonary embolism. Inadequately treated pain may also be the cause of long – un-anticipated hospital stay.

Currently, a variety of choices is available for pain management. These include narcotics (both oral and intravenous), nerve blocks, pain pumps, epidural injections, nonsteroidal anti-inflammatory drugs, opioids patches, and muscle relaxants. Similarly, there is a variety of orthopaedic procedures, each with different pain management possibilities e.g. splinting (Skinner HB. 2004). Optimal application of pain control methods depends on the cooperation among health care teams through out the course of treatment. The aim of analgesic should not only be to eradicate pain but also to facilitate early ambulation. It has been noted that physicians exaggerate the danger of opiod addiction and are more likely to prescribe lower doses of the drugs in the treatment of pain leading to the under treatment of the patient's pain (Lewis LM, *et al*, 1994).

1.2.2 Pathophysiology of pain

Pain is a result of primary activation of visceral or somatic nociceptor which is a sensory receptor in body tissue. These nervous receptors which respond to extreme pressure, temperature, and other pain stimulus are connected to the nervous system either by myelinated or non myelinated neurons. The axons of peripheral nerves are divided according to their sensory conduction velocity into A, B, C fibres fibre (Dubner r gold m 1999).

The A fibres are divided into Aα, Aβ, Aγ and Aδ in descending order of conduction velocity. A and B nerve fibres are myelinated while C fibres are not. Aδ nerve fibres are connected to the dorsal horn of the spinal cord through myelinated Aδ nerve fibre (Dubner r gold m 1999) Aδ never fibres are sub divided into two groups; those myelinated nerve fibres with small diameter and those with large diameter. These types of nerve fibres have nociceptors which are located mainly in the skin. They are activated by noxious stimulus such as pressure, ischaemia and trauma. The small diameter Aδ nerve fibre, also known as type III, and Aβ or type II nerve fibre are located in muscles and carry pain sensation. The

smallest myelinated C neve fibres are also known as type IV which are located in smooth muscle and carry pain sensation as well.

Polymodal nociceptors also known as C nociceptors are connected to the spinal cord dorsal horn cells via small diameter unmylinated C afferent nerve fibres. They are polymodal because of their ability to respond to mechanical, thermal or chemical stimuli. The stimulation of C polymodal nociceptors in deeply situated tissues such as muscles leads to the development of slow onset of pain characterised by ill defined dull ache as a result of the effect of substances realised by damaged cells. These include bradykinin, histamine, leukotrines, postaglandins, platelet activating factor, serotonin, and substance-P realised from sensitised C sensory afferent fibres (Fields HL, 1990)

The theory on pain mechanism postulates that in each dorsal horn cell of the spinal cord, there is a gate like mechanism which inhibits or facilitates the flow of afferent impulses into the spinal cord before it evokes pain perception and response. The theory states that the opening or closing of the gate is dependent on the relative activity of Aβ (lager diameter fibres), the Aδ and C small diameter fibres. The lager diameter fibres tend to close the gate and activity in the small diameter fibres tends to open it. The gate control theory proposes that the substansia gelatinosa in the spinal cord is the essential site of control. The control mechanism is referred to as a gate (Melzak R, and Wall. P. D., 1996). Pain impulse can only pass through when the gate is open. If nociceptive inputs exceed Aβ fibre input then the gate is open and the pain impulse ascends the spinal card to the brain. If Aβ input exceeds nociceptive input then the gate is closed and the pain impulse is stopped or diminished due to the action of inhibitory neurotransmitters (Melzak R, and Wall. P. D., 1996).

Pain severity should be assessed before and after potentially painful interventions. In verbal patients, self-report is the gold standard, and external signs of pain or distress (e.g., crying, wincing, rocking) are secondary. For patients who have difficulty in communication and for young children, nonverbal indicators (behavioural and sometimes physiologic) may be the primary source of information.

1.2.3 Treatment of pain

Nonopioid and opioid analgesics are the main drugs used to treat pain. Antidepressants, anticonvulsants, and other CNS-active drugs may also be used for chronic or neuropathic pain and are first-line therapy for some conditions. Neuraxial infusion and neural blockade of lignocane, nerve stimulation injection therapies, can help selected patients. Cognitive-behavioural interventions (e.g., incremental gains in function; changes in relationships in the home; systematic use of relaxation techniques, hypnosis, biofeedback or graduated exercise) may reduce pain and pain-related disability and help patients to cope.

Nonopioid Analgesics

Acetaminophen and NSAIDs are often effective for mild to moderate pain Acetaminophen has no anti-inflammatory or antiplatelet effects and does not cause gastric irritation. NSAIDs includeng non-selective COX (COX-1 and COX-2) inhibitors and selective COX-2 inhibitors (coxibs); are effective analgesics. Aspirin is the least expensive but has prolonged antiplatelet effects. Coxibs have the lowest risk of ulcer formation and GI upset

Opioid Analgesics

"Opioid" is a generic term for natural or synthetic substances that bind to specific opioid receptors in the CNS, producing an agonist action. Opioids are also called narcotics. Some opioids used for analgesia have both agonist and antagonist actions. In general, acute pain is best treated with short-acting pure agonist drugs, (Alfentanil,Salfentanil) and chronic pain is best treated with longer-acting pure agonist drugs, eg Pethidine, Morphine.

