

**PRACTICES OF NURSES IN MANAGEMENT OF PAIN AMONG
CRITICALLY ILL NON-VERBAL ADULT PATIENTS IN THE CRITICAL
CARE UNIT, KENYATTA NATIONAL HOSPITAL**

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FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN NURSING (CRITICAL CARE)
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DECLARATION

I, Hellen Wachera Kamotho declare that this dissertation is my original work and has not been presented in any other institution for the purpose of obtaining degree or any other award.

Signed.....*Hellen Kamotho*..... Date.....*17/10/2012*.....

DEDICATION

This work is dedicated to my husband, Solomon Musau for his constant support and frequent review and advice and to my daughter, Venessa Mwikali for her love and understanding.

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I wish to extend my sincere gratitude to the Ministry of State for Defense for giving me an opportunity to further my studies. Great thanks goes to, The Chief Executive Officer of Kenyatta National Hospital for allowing me to conduct this research at the hospital. Thanks to all nurses working in the critical care unit, Kenyatta National Hospital who participated in the study. I know how tight the schedules are, but thank you for finding time towards completing the questionnaires.

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You have been my pillar throughout my course.

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LIST OF ABBREVIATIONS AND ACRONYMS

BScN- Bachelor of science in Nursing

CCU- Critical Care Unit

ECG- Electrocardiogram

GABA- Gamma Amino butyric Acid

IASP- International Association for the Study of Pain

ICU- Intensive Care Unit

KNH- Kenyatta National Hospital

MScN- Masters of Science in Nursing

TENS- Transcutaneous Electrical Nerve Stimulation

UoN- University of Nairobi

SPSS- Statistical Programme for Social Sciences

WHO- World Health Organization

OPERATIONAL DEFINITIONS

Attitude- Positive or negative reaction or views of the nurse towards pain assessment and management in a critically ill nonverbal patient exhibited in his/her beliefs, feelings, or intended behavior.

Critical Care Unit- A specialized section of the hospital that admits the critically ill patients under the care of medical and nursing staff and contains equipment and monitoring devices necessary to provide intensive care. In this study, it excludes the burns unit and the renal unit.

Critically ill patient- Any patient who has an immediate requirement for any form of organ support e.g. intubation or ventilation and could either be sedated, unconscious or semi-comatose and is admitted in the critical care unit.

Knowledge- Familiarity/understanding/comprehension of the facts and skills of pain assessment and management for the critically ill nonverbal patient acquired through experience or education.

Non Verbal patient- Any critically ill patient who cannot communicate their health needs for example presence and intensity of pain, either due to sedation, mechanical ventilation, altered level of consciousness or cognitive impairment.

Optimal pain management -The use of pharmacological and non-pharmacological interventions to control the patient's identified pain and evaluation of effectiveness of intervention. Pain management extends beyond pain relief, encompassing social, cultural and spiritual factors.

Practice- A set of procedures/activities performed by the nurse towards management of pain in critically ill nonverbal patients. In this study the main practices the nurse is involved in include pain assessment, relief of pain through pharmacological or non pharmacological interventions, evaluation of effectiveness of intervention, documentation and reporting.

ABSTRACT

Background: Pain is a common distressing symptom among the critically ill patients, yet its assessment and management remains a major challenge to critical care givers because self-report is frequently compromised by altered level of consciousness, sedation and invasive procedures. Hence pain assessment among the critically ill nonverbal patients should remain a top priority among nurses who are the primary group of health care professionals responsible for the ongoing monitoring of patients to ensure that pain is effectively and appropriately managed. **Objectives:** To establish the practices of nurses in management of pain among critically ill non-verbal patients in the critical care unit.

Methodology: A cross sectional study design and convenient sampling method was employed to obtain a sample size of 86 nurses working in the critical care unit, Kenyatta National Hospital. A self administered Questionnaire and an observation checklist were used to collect data. Data was entered and analyzed using SPSS version 17. Continuous data was analyzed using t-test. Categorical data was analyzed using chi- square. Measurement of association between the independent variable with key dependent variables was ascertained through logistic regression modeling.

Results: Nurses working in the critical care unit had inadequate knowledge on pain assessment and management with an overall knowledge score of 8.26 (SD+2.23). Overall attitude score on a 3 Likert scale was 84% indicating positive attitude. Nurses significantly ($P=0.006$) considered physiological indicators more than behavioral indicators of pain in deciding to intervene. Lack of pain assessment tool to guide nurses and lack of well laid out regulations for frequent pain assessments, significantly ($P= 0.014$) prevented nurses from rating the patient's level of pain.

Results from binary logistic regression analysis indicated that the nurse's age ($p=0.065$), duration worked in critical care unit ($p=0.057$) and duration after critical care training ($P=0.038$) were key determinants of effective pain management.

Conclusion: Overall, critical care nurses need to be trained on pain assessment and management principles to improve on their knowledge for effective practice. It is also necessary to have a standard pain assessment tool for critically ill nonverbal patients with well laid out guidelines on the use of the tool. There is also need for policy change to enable critical care trained nurses prescribe analgesics based on assessment and clinical judgment without waiting for the doctor to prescribe.

CHAPTER 1: INTRODUCTION

1.1 Background

The International Association for the study of Pain describes pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage (Loeser & Treede 2008). Pain management is an essential component of quality care delivery for the critically ill patient. Considering that outcomes are difficult to predict in the intensive care unit, high quality pain management should be a goal for every patient (Mularski, 2004).

Puntillo *et al.* (2009) stated that relief of pain and improvement of patient outcomes provides the rationale for conducting systematic evaluations of pain experienced by critically ill patients. The American Pain Society (1999) established an appeal that made pain the “fifth vital sign” as a strategy to increase pain assessment and treatment. The concept means that to treat pain, clinicians need to systematically and repeatedly evaluate the presence and characteristics of pain. Pain assessment therefore is considered as important as assessment of rest of the patient’s traditional vital signs which include pulse, blood pressure, temperature, and respiration (Fenerdes, 2010).

Pain is a common distressing symptom in critical care setting yet its management remains a major challenge to critical care givers. According to the National Institutes of Health (1987), though self-report is considered the most reliable indicator of pain presence and intensity, pain assessment for critically ill patients is challenging, as self-report is frequently compromised by altered level of consciousness, sedation or invasive procedures.

Therefore the nurse must be well knowledgeable on routine assessment of pain for non-self reporting patients admitted at the critical care unit, identify and document presence and severity of pain, provide treatment and evaluate responses to treatment.

Critically ill patients in intensive care unit may experience pain that is due to their underlying illness or injury, surgical or non-surgical intervention. Pain may also be as a result of a variety of noxious stimuli present in the critical care setting from monitoring (e.g. arterial catheter, central venous catheter), therapeutic devices (e.g. ventilator), or routine nursing interventions (e.g. turning). Although some patients may be able to verbally or nonverbally communicate their pain control needs, the critically ill, intubated patient may not communicate their level of pain adequately. Pain control therefore in the critical care setting is often inadequate (Tietze, 2011).

Pain can lead to many adverse medical consequences and providing pain relief is central to caring for ill patients and therefore effective pain management is vital. Studies show patients admitted to critical care units still suffer from significant levels of acute pain (Subramanian *et al.*, 2011).

Therefore the critical care nurse is responsible and accountable in ensuring that a patient receives appropriate evidence-based nursing assessment and intervention which effectively treats the patient's pain and meets the recognized standard of care. In order to do this, the nurse must possess adequate knowledge on pain management, have the right attitude and show confidence in their ability to accurately assess pain in patients unable to self report.

1.2 Problem Statement

Pain is an important problem for critically ill patients. Research has shown that ICU survivors recall pain as a prominent feature of their ICU admission even up to 2-4 years post discharge from intensive care unit suggesting inadequate pain assessment and management (Arroyo-Novoa *et al.*, 2008).

Unrelieved pain has profound physiological and psychological effects on patients which can affect their recovery from acute illness, alter their physical and emotional functioning which may lead to prolonged chronic states and decrease quality of life (Dunwoody *et al.*, 2008). Accurate assessment, prompt intervention and adequate evaluation of pain relief measures are therefore necessary for better clinical outcomes (Plaisance and Logan 2006).