CHAPTER TWO

2.1 LITERATURE REVIEW

In a study conducted in Canada, found that documentation of pain intensity and pain relief is far from ideal. There was no uniform method of documenting the intensity of pain and re-assessment of pain relief. During implementation of the pain guideline, improvement was noted in providing analgesia to patients with severe pain, although the number of patients receiving analgesia was below 50% of the expected (Shah, K et al 2002). A study conducted in US showed that, pain severity scores appear to be underused in the ED setting. Pain scores were recorded in only 59% of patients. Even when pain scores were recorded as moderate or severe, analgesics were not routinely used. For patients with documented moderate to severe pain, only 73% received any analgesia {Julie C at el, 2003}.

In another study conducted in America, analyzing the use of pain medications in patients with different pain levels demonstrate that patients who rated their pain as severe were likely to receive some type of analgesic in the early and late periods; and patients who rated their pain as mild or moderate were much more unlikely to receive any analgesic (Shah, K et al 2002). The study also demonstrated alarming results in the sense that none of the notes had documented pain score. Only 4 out of a total 25 had a subjective pain assessment of patients having 'moderate' pain (Shah, K et al 2002). At Butterworth Hospital US Approximately 74% (170/231) of the study population who had isolated long-bone extremity fractures received analgesics (Jeffrey s. Jones, *et al* 1996).

A survey conducted in Jerusalem showed that inadequate pain management in the ED is related to poor staff assessment of pain (Todd KH, *et al* 1994). In the first phase of the survey, 70% of patients received analgesics. The mean time from admission to analgesia was 80 minutes and nearly 40% of patients with severe pain (VAS above 7) had to wait more than an hour for analgesics (Todd KH *et al*, 1994). Another important factor leading to

under treatment of pain is the tendency for health providers to underestimate the pain level experienced by patients (Todd KH *et al*, 1994).

A study conducted in the United State demonstrated that, pain is still under treated in the ED setting. Twenty percent (20%) of patients who rated their pain as severe were not provided with any analgesic at all (Miner J, *et al* 2006, Tamayo-Sarver JH, *et al* 2003, Bennett DS, and Carr DB 2002, Stalnikowicz R, *et al* 2005). Studies have tried to understand the reasons why healthcare providers do not give pain medication to patients. Several factors emerge from the literature. Firstly, Health care providers may not believe the patient's severity of pain because of a significant discrepancy between the self-report and the patient's behaviour (Wendel TD, 2001). Secondly, stereotypes about race or gender may lead physicians to think that a particular type of patient does not require analgesics (Miner J, et al 2006, Tamayo-Sarver JH, et al 2003,) Thirdly, health care providers prioritize their efforts, and as such, they are often more concerned about making the correct diagnosis than about providing symptomatic relief (Eder SC, et al, 2003). They believe that if they can make a proper diagnosis, then they can provide relief by addressing the underlying pathology. Fourthly, some physicians may be concerned about initiating an addiction in a patient and are therefore unwilling to prescribe opiates (Bennett DS, and Carr DB 2002, M. Rampanjato1, *et al* 2007, Stalnikowicz1 R, *et al* 2005). Fifthly for those who do believe that NSAIDs delay fracture healing, even thought the mechanism is uncertain. They tend not to prescribe the NSAIDs. (Zhang *et al*, 2001) reviewed the literature on cyclooxygenases and their role in bone repair observed that, the enzymes are implicated in key steps in bone repair including, chondrogenesis, chondrocyte differentiation, and osteoblast differentiation.

There is theoretical reason to believe that NSAIDs may retard fracture healing, and animal studies have largely borne this out. Human studies, on the other hand do not wholly support this conclusion. While retrospective studies have mostly confirmed the results of animal studies, only two prospective studies have been conducted, and they reached opposing conclusions. While it may be likely that NSAIDs do, in fact, retard fracture healing, more research in humans needs to be done, especially if patients are to be denied

the analgesic effects of NSAIDs. For example a study conducted by (Huo *et al* 1992) took 72 rats and assessed the healing of intramedullary pinned osteotomies of the femur. He found that the group given indomethacin showed statistically significant decreases in bone strength, absorbed energy, and bending rigidity when mechanically tested in cantilever bending. More *et al,* 1989 examined 28 rabbits with tibia fractures. Six were given flunixim, a NSAID used in veterinary medicine, other six were given low-dose and six more were given high-dose piroxicam. The remaining ten served as controls. After three weeks, there was no statistically significant difference in the healed fractures as measured by ankle stiffness or tibia torsional strength. Huo *et al* 1991 examined 152 rats with femur fractures. Half were given ibuprofen and the other half were given nothing. Animals were sacrificed at intervals over twelve weeks, and the study found no significant differences between the treated and control groups with regards to biomechanical testing as well as histologic study. Sixthly, providers may believe that patients are seeking narcotics to feed an existing addiction and thus may be unwilling to prescribe opiates for the patients (Eder SC, *et al,* 2003).

A study conducted in the Emergency Department of Maimonides Medical Center New York showed that Out of 198 patients evaluated in the study, 56% of patients received no analgesics medications while waiting in the emergency room; 69% waited for more than one hour before receiving analgesia, and 42% waited for more than two hours. Of those receiving analgesics, 32% received less than optimal analgesic doses (Motov and Khan 2009).

Raftery and colleagues in a prospective cohort study demonstrated that female patients reported more pain and were perceived by providers to have more pain than male patients in the ED (Raftery KA, *at el 1995*). An observational study in 19 EDs across the US and Canada with the goal of determining the influence of patient gender on ED pain management practices revealed that, women received more analgesia than men (74% vs. 64%). However, no difference was noted between genders in two-point pain reduction in the ED, in the frequency of pain assessment, and in the amount of intravenous analgesics (Safdar B, *et al* 2006).

Studies in North America have documented that patients often receive no analgesia for painful conditions and that they experience delays in receiving analgesia or receive inadequate doses of the appropriate medications. This phenomenon appears to cut across many settings, including medical and surgical inpatient units, burn units, ICUs, postoperative units, and emergency departments, in both adult and pediatric practices (Tamayo-Sarver JH, *et al* 2003). A study conducted in Canada showed that well-described barriers both psychological and educational, contribute to inadequate pain relief (Ducharme J.,2000).

A study in Costa Rico involving two Costa Rican hospitals has demonstrated poor analgesic practices with regard to pain treatment. Adult patients who presented to these two Costa Rican hospitals for acute orthopaedic pain rarely received analgesics in the ED. Moreover, many adults were not prescribed analgesics for home therapy. Patient satisfaction was not evaluated. Data demonstrated that patients were experiencing pain before and after their evaluation and treatment. Presumably the opportunity to provide analgesia existed and was missed in most cases. When analgesics were used, there was a reluctance to use opioids, although these were available in the hospitals in various forms (Jantos TJ, *et al* 1995*)*. The study demonstrated inadequate pain management in these Costa Rican EDs. Pain decreased in many patients without specific interventions, but 41% of all patients showed little or no pain relief at discharge. This study revealed that pain-management strategies were deficient in these Costa Rican EDs (Jantos TJ, *et al* 1995*)*. Although a variety of analgesic options exist for the treatment of acute pain, both adults and children frequently receive suboptimal doses.

A study conducted in Paraguay on use of analgesic showed that, out of 71 Adult only 8 patients (11%); had, an oral or intramuscular NSAID, with one patient receiving an intrarticular local anesthetic before a fracture-dislocation was reduced. 54 (76%) adults with orthopaedic trauma were given prescriptions for analgesics. No patient in the adult group received an opioid analgesic. (Ducharme J,2000).

A study conducted in Rwanda 2006, on factors influencing pain management by nurses in emergency departments showed that, patients with a VAS score of ≥7 received their analgesic medication at 150 min (median), which was significantly longer than for those

who had pain scores of <7 (p = 0.003). The survey confirmed that lack of education on pain management was a serious problem. The survey also proved that cultural factors influenced how pain was managed in the ED (Mc Grath P., 2006). Nurses thought that the administration of opioids caused addiction in patients. A significant number of nurses also believed that taking medication for pain was a sign of weakness, that pain was an expected consequence of injury and that pain relief could interfere with healing (Rampanjato M., *et al* 2007).

In Tanzania no specific study has been conducted in ED for the purpose of assessing pain management. A study done at the Muhimbili Medical Centre showed misconception about analgesia in post- operative care among Nurses, a factor that may contribute considerably to failure of adequate pain relief for patients (V. Mwafongo, and C.M.A. Yongolo, 1994).. Another study conducted in surgical, obstetric, and ICU wards demonstrated that 33% of health care providers believed that patients did not receive adequate analgesia (Makia I.M., 2004)

2.2 PROBLEM STATEMENT AND JUSTIFICATION

Since the mid-1990s, several important health care organizations have mounted educational campaigns to increase the assessment and proper management of pain by health care providers. In 1995 the American Pain Society coined the phrase, "Pain: The 5th Vital Sign" and began promoting pain assessment in outpatient and inpatient settings; (Shah K, et al 2002). The importance of frequent assessment and adequate control of pain was also emphasizing (Wilson JE, and Pendleton JM, 1989). January 2001, the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) made assessment and management of pain a quality control standard on which all hospitals, outpatient facilities, and long-term care facilities are judged. Despite this efforts and national focus, there is little evidence that the quality of pain management has improved. This study aims at establishing baseline information regarding pain management in the ED among patient with fractures of long bones and come up with recommendations for MUHAS and MOI

2.3 Aim of the study

This study is carried out in order to determine pain management, analgesic prescribing pattern and adequacy of pain relief and come up with recommendations for pain management strategies for MOI.

Information obtained from this study will help the Institute to improve pain management at the ED and increase patient's satisfaction.

2.4 Research question

What is the situation of pain management among patients with fractures of long bones being attended at Muhimbili Orthopaedic Institute Emergency Department?

2.5 Broad Objective

To determine the pattern of pain management among patients with fractures of long bones managed at the emergency department of MOI

2.6 Specific objective

1. To determine type and dose of analgesic prescribed within 3hrs of admission in the emergency department
2. To determine the adequacy of pain control within 3hrs of admission in the emergency department
3. To determine time of onset of administration of analgesic in relation to the time of admission.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study area

The study was conducted at the Emergency Department (ED) of Muhimbili Orthopaedic Institute (MOI). The study hospital was selected because it is the only well established orthopaedic and trauma centre in Tanzania, and that it is the teaching centre of the Muhimbili University of Health and Allied Sciences (MUHAS). The ED is staffed by Orthopaedic registrars and General surgery residents, interns and Nurses trained in trauma and causality care. The Emergency Department attends about 500 trauma patients per month. The hospital receives its patients from within Dar es salaam city, Coastal region and referred patients from all Regions and Districts of Tanzania.

3.2 Study design

A descriptive Hospital based Cross-sectional study design was used.

3.3 Study population

The study population included patients with fracture of long bone and aged between 18 – 60 years old, who attend the ED at MOI. This age group was chosen because of their ability to understand the scale used to evaluate pain.

3.4 Sampling methods

All patients with long bones fractures seen at ED MOI during study period (March to June, 2008) were recruited until the sample size was achieved.