Nurses are the primary group of health care professionals responsible for the ongoing assessment and monitoring of patients to ensure that pain is effectively and appropriately managed and that patients and families are informed of the consequences of acute pain (Buckley 2000). Despite overwhelming evidence in the literature that pain is a significant problem within the critical care environment, nurses have shown less confidence in their ability to accurately assess and effectively manage pain especially in patients unable to self report (Louise *et al.* 2011).

Nurse requires accurate knowledge, positive attitude and accurate assessment skills for effective pain management. Nurses can assume a pivotal role in pain management by utilizing current knowledge of pain relieving measures and by adopting best practices in pain assessment and management and ensure that pain relieving strategies are utilized in promoting patient comfort.

1.3 Justification

Pain management presents a major challenge to the health care service providers working in the critical care setup because most patients admitted in the critical care unit have a compromised level of consciousness or are sedated thus are unable to verbally report their level of pain.

Nurses spend more time with patients than any other health care team member. It is the nurse who performs many interventions for pain relief or further individualizes for the patient those interventions prescribed or performed by others. The nurse also in most occasions is in a position to evaluate the effectiveness of pain management, plan and initiates the necessary changes. The nurse should therefore be knowledgeable on pain assessment, management and evaluation procedures in order to enhance correct determination of the patient's level of pain and when appropriate, provide pain relieving measures.

Kenyatta National Hospital is the main referral hospital in Kenya and has the highest number of ICU patients in the country. It is therefore important to understand the knowledge skill mix available in Kenyatta National Hospital critical care unit, the barriers to pain management and their effect on optimal pain management in critically ill non-verbal patients.

Currently, there is no study of this kind that has been done in the hospital thus the information obtained from this study will form a valuable guide to nursing practice, policy formulation and curriculum development on pain management for the critically ill patients unable to self report. It will also help provoke more research in pain management in critically ill non verbal patients.

1.4 Study questions

1. What are the nurses' practices in management of pain among critically ill non-verbal patients?
2. What is the nurses' level of knowledge in management of pain among critically ill non verbal patients?
3. What are the nurses' attitudes towards pain management among critically ill nonverbal patients?
4. What are the other perceived barriers and challenges to effective pain management in the critical care setting?
5. How are nurse's practices in pain management among critically ill non-verbal patients influenced by their knowledge, attitudes and other perceived barriers?

1.5 Study Objectives

1.5.1 Broad Objective

To determine practices of nurses in pain management among critically ill non-verbal patients.

1.5.2 Specific Objectives

1. To identify clinical indicators of pain used by nurses while assessing critically ill nonverbal patients.
2. To determine how nurses conduct assessment, manage and follow up critically ill nonverbal patients who are in pain.

3. To determine nurses' level of knowledge, attitude and other perceived barriers in pain management among critically ill nonverbal patients.
4. To establish the relationship between nurse's practices in optimal pain management among critically ill non-verbal patients and their knowledge, attitudes and other perceived barriers.

1.6 Study hypothesis

Knowledge, attitude and other perceived factors/barriers have no influence on Nurses practices in optimal pain management among critically ill nonverbal patients.

1.7 Study Benefits

The findings of this study will help in laying a basis for continuous staff training through continuing professional development and refresher courses on accurate pain assessment and effective management for the critically ill non-verbal patients. The information will also be helpful in provoking research on pain management which will form a guide to curriculum development in pain assessment and management for nurses.

1.8 Theoretical framework

The theory that guided this study is the self care deficit nursing theory by Dorothea E. Orem. In her theory Dorothea believes that the condition that validates requirement for nursing in an individual is the inability to continuously maintain that amount and quality of self care that is therapeutic in maintaining life and health and in recovering from disease and injury or in coping with their effect (George, 2002).

Self care deficit exists when an individual's self care demands exceed his or her ability to perform self care needs. Nursing care is then required when an individual is incapable or limited in his ability to provide effective self care. This is the case in the critical care unit, where the patient has limited ability to perform his self care needs hence the nurse has to perform most of the needs to enhance quality life.

In the patient with impaired level of consciousness or the intubated patient, ability to report pain is limited. It is the duty of the nurse to accurately assess the patient's level of pain, institute the relevance pain management intervention, evaluate effectiveness of such measures and initiate the necessary changes to ensure that the patient is comfortable and free of pain even in his non verbal state. In her theory, Orem developed the concept of the nursing systems which included the wholly compensatory nursing system; whereby the nurse accomplishes the patient's therapeutic self care need, compensates for the patient's inability to perform his or her self care activities and supports and protects the patient.

The nurse should therefore be knowledgeable and highly skilled in his/her ability to provide care to the patient. This study is based on the wholly compensatory nursing system whereby the nurse should be able to assess, diagnose, plan for the patients care, implement and evaluate the relevant nursing intervention to the critically ill patient who is not able to verbalize his care needs especially presence and intensity of pain.

1.9 Conceptual framework

The nurses' practices in pain management include assessment of pain using an appropriate pain rating scale to determine the type of pain intervention that should be given to the patient to relieve the pain, administration of appropriate or prescribed pharmacological or non pharmacological analgesics, evaluation of effectiveness of intervention and subsequent documentation to enable follow-up. Thus the nurses' practice forms the dependent variable in this study.

Nurses' knowledge, attitude and perceived barriers form the independent variables in this study. The perceived barriers include resources, hospital policies, staffing and equipment. They can directly affect the nurse's level of practice in providing effective pain management.

The confounding variables in this study that may affect the relationship between the dependent and independent variables include the nurse's level of qualification, gender and culture. These will be controlled by stratification.

The overall outcome is the effective pain management which improves the quality of life of the patient or an eventual peaceful death. This is as detailed in the schema below: -