3.5 Sample size estimation

A survey conducted from MOI registers for previous 6 month showed that patient attended for long bones fractures aged 18 – 60 years were 79 per month among them 63 were given diclofenac. Basing on these findings proportional of the patient with long bones fractures will be 80% of all admissions with long bones fractures during study period. The sample size estimation will be calculated using the following formula

$N = Z^2 p (1-p)/E^2$ 35 (Kirkwood B. R., 2003)

$N= 1.96^2 p (1-p)/E^2$ N = Sample size

P = proportional = 80%

E = maximum error tolerance = 5%

Z^2 = 95% Confident interval

$N= 3.8416 \times 0.8 (1- 0.8)/0.05^2$

N= 245 number of patients will be studied

3.6 Inclusion criteria:

- All patients who attend ED within eight hours post of injury.
- Patients with fractures of long bones
- Patients aged between age of 18 -60 years

3.7 Exclusion criteria

- Patients who attends ED after a period of more than eight hours post injury
- Patients above 60 years of age and less than 18 years
- Patient with multiple injury and open fractures
- Mentally ill and abnormal level of consciousness
- Patient with Diabetics or leprosy, peripheral neuropathy or stroke
- Patient with Intra-articular fractures
- Those who do not consent for the study
- Patients with severe head injuries

3.8 Recruitment of research assistant

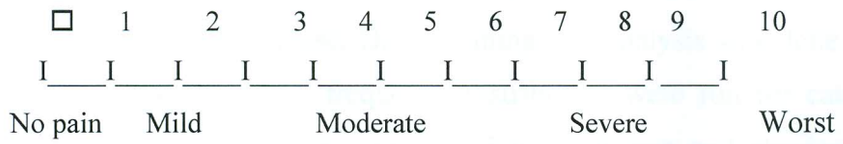
Two registered Nurses were recruited as a research assistants with knowledge, ability and experience in research . The research assistants were underwent two days of training where they were oriented on the study objective, data collection tool and the importance of consent administration and confidentiality.

3.9 Data collection tool

Structured questionnaire was used for data collection. The questionnaire had two sections; section one collected data on patients' demographic information. Section two included, questions to determine type, dose, and adequacy of analgesic given within three hours following admission. Visual analogue scale (VAS) was used to assess the effect of analgesics in pain relief. For the purpose of this study verbal rating scale was used, which is among a type of visual analogue scale.

Visual Analogue Scale (VAS)

VAS = 10cm horizontal line from "worst pain imaginable – no pain"



Mild pain (1 to 2 score) describe a sense of discomfort that can be ignored and does not prevent the patient from sleeping. Moderate pain (3 to 6 score) is pain that may disturb the patient's sleep. Severe pain (7 to 9 score) is the pain that prevents the patient from sleeping. Worst pain (10 score) the pain that is completely unbearable. The study subject was interviewed by a research assistant to categorise their pain according to this rating scale.

3.10 Data collection techniques

The researcher and assistants interviewed all eligible patients who consented to participate in the study. The interview was conducted within three hours of admission while the patient is undergoing treatment as per MOI guidelines. The interviewee was asked to rate the pain before he /she received analgesic and after use of analgesic by using verbal rating scale (i.e. No pain, mild, moderate, severe and worst pain). The response was recorded. The information about diagnosis and drug type, dose, route of administration was obtained through review of patient's file, treatment chart and admissions register.

3.11 Pre- testing

Pre- test was conducted at MOI to test the data collection tool if they provide the depth, range and quality of information required and the likely response rate. No significant changes were made to the tool.

3. 12 Data processing and analysis

The data which consist of both coded answers and text responses was entered into a Microsoft access database. Data cleaning and analysis was done using SPSS version 11. For univariate analysis, frequency distribution were run for categorical variables while continues variables were summarised using means and standard deviations (SD). Chi-square test was used to compare differences between proportions and t-test for differences between means. All the analyses were two-tailed and significant level was set at 0.05%. Verbal rating scale was used to determine severity of the pain.

3.13 Plan for dissemination of the results

The final report will be submitted to the Muhimbili University of Health and allied science as part of fulfilment for the award of the degree of Master of Medicine (Orthopaedics and Trauma). Publication to scientific journals will be done with the assistance of the supervisor.

3.14 Ethical consideration

The proposal was submitted for ethical clearance at the MUHAS Research Ethics Committee, before conducting the research. Ethical clearance was obtained vide (quote letter of permission). Written informed consent was obtained from all eligible participants after being informed of the aims of the study. Confidentiality was assured and the information was only used for the purpose intended by the study. Refusal to participate did not affect the management of the patient in anyway and this information was provided to all eligible participants.

CHAPTER FOUR

4. 0 RESULTS

Demographic characteristic of study population

During the data collection period (May to August, 2008 inclusively) a total of 250 patients with long bone fractures and aged between 18 to 60 years were interviewed. The study group included 76% (189/250) male and 24% (61/250) female. The overall mean age of the study population was 34.6 with the standard deviation of 11.7. The mean age did not differ between male (34.5 years (SD=11.7)) and female (35.0 years (SD=11.8)), p=0.313).

Most of the patients interviewed were of primary education level. Education level did not defer between male and female p= 0.895. The Figure1 depicts the distribution of the study participants by education level.

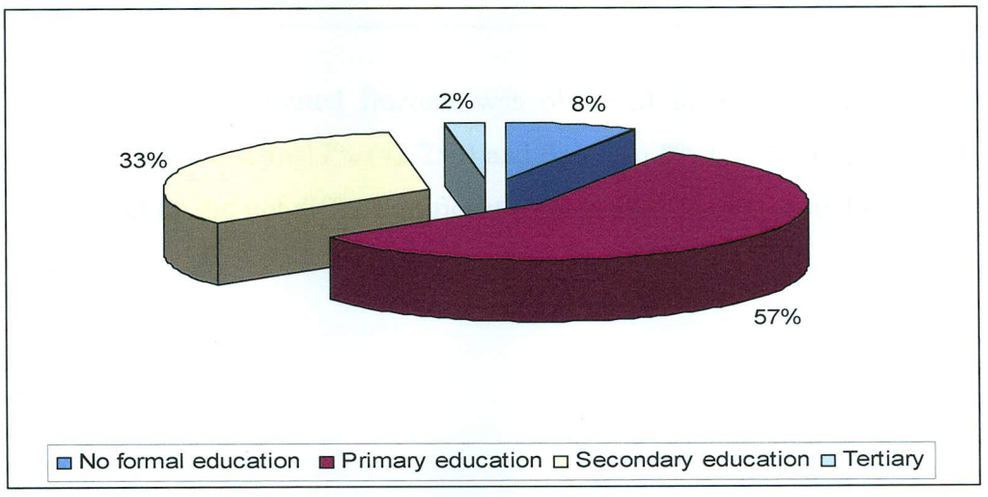


Figure: 1 showing level of education of study population

The commonest bone fracture for both male and female observed in this study was Tibia and fibula accounting for 44% (111/250) of all fractures and the least fractured bone was Humerus 12% (30/250).The distribution of bone fracture did not differ between sex (p=0.118). Distribution of type of bone fractured by sex is presented in table 1.

Table 1: Distribution of bone fracture by sex

Type of bone	Frequency n (%)			
	Male	**Female**	**Total**	**p- value**
Humerus	21 (11.1)	9 (14.)	30 (12)	0.118
Radius / Ulna	32 (16.9)	11 (18.1)	43 (17)	
Femur	57 (30.2)	9 (14.7)	66 (26)	
Tibia /Fibula	79 (41.8)	32 (52.5)	111 (45)	
Total	**189 (100)**	**61 (100)**	**250 (100)**	

In this study comminuted fracture was observed in 44% (111/250), oblique in 31% (77/250), Transverse in 17% (42/250) and Spiral in 8% (20/250) of patients recruited. The type of fracture did not differ significantly between the sexes (p=0.84).

Table2: Distribution of type of fracture by sex

Type of fracture	Frequency n (%)			
	Male	**Female**	**Total**	**p- value**
Transverse	31 (16.4)	11 (18.0)	42 (16.8)	0.840
Oblique	56(29.6)	21 (34.4)	77 (30.8)	
Spiral	16 (8.5)	4(6.6)	20 (8.0)	
Comminute	86 (45.5)	25 (41.0)	111 (44.4)	
Total	**189** (100)	**61** (100)	**250 (100)**	

Methods of pain control:

The prevalence of analgesics administration before admission was 40.4% (101) and 46% (115) after admission to the ED. The commonest analgesic given to patients was Diclofenac sodium. Before or after the admission at ED no patient was given opioids (pethedine/ morphine).

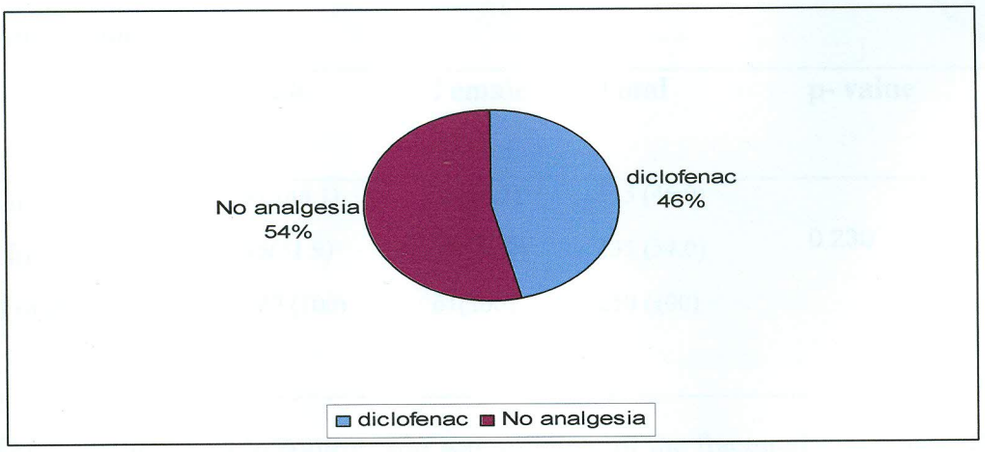


Figure: 2 showing type of analgesia given at ED

The route of administration of the diclofenac sodium to patients who received analgesic at ED was intramuscular and it was given at a dose of 75mg once. No combination of analgesic was used to control pain.

Table 3 shows analgesics given before admission

Analgesia before Admission	**Frequency n (%)**			
	Male	**Female**	**Total**	**p- value**
Given	73 (38.6)	28 (45.9)	101 (40.4)	0.314
Not Given	116 (61.4)	33 (54.1)	149 (59.6)	
Total	189 (100)	61 (100)	250 (100.0)	

It was observed that 46% (115/250) were given analgesia while 54% (135/250) were not given any medication. There were no statistical significant deferent between male and female p value = 0.230

Table 4: shows analgesics given after admission at ED

Analgesia before Admission	**Frequency n (%)**			
	Male	**Female**	**Total**	**p- value**
Given	91 (48.1)	24(39.3)	115 (46.0)	
Not Given	96(51.9)	37 (60.7)	135 (54.0)	0.230
Total	189 (100)	61(100)	250 (100)	

Other method used to control pain was splinting of the fractured limb where (37.2%) 93 of patients were splinted before admission and 68.8% (172/250) after admission to the ED.