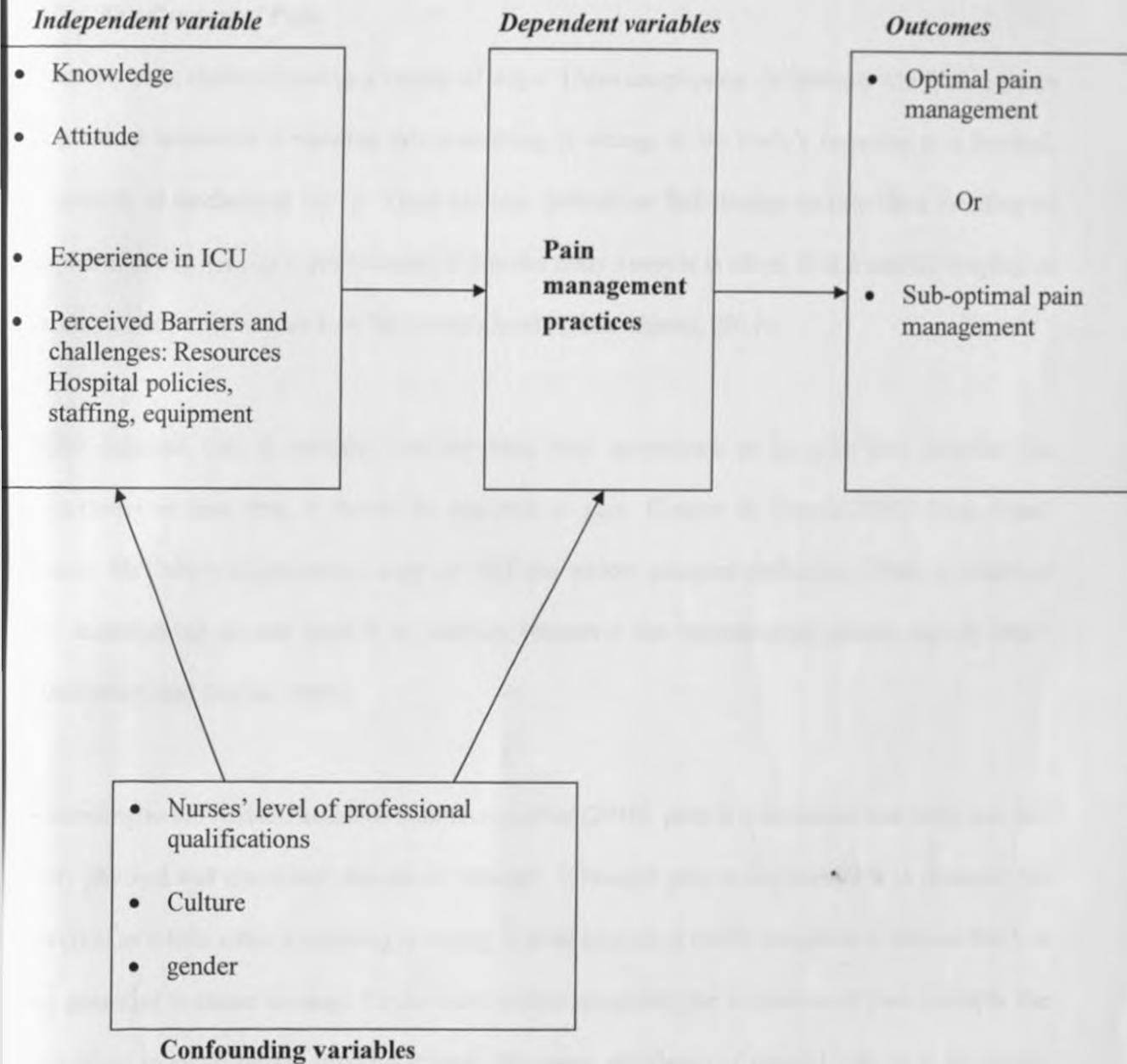


Figure 1: The Conceptual Framework Schema

CHAPTER 2: LITERATURE REVIEW

2.1 *The Concept of Pain*

Pain has been characterized in a variety of ways. There are physical definitions which include an unpleasant sensation; a warning that something is wrong; or the body's response to a thermal, chemical, or mechanical injury. There are also definitions that attempt to provide a meaning or explanation e.g. pain is a punishment; it lets the body know it is alive; it is a teacher helping to modify future behavior; or it is "all in one's head" (Kastenbaum, 2011).

IASP suggests that if patients consider what they experience to be pain and describe the experience as pain then it should be accepted as pain. (Loeser & Treede, 2008). Pain expert Margo McCaffery suggested as early as 1968 the widely accepted definition, "Pain is whatever the experiencing person says it is, existing whenever the experiencing person says it does" (McCaffery and Beebe, 1989).

According to the Africa Palliative Care Association (2010), pain is a sensation that hurts and has both physical and emotional aspects to consider. Although pain is unpleasant it is essential for survival as it tells when something is wrong. It is an important bodily response to stimuli that has the potential to cause damage. Under normal circumstances, the sensation of pain prompts the individual to avoid further noxious stimuli. However, avoidance of painful stimuli is frequently not possible for the patient in the critical care unit.

The above definitions point out the fact that pain is much more than tissue damage that triggers a response from the nervous system. They stress the subjective nature of pain which means that the management of pain should involve more than treating the tissue injury. The individual's cultural background, present circumstances, and state of mind all require assessment and attention.

Though definitions of pain emphasizes the highly subjective nature of pain and also describes the patient as the best authority on its existence and considers self- assessment by the patient as the “gold standard” means of assessing pain, it may not be reliable for the critical care unit patient who is cognitively impaired, sedated, paralyzed or mechanically ventilated and is therefore unable to communicate the presence or degree of pain intensity (Puntillo *et al*, 2009).

2.2 Pain Theories

Regardless of the type of patient i.e. whether the patient can communicate his/her pain presence or cannot, pain is considered as an unpleasant subjective sensation resulting from a physiologic response to a variety of noxious mechanical, thermal or chemical stimuli and is associated with physical, psychological and emotional distress (Astle,2009). Researchers believe that an individual's perception of pain includes cellular, molecular, genetic, psychological and cultural factors (Chen *et al*, 2000). Other influencing factors that have an impact to the perception of an individual's pain include: gender, age, past experiences, ethnicity, and temperament (Ranger and Campbell-Yeo, 2008).

Several theories attempt to explain the mechanism of pain. The gate control theory of pain put forward by Ronald Melzack (a Canadian psychologist) and Patrick David Wall (a British physician) in 1962, and again in 1965 was the most important theory in science that put the brain and the spinal cord into perspective in relation to pain. Melzack and Wall described the brain as the active system for filtering, selecting and modulating sensory information. The brain is the “gate keeper” and is able to increase or decrease the flow of pain impulses from peripheral nerves system. Melzack and Wall suggested that the central nervous system has a gating system with gates that open or close to pain pathway. The gates can open to let pain to the brain or close to prevent pain from reaching the brain. There are many factors that influence the opening or closure of these gates. These factors are to do with how the patient feels about things, how they think about things, and what they are doing (Astle, 2009).

The gate keeper theory further integrates the physiological, psychological, cognitive and emotional components of an individual in regulation of pain perception. It brings out the idea that the perception of physical pain is not a direct result of activation of nociceptors, but instead is modulated by interaction between different neurons, both pain-transmitting and non-pain-transmitting. The theory asserts that activation of nerves that do not transmit pain signals can interfere with signals from pain fibers and inhibit an individual's perception of pain (Melzack and Wall 1965).

Theories of pain try to explain that there are multiple factors that contribute to each person's pain experience and therefore each person experiences pain differently than anyone else. The nurse should recognize that each patient perceives pain differently thus management is patient directed.

2.3 *Pathophysiology of pain*

A review of pain physiology is helpful in understanding the way analgesics work. The sensory experience of pain depends on the interaction between the nervous system and the environment. Among the nerve mechanisms and structures involved in the transmission of pain perceptions to and from the area of the brain that interprets pain are nociceptors, or pain receptors, and chemical mediators.

Nociceptive pain is the perception and transmission of painful stimuli and it occurs when nerve endings in the periphery are activated by a noxious stimulus such as tissue damage. After being activated, neurotransmitters, including Norepinephrine, dopamine, serotonin and gamma amino butyric acid (GABA), allow the pain message to ascend through the dorsal horn of the spinal cord to the brainstem by way of the anterolateral tract and enter the thalamus where perception about the location and intensity of the pain occurs. The thalamus relays the pain stimulus to the autonomic system increasing heart rate and blood pressure and to the emotional (limbic system) and memory centers of the brain that may trigger fear and impact the individual's current emotional status. Damage activates nociceptors and the pain process begins.

Two types of nociceptive nerve fibers transmit the pain stimulus from visceral and somatic areas to the brain: A-delta fibers are myelinated and allow a very rapid transmission of the pain sensation, often causing the body's reflex to occur before the pain is felt. The sensation of pain from A-delta fibers is sharp and quickly dissipates. C-fibers are unmyelinated and transmit the pain signal much more slowly than the A-delta fibers. Pain transmitted slowly through C fibers is felt constantly as a dull, burning or aching sensation (Astle, 2009).

A local inflammatory response is sustained with the release of various chemical mediators including histamine, substance P, Bradykinin, and Prostaglandins. These mediators cause endothelial vasodilatation, vasoconstriction or vascular permeability; they sensitize functional nociceptors and activate those that have been dormant, causing the pain to amplify (Astle, 2009).

2.4 Types of pain

Different types of pain respond differently to different types of analgesics, hence the need for the nurse to determine the type of pain that the patient is experiencing. According to the African Palliative Care Association (2010), pain can be classified according to the duration, underlying mechanism or situation.

2.4.1 Duration

Acute pain is usually due to a definable acute injury or illness. It has a defined onset and its duration is limited and predictable. It is accompanied by anxiety and clinical signs of sympathetic over-activity. Acute pain is limited in time but can progress to chronic pain if not adequately treated. Treatment is directed at the acute illness or injury causing pain with the short term use of analgesics (African Palliative Care Association, 2010).

Chronic pain results from a chronic pathological process. It has a gradual or ill defined onset, continues unabated and may become progressively more severe. It persists longer than the expected healing time for the injury or illness in question. It often leads to the patient appearing depressed or withdrawn. It offers no protective benefits, serves no purpose and has detrimental effects causing changes at the level of the nervous system as well as psychological burden.

Treatment is directed at the underlying disease where possible, along with regular use of analgesics to relieve pain and prevent recurrence as well as psychological supportive care (African Palliative care association, 2010).

2.4.2 Underlying mechanism

Nociceptive pain is produced by stimulation of specific sensory receptors in the viscera and somatic structures. It includes Somatic pain and visceral pain. Somatic pain occurs at the tissue level, either superficial, involving the skin and subcutaneous tissue or deep, involving the musculoskeletal tissue. It can be characterized as sharp, burning, dull, aching or cramping, and is usually well localized. Examples of somatic pain include incision pain, muscle spasms, and the pain that occurs with bone metastasis. (African Palliative care association, 2010).