The rate of analgesics administration or splinting before admission and after admission to the ED did not differ between sex (p=0.314 versus p= 0.230) and (p=0.314 versus p= 0.114), respectively.

Timing of analgesic administration:

Among those who received analgesics, almost half (54/115 (47.0%)) of them spent 20 min to 1hr before the administration of analgesics. The proportion of patients and time spent before administration of analgesics are shown in figure 3

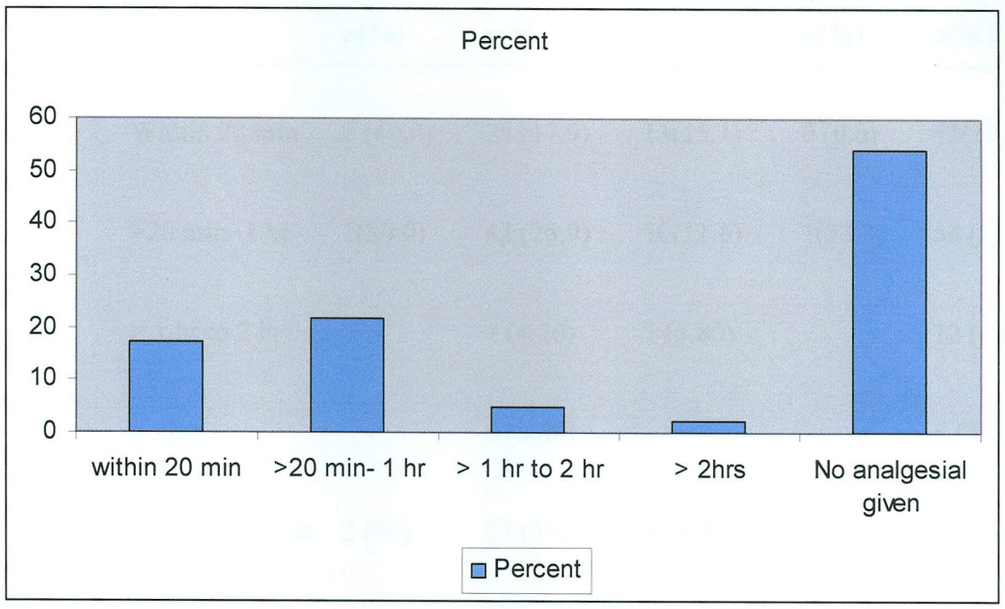


Figure: 3 Proportion of patients and time spent before administration of analgesic

The study demonstrates that, 17% (43/250) received analgesia within 20 minutes after admission, 22% (54/250) received analgesia above 20 min to one hour of admission. However 54% (135/250) of the patient were not given analgesia at ED.

Pain score/assessment/evaluation

It was observed that there were no recording of pain assessment before analgesic administration or pain re evaluation after the administration of analgesic. A total of 156 (62.4%) patients scored their pain as severe at the ED and among these, only 28 patients received analgesia within 20 min of admission, 42 patients received analgesia above 20min to 1hour after admission while 73 patients were not given analgesic despite scoring severe

pain. The table 5 shows the pain score before analgesic and the time waited from admission to the administration of analgesia.

Table 5: shows pain score before analgesia and time waited to receive analgesia at ED

PAIN RATE BEFORE ANALGISIA GIVEN AT ED

TIME WAIT	**Worse n(%)**	**Severe n(%)**	**Moderate n(%)**	**Mild n(%)**	Total **n(%)**
Within 20 min	2 (40,0)	28 (17.9)	13(15.1)	0 (0.0)	43(17.2)
>20 min- 1 hr	1(20.0)	42 (26.9)	10(11.6)	1(33.3)	54 (21.6)
> 1 hr to 2 hr		7 (4.50)	5 (5.80)		12 (4.80)
> 2hrs		6 (3.80)			6 (2.40)
No analgesia given	2 (40)	73 (46.8)	58(67.4)	2 (66.7)	135(54)
Total	5(100)	156 (100.)	86 (100)	3 (100)	250 (100)

Effects of analgesia/analgesics/pain control

After analgesics, 22 (19%) of the115 who received analgesics continued to rate their pain as severe, 66 (57%) as moderate, 27(23%) as mild and only one reported no pain (Figure 4).

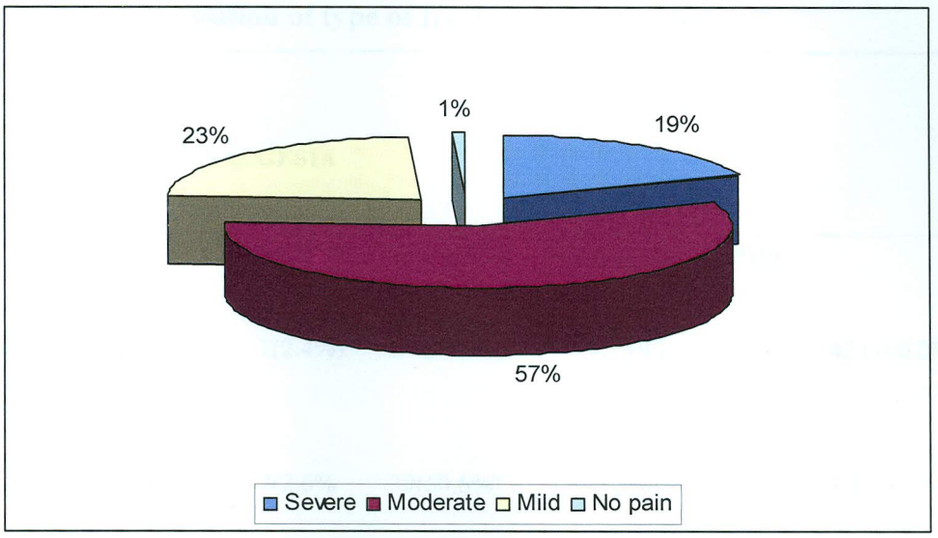


Figure 4: shows the patient pain score after receiving analgesia

Furthermore, 79% (198/250) of patients were given analgesic prescription after being discharged from the ED while 20% (52/250) were not given prescription for analgesia.