Visceral pain refers to pain in the organs and linings of body cavities. This pain may be caused by procedural pain associated with chest tube insertion, bladder distension or infiltrates into organs such as pancreatic cancer. This pain is diffuse, cramping, sharp or stabbing, and is poorly localized. Referred pain often occurs with visceral pain and is felt at a location other than the site of injury. This phenomenon is thought to occur because the area of injury and the area that senses the pain are supplied by nerves in the same spinal segment. An example of referred pain is myocardial pain that is felt in the jaw or shoulder but not in the chest. Visceral pain is associated with autonomic responses e.g. sweating and nausea (Aistle 2009).

Neuropathic is produced by damage to the central nervous system or peripheral nervous system. It is characterized by a burning sensation, shooting pain, aching sensation relieved by pressure applied to the affected area (African Palliative care association, 2010).

2.4.3 Situation

This category of pain includes breakthrough pain which is a transitory exacerbation of pain that occurs on a background of otherwise controlled pain, incident pain which occurs only in certain circumstances e.g. after a particular movement and procedural pain which is related to procedures or interventions for example suctioning, catheterization or intubation African (Palliative care association, 2010).

2.5 *Assessment of pain among critically ill patients*

Assessing and evaluating pain in critically ill nonverbal patients remains a major challenge because pain is a subjective experience and self report is often considered the “gold standard” for pain assessment. Meticulous attention to the evaluation of a critically ill patient’s pain provides the basis for selection of pain interventions and the subsequent assessment of the intervention’s effectiveness (Puntillo *et al.*, 2009).

Critically ill patients are often not able to communicate their discomfort because of mechanical intubation, sedation, or being in a state of unconsciousness and they are at greater risk for inadequate analgesia (Astle, 2009). Effective pain management depends on using established pain assessment methods for CCU patients, most of whom will probably experience pain during their ICU stay (Erstad *et al.*, 2009). Recommendations for critical care clinicians include erring

on the side of presuming pain when patients cannot communicate or when pain assessments are conflicting, preventing pain escalation by early assessment and management and starting analgesia with or before sedation if pain is suspected (Erstad *et al.*, 2009)

In 2006, the American Society for Pain Management Nursing published a position statement and five clinical practice recommendations for pain assessment in the nonverbal patient. These are in line with the hierarchy of pain assessment recommended by McCaffery and Pasero (1999) which has five steps.

The nurse should first attempt eliciting a self report from the patient. This may be possible for the conscious but not intubated patient or semiconscious who may not respond to verbal command. The patient's response could be a simple nod or finger tapping or finger pressing. If self report is not possible, the nurse should then look for potential causes of pain. Pathological condition or procedures known to cause pain should trigger pain intervention (Herr *et al.*, 2006).

Stunik-Hutt (2001) notes that sources of pain in critically ill patients include existing medical condition, traumatic injuries, medical/surgical procedures, invasive instrumentation, blood draws and other nursing procedure e.g. suctioning, turning, positioning, drain and catheter removal and wound care which should be considered during pain assessment.

Yet pain assessment during known painful procedures was found to be documented infrequently for mechanically ventilated critically ill adults (Paven *et al.*, 2007).

The third step in the hierarchy involves observation of patient's behavior. Common behaviors that indicate discomfort e.g. facial tension and expressions like grimacing, frowning and wincing are often seen in critically ill patients experiencing pain. Other indicators of pain may include tearing and diaphoresis (Herr *et al.*, 2006).

Astle (2009) notes that the two frequently employed behavioral assessment tools in adults include the Behavioral Pain Scale and the Critical-Care Pain Observational Tool. These scales have been tested in the nonverbal adult population and are helpful assessment tools, however, they are not beneficial for patients who are pharmacologically or otherwise paralyzed, over-sedated, or who have underlying diseases such as myasthenia gravis, *Guillain-Barre* syndrome, or critical illness poly-neuropathy.

Herr *et al.* (2006) recommends that patients falling into this category and cannot demonstrate the behavioral cues such as facial grimacing and hand clenching needed for pain scoring, the nurse should assume that pain is present and administer analgesics appropriately especially to patients who are given muscle relaxants and/or deep sedation and experience conditions and procedures thought to be painful.

Herr *et al.* (2006) further noted that patients may exhibit distress behaviors as a result of the fear and anxiety associated with being in the critical care unit and not necessarily due to the presence of pain. Therefore an analgesic trial may be helpful in distinguishing distress behaviors from pain behaviors. Herr *et al.* (2006) also notes that changes in vital signs can also indicate presence of pain but relying on these changes as a primary indicator of pain can be misleading because

these may also be attributed to the underlying physiologic condition, homeostatic changes and medication. Physiologic measures should be considered as a cue to begin further assessment for pain or other stressors. The tables below show two of the behavioral pain assessment tools commonly used in assessing pain in the critically non verbal patients:

Table 1: Critical Care Pain Observation Tool

Indicator	Description	Score	
Facial expression	No muscular tension, observed	Relaxed, neutral	0
	Presence of frowning, brow lowering, orbit tightening, and levator contraction	Tense	1
	All of the above facial movements plus eyelid tightly closed	Grimacing	2
Body movements	Does not move not at all (does not necessary mean absence of pain)	Absence of movements	0
	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements	Protection	1
	Pulling tube, attempting to sit up moving limbs/thrashing, not following commands, striking at staff, trying to climb out of bed	Restlessness	2
Muscle tension	No resistance to passive movements	Relaxed	0
	Resistance to passive movements	Tense	1
	Strong resistance to passive movements, inability to complete them	Very tense or rigid	2
Compliance with the ventilator (intubated patients)	Alarms not activated, easy ventilation	Tolerating ventilator or movements	0
	Alarms stop spontaneously	Coughing but tolerating	1
	Asynchrony; blocking ventilation, alarms frequently activated	Fighting ventilator	2
OR vocalization (extubated patients)	Talking in normal tone or no sound	Talking in normal tone or sound	0
	Sighing, moaning	Sighing, moaning	1
	Crying out, sobbing	Crying out, sobbing	2
Total range			0-8

Source: Gelina et al, 2006.

Table 2: Behavioral Pain Assessment Scale*This applies to patients who are unable to provide a self report of pain: Scored 0-10 observation*

Face	0 Face muscles relaxed	1 Facial muscle tension, frown, grimace	2 Frequent to constant frown, clenched jaw	Face Score
Restlessness	0 Quiet, relaxed appearance, normal movement	1 Occasional restless movement, shifting position	2 Frequent restless movement may include extremities or head	Restlessness score
Muscle Tone*	0 Normal muscle tone	1 Increased tone, flexion of fingers and toes	2 Rigid tone	Muscle Tone Score
Vocalization**	0 No abnormal sounds	1 Occasional moans, cries, whimpers or grunts	2 Frequent or continuous moans, cries whimpers or grunts	Vocalized Score
Consolability	0 Content, relaxed	1 Reassured by touch or talk	2 Difficult to comfort by touch or talk	Consolability Score
Behavioural Pain Assessment Scale Total (0 To 10)				10

*Assess muscle tone in patients with spinal cord lesion or injury. Assess patients with hemiplegia on the unaffected side.

**This item cannot be measured in patients with artificial airways

How To Use Pain Assessment Behavioural Scale:

- Observe behaviours and mark appropriate number for each category
- Total the numbers in the pain assessment behavioural score column
- Zero=no evidence of pain. Mild pain=1-3. Moderate pain=4-5 severe uncontrolled pain >6

Source: Erdek M. A and Pronovost P.J, (2004)

Surrogate reporting of pain is the fourth principle and includes taking into account family member/ care giver's report of their impression of a patient's pain and response to intervention.

These individuals can frequently supply additional information relating to the patient's responses to pain and treatment modalities that have previously been effective to relieve pain (Astle, 2009).

If pain is suspected but unable to be measured, an analgesic trial should be initiated. During this trial the analgesic medication is slowly titrated upward, frequent assessments are needed to evaluate the patient's response (Herr *et al.*, 2006).

Table 3: Pain Assessment in Unconscious Patient

Guiding principles and recommendations for pain assessment in the unconsciousness patient

Guiding principle	Limitations
Self report: requires serial assessments	Delirium, endotracheal level of tubes, decrease consciousness, sedatives
Identify potential causes of pain or discomfort	Practitioner must predict sources of pain (e.g. injuries, invasive procedures, wound care, suctioning, repositioning, immobility)
Observation of patient behavior	Use is not appropriate with paralytic agents or individuals who are paralyzed or have neurologic diseases limiting physical responses
Surrogate reporting of pain	Caregivers/family members assessment of the patient's pain may be inaccurate
Analgesic trial: escalating doses of analgesic medications	Given if pain is suspected, subjective assessment

Source: Herr K, Coyne PJ, Manworren R, *et al.* (2006).

2.6 Pain management among critically ill patients

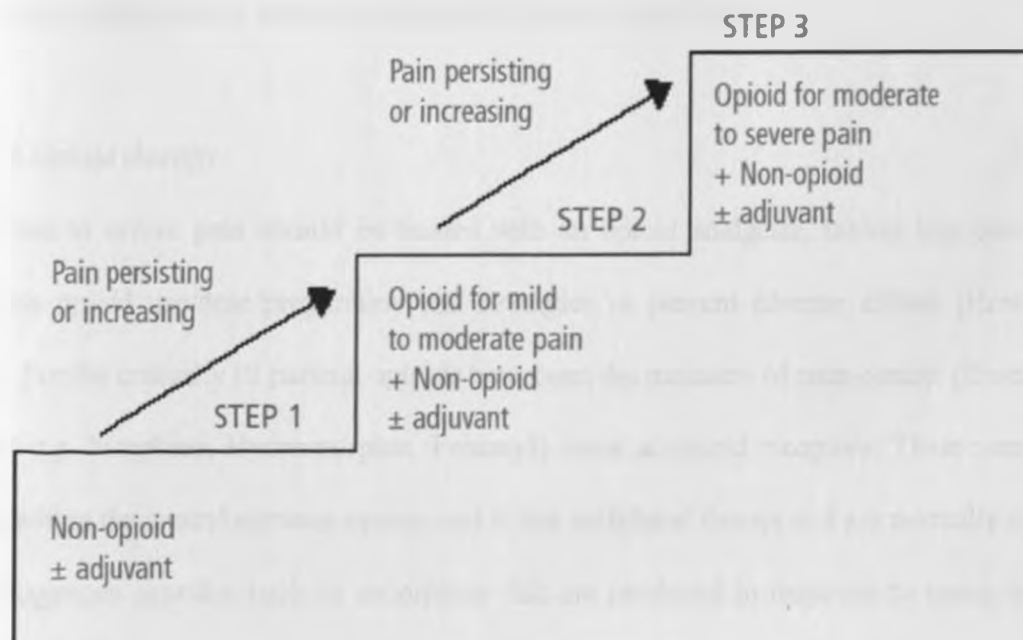
Treatment of pain in the ICU attempts to relieve an aspect of human suffering and to mitigate the untoward physiologic effects that untreated pain brings to patients and to enhance quality of life for the dying patient until death (Mularski, 2004).

Pain management interventions in the CCU should include both pharmacological and non pharmacological pain relief method. A regular schedule of pain relief method is preferred rather than as- needed doses for any patient expected to have pain which gives the patient around the clock reduction of pain (Stanik-Hutt, 2003).

2.6.1 Pharmacological pain relief Methods

According to Howell *et al.* (2007) selection of analgesics is individualized to the person, taking into account type of pain (acute, persistent, nociceptive, neuropathic); intensity of pain; potential for analgesic toxicity (e.g., age, renal impairment, peptic ulcer disease, thrombocytopenia); general condition of the patient; concurrent medical conditions; response to prior or present medications; cost to the individual and family; and the setting of care.

The WHO recommends the use a step-wise approach in making recommendations for the selection of analgesics for pharmacological management to match the intensity of pain unless contraindicated due to age, renal impairment or other issues related to the drug. The WHO analgesic ladder is used to guide the use of pharmacologic analgesia. A multi-modal analgesic approach is considered as the most effective for the treatment of pain and includes the use of adjuvant medications (Howell *et al.*, 2007).



Source: Howell *et al.*, 2007

Figure 2: World Health Organization Analgesic Ladder

2.6.1.1 Non opioid Analgesics:

Mild to moderate pain should be treated with Non opioid and adjuvant analgesics. Non opioid analgesics include acetaminophen, aspirin or NSAIDS (e.g. Ibuprofen, Naprocin, ketorolac) given if the patient has no history of ulcers or a bleeding disorder. Non opioids are medications that break the inflammatory cycle by blocking the enzyme cyclooxygenase required for prostaglandin synthesis hence reverse the inflammatory process that accompany tissue damage that produces pain (Astle, 2009).

2.6.1.2 Adjuvant therapy:

Adjuvant include anticonvulsants such as Gabapentin (Neruentin) and Tegretol that slow nerve transmission and stabilize nerve membranes, while Tricyclic antidepressants interfere with the reuptake of neurotransmitters, Baclofen interferes with transmission of nociceptive impulses and treats pain associated with muscle spasm. Local anesthetics, such as Lidocaine and Bupivacaine, block nerve transmission along the peripheral nerves (Astle, 2009).

2.6.1.3 Opioid therapy:

Moderate to severe pain should be treated with an opioid analgesic, taking into consideration previous opioid use/dose/preparation and strategies to prevent adverse effects (Howell *et al.*, 2007). For the critically ill patient, opioids have been the mainstay of pain control (Erstad, 2009). Opioid e.g. Morphine, Hydromorphan, Fentanyl) work at opioid receptors. These receptors are found within the central nervous system and in the peripheral tissues and are normally stimulated by endogenous peptides such as endorphins that are produced in response to tissue injury and other noxious stimuli. The three major opioid receptors include; Mu, Kappa and Delta.

Most opioids prescribed for clinical analgesia create their effect by stimulating the morphine or Mu (μ) receptors hence inhibit pain transmission (Astle, 2009). Opiates are preferred based on potency, lack of a ceiling effect, and their concomitant mild sedative and anxiolytic properties. However, opiates lack amnesic properties and, for many ICU patients, additional sedative therapy is required. When not limited by potential side effects or patient delirium, adjuvant and non pharmacologic therapies should be considered (Mularski, 2004).

2.6.2 Non pharmacological Pain Relief methods

Non pharmacological pain management is one approach to a comprehensive method of pain relief which should not replace pharmacological methods of pain management but can be used in conjunction with pharmacological pain practices to enhance the patient's relief of pain (Bicek 2004).

Once initial pain is controlled, the use of non-pharmacological pain-relief methods can be considered (Stanik-Hutt, 2003). Non pharmacologic, complementary therapies are low cost, easy to use, safe and, many clinicians can implement them with little difficulty or resources. The gate control theory of pain offers a framework for practicing, testing, and evaluating non pharmacologic interventions for pain, These types of interventions are proposed to either inhibit or modulate the ascending transmission of a noxious stimulus from the periphery or, conversely, to stimulate descending inhibitory control from the brain (Estad *et al.*, 2009).

Non pharmacological pain management therapies can be classified into three categories. The first category includes cognitive or behavioral strategies, e.g. distraction, relaxation, imagery, and

breathing techniques. The second category is physical or cutaneous strategies, e.g. heat/cold, vibration, massage, position changes, acupuncture and Trans-Electrical Nerve Stimulation (TENS). Finally, there are environmental or emotional strategies such as touch, reassurance, or interior decorating of the room (Bicek, 2004).

2.6.2.1 Cognitive Behavioral Strategies:

According to Titler & Rakel (2001), the cognitive behavioral strategies are thought to interfere with the neural perceptions of pain in the brain. They alter the subjective experiences of pain intensity. Distraction is directing attention away from pain by focusing attention and concentration on something else examples of distraction methods include music, humor, and movement. Relaxation relieves pain by reducing muscle tension. Relaxation techniques include relaxation imagery, which involves a person imagining a pleasant or peaceful experience, music, massage and slow breathing. When a person is relaxed the heart rate, blood pressure, and respiration rate decreases.

Deng et al. (2005) noted that music reduces heart rate, blood pressure, body temperature and respiration rate. It distracts the attention of the patient to another point thus reducing pain perception. It also stimulates the release of endorphin and creates a relaxation state.

Dillard & Knapp (2005) noted that other cognitive behavioral techniques used for the conscious patient include Yoga (providing relaxation by using respiration exercises and meditation with slow movements), meditation (focusing on the present), praying, , hypnosis (a state of conscious change similar to sleep which requires the body to relax and the patient to focus on an object, a stimulant or memory).