A large proportion, 72% (80/111) of patients with comminuted fracture scored severe pain followed by spiral fracture 65.0% (13/20) (However, the type of fracture was not found to significantly influence the pain score before analgesics in this study (p=0.230) (Table 6).

Table 6: Distribution of type of fracture by pain score

PAIN RATE BEFORE ANALGESIA Total		Worse	Severe	Moderate	Mild	
TYPE OF FRACTURE	Transverse	1(2.4%)	24 (57.1%)	17 (40.5%)		42 (100.0%)
	Oblique	2(2.6%	39(50.6%)	35(45.5%)	1(1.3%)	77(100.0%
	Spiral		13(65.0%)	7(35.0%)		20 (100.0%)
	Comminuted	2 (1.8%)	80 (72.1%)	27(24.3%)	2 (1.8%)	111(100.0%)
Total		5(2.0%)	156(62.4%)	86(34.4%)	3(1.2%)	250 (100.0%)

CHAPTER FIVE

5.0 Discussion

5.1 Introduction

Pain is a cardinal symptom of fracture of long bones and is the reason that patients seek medical care in the emergency rooms. It strikes acutely or lingers chronically, causing physiological and social disturbances and forcing people to seek assistance. Despite this, study revealed that pain is under treated. The same was demonstrated by study conducted in Jerusalem which showed that, patients with painful conditions were mismanaged and termed as "oligoanalgesia (Todd KH, et al, 1993, Wilson JE, et al, 1989).

5.2 Demographic characteristic of study population

In this study a total of 250 patients with long bone fractures, aged between 18 to 60 years were interviewed. The overall mean age of the study population was 34.6 with the standard deviation of 11.7. The mean age did not differ between male and female. This similar to a study conducted in Costa Rica where the study population of those who presented with painful fracture of long bone was aged 16 to 63 years (Thomas J. *et al,* 1995). The commonest long bone fracture for both male and female observed in this study was Tibia and fibula. The distribution of bone fracture did not differ between sexes. The type of fracture did not differ between male and female. These results were different from the study conducted at Butterworth Hospital, where the commonest bones involved were Radius/ulna 38%, followed by Tibia/fibula 28%, Femur 19%, and Humerus 15% among patient aged between 20 to 50 years old (Jeffrey s. Jones, *et al* 1996).

The study shows that, there is no difference between male and female in the experience of pain after fracture. Similar to Vaisto study there is no correlation between the type of fracture and severity of pain and no correlation between severity of pain and sex (Vaisto O, at el 2005). In the Observational study in 19 EDs across the US and Canada, women received more analgesia in the ED than men (74% vs 64%). However, no difference was

noted between genders in the frequency of pain assessment, and in the amount of intravenous analgesics (Safdar B, et al 2006). This study found equal administration of analgesics between male and female this may be, because of lack of documentation of pain assessment or reassessment which would have classified patients according to their analgesia need. Nevertheless these results were different from Raftery and colleagues who in a prospective cohort study demonstrated that female patients reported more pain and were perceived by providers to have more pain than male patients in the ED (Raftery KA, at el 1995).

5.3 Type and dose of analgesic prescribed within 3hrs of admission at ED

Although patient satisfaction was not measured in this study, it was found that, patients were experiencing pain before and after their treatment. Presumably the opportunity to provide analgesia existed and was missed in most cases. When analgesics were used, there were no prescriptions for opioids, although these were available in the hospitals. The study shows that among patients attended at the ED 46% were given diclofenac (NSAID), 54% of patients were not given analgesia and none of the patients were given opiods this is similar to the study conducted in the Paraguay where by no patient in the adult group received an opioid analgesic (Ducharme J. 2000). A study conducted in US also showed that, third of the fracture patients did not receive any pain medications {Julie C at el, 2003}

Though this study did not asses factors contributing to oligoanalgisia, other study have revealed several factors such as: fear among physicians about initiating addiction in patients and therefore unwilling to prescribe opiates. This could also be explained by tough regulations and licensing regarding opioids (Rampanjato1, *et al* 2007, Stalnikowicz1 R, *et al* 2005). On the Other hand, others believe that NSAIDs delay fracture healing, even thought the mechanism is uncertain. (Bennett DS, and Carr DB 2002, Rampanjato1 M. *et al* 2007, , Zhang R. *et al,* 2001, Eder SC, et al, 2003, Miner J, et al 2006, Tamayo-Sarver JH, et al 2003, Wendel TD, 2001).

In this study all patients who received analgesia at ED were given Diclofenac sodium at a dose of 75mg once. Following this medication only one patient recorded no pain amoung

115 patients who received analgesia. This result was statistically significant in that the type of analgesia, dosage given and frequency of administration was not sufficient to relive pain. This us deference to the study conducted in US the most commonly used analgesics in the adult patient were meperidine (61%), morphine (32%), hydromorphone (14%), hydrocodone (11%), codeine (11%), propoxyphene (3%), and ketorolac 2%) (Jeffrey S. Jones, *et al* 1996). In a study from Costal Rico it was found that pain decreased in many patients without specific interventions, but 41% of all patients showed little or no pain relief at discharge. This finding suggests that pain-management strategies are deficient for these fractures in the EDs. Furthermore the study conducted by Motov and Khan (2009) showed that, 32% of the patient with fracture at ED received less than optimal analgesic doses. This was also demonstrated by the study conducted in North America, showing that patients at ED received inadequate doses of the pain medications (Tamayo-Sarver JH, *et al* 2003).