2.6.2.2 Cutaneous Interventions:

Cutaneous interventions such as heat or cold work according to the gate control theory of pain transmission. Stimulation of the skin activates the large diameter nerve fibers and prevents the short diameter nerve fibers from transmitting pain to the brain (Titler & Rakel, 2001).

According to (Titler & Rakel, 2001) both heat and cold relieve pain by decreasing the sensitivity to pain or decreasing muscle spasms. Vibration causes paresthesia or anesthesia to the area stimulated and changes sharp pain to a dull sensation. The use of heat with vibration is the best cutaneous stimulation method to relieve pain.

Acupuncture is accepted as a scientific treatment method that assists the body to restore its balance by means of stimulating some special points on the body with needles. Mechanism of action can be explained by the Gate Control Theory. According to this theory, effect of a sensory stimulant (for example pain) can be suppressed with another stimulant (picking a needle) within a neural system. Acupuncture is also thought to stimulate the production of endorphin, serotonin and acetylcholine within the central nervous system (Van Tulder et al, 2005).

TENS has been defined by the American Physical Therapy Association as applying electrical stimulation to the skin to manage pain (Sluka & Walsh, 2003). Its mechanism of action is explained by the Gate Control theory, thick and rapid transmitting nerve fibers are stimulated artificially with TENS to stop or reduce the transmission of pain (Sluka & Walsh, 2003).

2.7 *Clinical indicators of pain in critically ill nonverbal patients*

When patients cannot express themselves, observable indicators, both physiological and behavioral, have been labeled as 'pain behaviors' (Herr et al, 2006). Arif-rahul and Grap (2010) notes that one of the most frequently used pain behavior incorporated in a variety of pain scales for the non-communicative patients is facial expression.

Kappesser *et al.* (2006) found that the pain behaviors most frequently reported by nurses in the critically ill abdominal or thoracic surgery patients were grimacing, frowning, wincing, vocalization and restlessness. No movement was also considered by a few nurses as indicating pain and hence influenced their decision in initiating intervention.

The 2004 Thunder Project II, developed by the American Association of Critical-Care Nurses Task Force, identified behaviors displayed during procedures in critically ill adult patients. In this comprehensive examination of procedural pain-related behaviors, patients who reported pain during a procedure (turning, suctioning, wound care, device removal) displayed five behaviors: grimacing, rigidity, wincing, shutting of eyes and verbalization of complaints. In addition, they showed that patient's age and ethnicity or amount of sedation did not contribute to behavioral activity during a procedure. The presumption that sedation would decrease behavioral activity was not supported (Puntillo et al, 2004).

To identify pain behaviors in critically ill intubated patients, Gelinas *et al.* (2004) conducted a retrospective review of 183 pain episodes that occurred in the first 72 hours after the patients were intubated. Pain behaviors such as facial expressions, agitation, movement, compliance with

ventilator, etc. were identified in nurses' notes 73% of the time, whilst physiologic indicators (BP, HR, and arrhythmia) were found only 24% of the time. Facial expressions were identified 6% of the time, whereas, movement occurred 59% of the time. This study led to the development of pain assessment tools in the non-communicative critically ill patients.

In a qualitative study of nursing perspectives, Puntillo *et al.* (2008) confirmed that nurses use physiological signs, behavioral symptoms or a combination of the two to infer the presence or absence of pain. However, the validity of vital signs as an indicator of pain presence has been questioned by Payen *et al.* 2001, Gelinas & Johnston 2007, Arbour & Gelinas 2010.

2.8 Nurses' knowledge and attitude regarding pain management

To manage patients' pain successfully, nurses need to know the physiology of pain, myths and misconceptions about pain, how to assess pain, patients' behaviors when in pain, pharmacological and non-pharmacological pain-management techniques and ethical issues in pain management (Hsiang-Ling and Yun-Fang, 2010).

Hsiang-Ling and Yun-Fang,(2010) found out that inadequate knowledge of CCU nurses regarding pain management was significantly related to their education level and nursing clinical position. Apart from their inadequate knowledge in pain management, nurses also faced other barriers to their practice which included the need for doctors' approval for proper pain prescription and lack of pain-assessment tools and forms appropriate for CCU patients who cannot report their pain.

Shannon & Bucknall (2003) noted that barriers to pain management by CCU nurses have been associated with their poor pain-management knowledge and skills as well as misconceptions about pain. Moreover, ICU nurses have consistently rated their patients' pain lower than patients' self-reported pain.

In a study done by (Erkes *et al.* 2001) only one-third of CCU nurses showed moderate pain knowledge before an educational intervention consisting of a one-hour videotape on pain management and a self-learning module on pain control. Similarly, CCU nurses in Taiwan have been shown to have inadequate pain knowledge as measured by the Nurses' Knowledge and Attitudes Survey-Taiwan version (NKAS-T) (Lai *et al.*, 2003). This was suggested to result from patients' inability to express pain or to nurses' placing a higher priority on saving patients' lives.

The Board of Nursing, Baltimore, (2004) noted that licensed nurses may have incomplete or inaccurate information about pain which contribute to ineffective pain management. The Board also indicated in their nursing guide that adequate measurement and management of pain includes knowledge in pain assessment, pharmacologic and non-pharmacologic intervention, current pain management standards, the difference between tolerance, physical and psychological dependence, withdrawal and pseudo addiction.

2.9 Nurses' perceived barriers/Limitations to pain management

Barriers to pain management as identified by Hsiang-Ling and Yun-Fang, (2010) include nurse related factors for example, the nurse may feel that when the patient is sedated it is not possible to assess pain, a previous history of alcoholism makes it difficult to judge if pain medication is

enough. Nurses worry about the side effects of pain medication for example respiratory depression. Nurses lack pain management knowledge and are unable to accurately assess pain and provide the appropriate intervention.

Hsiang-Ling and Yun-Fang. (2010) also notes that government and hospital policies may be perceived by the nurse a barriers to effective pain management practices. These policies include Lack of forms to fill out the results of pain assessment, requirement of doctor's approval for the nurse to give any form of pain medication, lacks of manpower, lack of proper pain assessment tool to assist the nurse in pain assessment, Lack of well laid out regulations for frequent pain assessments and lack of regulation for timing pain assessments.

Subramanian *et al.* (2011) noted that nurses perceived four main challenges in managing pain namely lack of clinical guidelines, lack of structured pain assessment tool, limited autonomy in decision making which means that the nurse has to rely on the doctor to assess and prescribe pain management intervention. The patient's condition itself is a challenge to the nurse because these patients are critically ill and have limited ability to communicate.

CHAPTER 3: MATERIALS AND METHODS

3.1 Study area

The study was carried out in Kenyatta National Hospital (KNH) critical care unit. KNH was selected on a purposive basis because it is the largest referral hospital in Kenya and receives the highest number of critically ill patients in the country.

KNH has a bed capacity of approximately 2000 patients. It gathers patients within Eastern and Central Africa. For effective and efficient administration, Nursing services in KNH have been categorized into Accident and Emergency, Critical Care Unit, Obstetrics/Gynecology/Radiotherapy, Pediatrics, Operating Room Nursing, Surgery (General and Specialized), Orthopedics, Ear/Nose and Throat, Eye/ophthalmology, Medicine, Private (Amenity) wing, Patient Health Education and Research Unit, Counseling and Continuing Education departments.

The CCU has a bed capacity of 21 with 110 qualified nurses. It receives critically ill patients from the Emergency ward in the hospital's A&E department.

3.2 Study population

The study population consisted of all Nurses deployed at KNH critical care unit at the time of the study.

3.3 Study design

A descriptive cross-sectional survey design was utilized.

3.4 Study sample size

The sample size was obtained using the sample size calculator for prevalence studies formula with finite population correction (Daniel, 1999).

$$n' = \frac{NZ^2 P (1-P)}{d^2 (N-1) + Z^2 P (1-P)}$$

Where:

n' = Sample size with finite population correction,

N = Population size (The estimated population size i.e. the number of CCU nurses as at 16th January 2012 =110)

Z = Z statistics for a level of confidence (The standard normal deviation at the required confidence level = 1.96)

P = Expected prevalence practice. Since P was unknown (no previous studies) 50% was used. Thus $P= 0.5$

d = Level of Precision set at 5%. (Thus $d= 0.05$)

Therefore:

$$n' = \frac{110 \times 1.96^2 \times 0.5 \times 0.5}{(0.05^2 \times 109) + (1.96^2 \times 0.5 \times 0.5)}$$

$n' = 85.687$; Rounded off to **86 Nurses**

3.5 Sampling procedure

Non probability convenient sampling procedure was used. Any nurse available and willing to participate in the study was conveniently picked until a sample size of 86 was achieved. This is because the CCU nurses perform their duties in shifts and not all the nurses were available to participate in the study at the same time.

3.6 Inclusion criteria

The study included:

1. Qualified nurses both enrolled and registered working at the hospital critical care unit at the time of the study.
2. Nurses working either full or part-time.
3. Nurses directly involved in nursing care of the critically ill patients.
4. Nurses willing to participate in the study and sign a written consent.

3.7 Exclusion criteria

The study excluded:

1. Student nurses on their placement at the study area at the time of the study because most of them may not have completed their nursing curriculum.
2. Nurses on maternity, study and annual leave.
3. Nurses who declined to participate in the study or declined to sign a written consent.

3.8 Study Instruments

Data was collected using a modified version of a questionnaire originally developed by Ferrell and McCaffery (1998), entitled, *Nurses' Knowledge and Attitude Survey Regarding Pain*. The questionnaire attached in appendix 2, was modified to meet the objectives of this study and used to collect demographic data, data on nurse's General knowledge on pain management, nurses' attitude towards pain management, perceived factors influencing effective pain management and the clinical indicators commonly used by nurses to identify patients' pain. To maximize on group size, the original five Likert scales used to measure attitude and various clinical indicators of pain were transformed into a three Likert scale.

An Observation checklist attached in appendix 3, was used to assess nurses' actual practice on pain management. The nurses' observed practice was used to match the information collected from the questionnaire on practice, knowledge and attitude. The main areas of observation included history taking, pain assessment, administration of analgesics, documentation and evaluation of response to intervention.

3.9 Research Assistants

The researcher fully participated in data collection and worked closely with two research assistants. The research assistants were selected from the nurses working in the critical care unit. They were trained on how to collect the data using the various data collection instruments and how to check the tool for completeness.

3.10 Pre-testing of Questionnaire

The questionnaire was pre-tested at Kenya Defense Forces Memorial Hospital to ascertain its reliability. Kenya Defense Forces Memorial Hospital was chosen because of its close proximity to KNH. The hospital has an ultra-modern critical care unit with a capacity of seven patients. The nurses working in this hospital have the same basic nursing training as those in KNH. The hospital sponsors its nurses to KNH for critical care training and placement. The nurses are therefore likely to share the same characteristics in management of patients. During questionnaire pre-test, written consent was administered to ten nurses deployed at the critical care unit who were willing to participate. Some questions from the original questionnaire were modified guided by the results of the pretest.

3.11 Data Collection methods

The participants were issued with a self administered questionnaire which they were guided through to answer all the questions. Data on the nurses' practice on pain management was collected using the observation checklist as the nurses performed their routine nursing procedures. The focus of observation was on the manner in which the nurses apply and implement their knowledge and skills on pain management.

3.12 Data analysis

Data was analyzed using the statistical program for social scientists (SPSS) version 17. Data cleaning was done after which actual analysis involved calculation of case prevalence, and associations using logistic regression. Measured variables included identified confounding factors so as to enhance their control by stratification. Level of significance at 0.05 cut off was used in student t-tests and χ^2 test of significance depending on the data type and scale of measurement.

For those variables with nominal or ordinal scale, the chi-square test of significance was applied to ascertain the significance of any findings. The null hypothesis for this test is that there is no difference in the various strata designed to measure practice. For tables with two rows and two columns, Pearson chi-square, the likelihood-ratio chi-square, Fisher's exact test, and Yates' corrected chi-square (continuity correction) was applied depending on the sample size and expected counts. For 2×2 tables, Fisher's exact test was computed when a table that does not result from missing rows or columns or when a larger table has a cell with an expected frequency of less than five. Yates' corrected chi-square was computed for all other 2×2 tables. For tables

with any numbers of rows and columns, it is understood that when both table variables are quantitative, Chi-square yields the linear-by-linear association test.

For variables with continuous data, Student's t-test was used to compare sample means by calculating Student's t and display the two-tailed probability of the difference between the means. Overall measurement of association between the independent variable with key dependent variables was ascertained through logistic regression modeling.

3.13 Ethical Considerations

The proposal to undertake the study was approved by Kenyatta National Hospital/ University of Nairobi Ethics and Research Committee and authority to conduct the research was obtained from the Ministry of Education science and Technology. The purpose of the research was explained both verbally and in written to participants. Participation in the study was voluntary. Informed consent was obtained from each participant willing to participate. Subjects were assured of confidentiality and anonymity was maintained throughout data collection process by ensuring that participants did not write their names on the questionnaire. The researcher intends to present findings to the Ethics committee of KNH, KNH management and Ministry of Education Science and Technology. The researcher declares no conflict of interest.

3.14 Study limitations

Participants who were not willing to provide information or complete the questionnaire were two while two others willingly signed for the questionnaire but did not return them. Four other participants were selected replace the above.

CHAPTER 4: RESULTS

This study was conducted among nurses working in KNH critical care unit. A total of 86 nurses were recruited. The aim of the study is to determine the nurses' practices in pain management among critically ill nonverbal adult patients. The results are as presented in the sections below:-

4.1 Social demographic characteristics

The proportion of female participants (79.1%) was significantly ($p < 0.0001$) higher than that of male participants (20.9%) as shown in figure 3 below: -

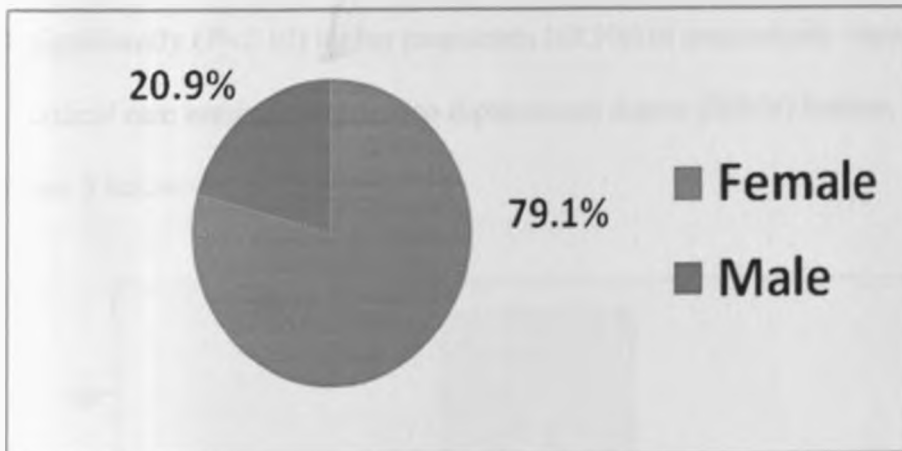


Figure 3: Respondent's gender

Majority (61.6%) of the participants were aged between 30-39 years while only 5.8% were above 50 years of age. The older age groups had significantly ($P < 0.05$) lower proportion of respondents compared to those between 30-39 years old. There was no statistical significant difference ($P = 0.221$) in proportion between those who were between 40-49 years and those who were above 50 years old as shown in figure 4 below: -

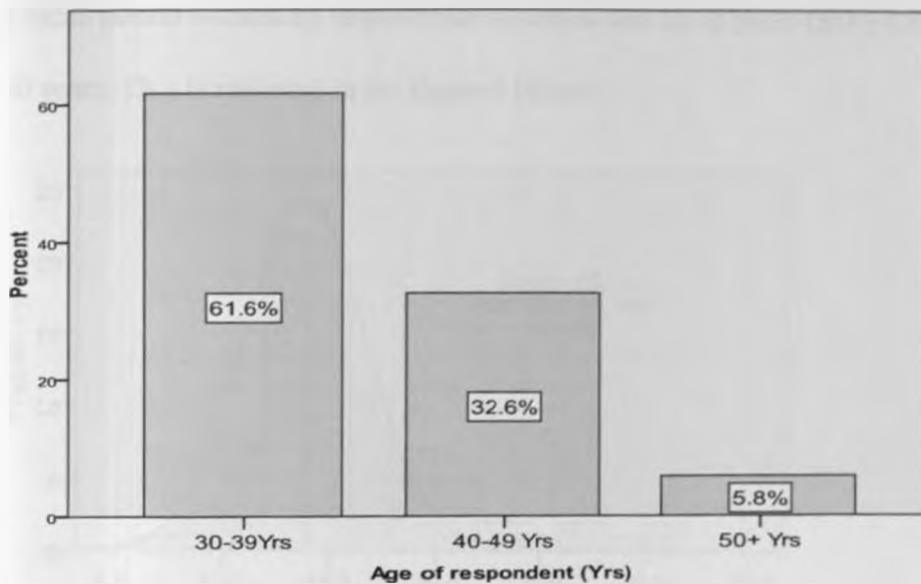


Figure 4: Age of respondent (Years)