The study observed that 79% of the study population were given a prescription for oral NSAID after discharge. While 71% of Adult with orthopaedic trauma who were given oral or intramuscular prescription for NSAID in the study conducted in Paraguay by Ducharme J. 2000. In Costa Rico, adults with long borne fracture were not prescribed analgesics for home therapy. (Jantos TJ, et al 1995)

5.4 Timing of administration of analgesic in relation to the time of admission

This study revealed that only 17% of patients with long bone fractures received analgesia within 20 min of admission. On the other hand 22% of the patients spent 20 min to 1hr before the administration of analgesics after admission. The time of administration of analgesics in this study was shorter compared to other study conducted elsewhere. A study in Jerusalem revealed a mean time of waiting from admission to analgesia was 80 minutes and nearly 40% of patients with severe pain (VAS above 7) had to wait more than an hour for analgesics (Todd KH *et al,* 1994). in Rwanda ED showed even much longer waiting time where, patients with a VAS score of $\geqslant$ 7 received analgesic medication at 150 min (median), (Rampanjato1, *et al* 2007).

In this study out of 115 patients who received analgesia 47% of patients receive analgesia within twenty minutes to one hour after admission, while 10.4% received analgesia from one hour to two hours. This was deferent to a study conducted in New York which demonstrated that, 69% waited for more than one hour before receiving analgesia, and 41% waited for more than two hours among those who received analgesics (Motov and Khan 2009). Generally 80% of the patients treated at the ED did not receive the appropriate pain management according to the British Association of Accidents and emergency (A&E) Medicine guideline (Shah K. et al 2002). Moreover, studies conducted in North America indicated that, patients often receive no analgesia for painful conditions and that they experience delays in receiving analgesia (Tamayo-Sarver JH, et al 2003).

In 2007, Todd and his colleagues evaluated the current state of ED pain management practices. The results showed that only 60% of patients received analgesics after lengthy delays with median waiting time of 90 minutes (range, 0 to 962 minutes). Seventy-four percent (74%) of these patients were discharged in moderate to severe pain (Todd KH, 2007); which was similar to findings in this study where by 80% were discharged with moderate to severe pain.

5.5 Adequacy of pain control within 3hrs of admission in the emergency department

This study observed that there was no documentation of pain assessment before administration of analgesia and re evaluation there after. This is different from the study conducted in US, where pain scores were recorded in 59% of patient's overall. However when pain scores were recorded as moderate or severe, analgesics was not routinely used in the US study. A study in Canada showed that, for patients with documented moderate to severe pain, 73% received any analgesia (Julie C *at el,* 2003). The study showed that, documentation of pain intensity and pain relief is far from ideal. There was no uniform method of documenting the intensity of pain and re-assessment of pain relief (Shah K. *et al* 2002). Due to lack of assessment and reassessment of pain most of patients treated at ED are under treated.

In another study conducted in America, analyzing the use of pain medications in patients with different pain levels it was found that patients who rated their pain as severe were likely to receive any type of analgesic in the early and late periods. However, patients who rated their pain as mild or moderate were much more unlikely to receive any analgesic. (Shah K. *et al* 2002). This was different from this study, where out of 156 patients who scored their pain as severe only 17% of them receive analgesia within 20 min while 48% did not receive any pain medication, this may be due to lack of evidence that the patient's pain was assessed or re assessed since there were no documentations of pain observed. This was also higher than study conducted in United State demonstrated that, Twenty percent (20%) of patients who rated their pain as severe were not provided with any analgesic at all (Miner J, *et al* 2006, Tamayo-Sarver JH, *et al* 2003, Bennett DS, and Carr DB 2002, Stalnikowicz R, *et al* 2005). A survey conducted in Jerusalem showed that inadequate pain management in the ED is related to poor staff assessment of pain similar to what was found in this study (Todd KH, *et al* 1994).

5.6 Limitation of the study

Several limitations are considered in the interpretation of the results of this study. First, only one hospital was used as study site, and the study was limited to data collected over a seasonal time period. The results is not representative of the other institutions ED departments

It is possible that the patients' responses to the pain scales and that a discrete pain assessment may not reflect brief instances of intense pain sustained in the ED.

The existence of cross-cultural differences in Tanzania was not investigated, although it may have influenced physicians' treatment patterns, as seen in a prior United States study.

There was no attempt to identify the basis of the physicians' treatment strategies.

Conclusion

Pain at MOI ED is under treated; there is no documentation of pain assessment or reassessment of the pain resulting in inadequate dosage and delay to administer analgesia to relive pain. Opioids was not used to relive pain and majority of the patient with severe pain were not given analgesia at ED. Most patients who had not receive analgesia within one hour actually did not get any analgesia. The great responsibility of ED is to relieve pain by all possible appropriate means in a timely, efficient and effective manner. Pain should be assessed, reassessed and recorded as a fifths vital sign. This is the greatest service a physician can provide to the patient at ED.

Recommendations MOI ED

- Improvements in pain assessment, re assessment and documentation,
- Development of guidelines for the pain management
- A study look into reasons of not using opiods at ED
- Conduct refresher courses for the pain management at ED
- ED health providers must recognise that pain is a true emergency and treat it as such

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