A significantly ($P < 0.05$) higher proportion (69.5%) of respondents were higher diploma holders in critical care nursing compared to diploma and degree (BScN) holders. Details are as shown in figure 5 below:-

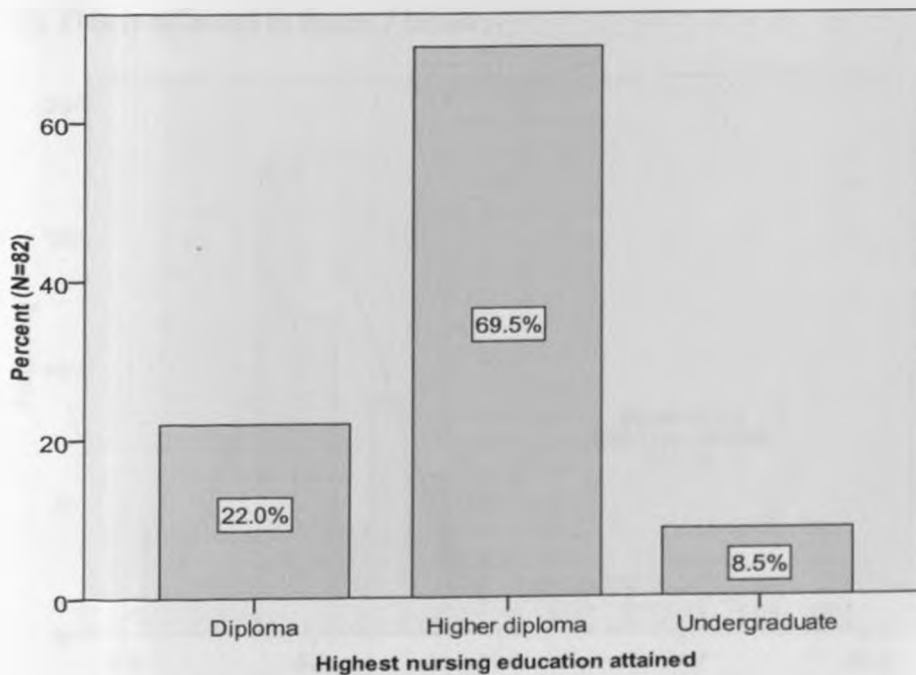


Figure 5: Highest nursing education attained

The mean period worked by respondents as nurses was 15.15 years (SD +4.79) and a range of 7 to 30 years. This is reflected in the figure 6 below: -

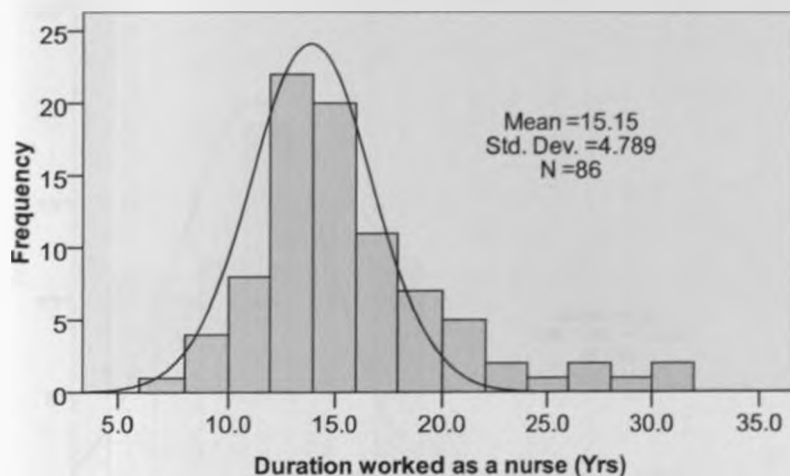


Figure 6: Duration worked as a nurse

The mean duration of respondents after completing critical care training was 6.51 years (SD+ 3.69). This is reflected in figure 7 below: -

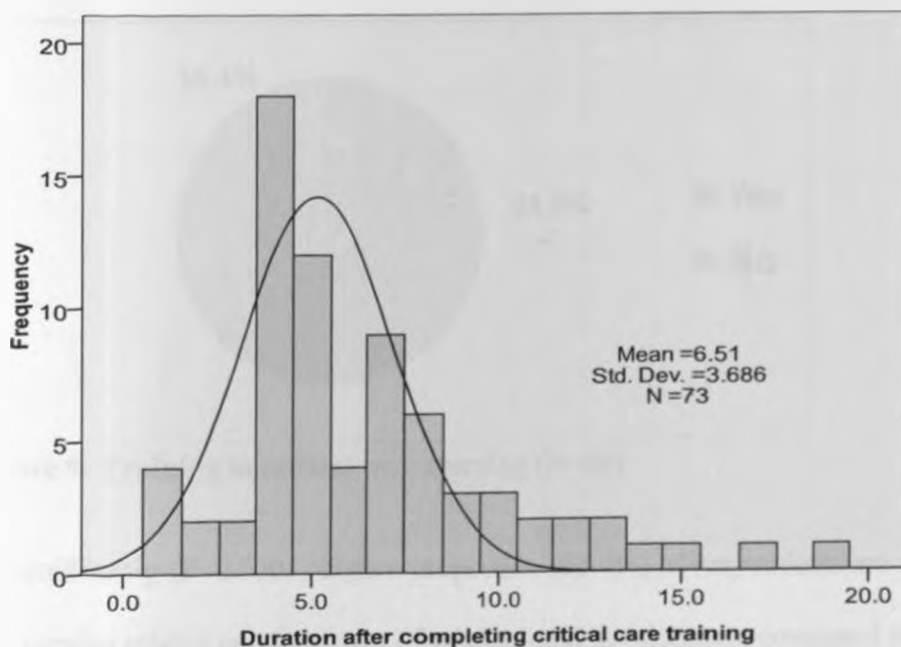


Figure 7: Duration after completing critical care training

The mean duration worked in the critical care unit by respondents was 6.14 years (SD+ 3.77) and a range of 0.5 to 20 years as shown in figure 8 below: -

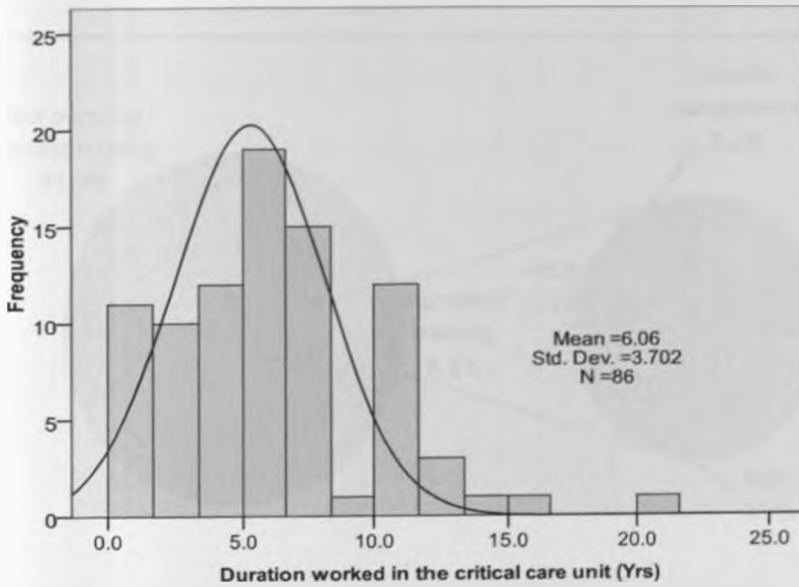


Figure 8: Duration worked in the critical care unit (Years)

A significantly ($P < 0.0001$) higher proportion (84.9%) of respondents are trained in critical care nursing compared to those without training (15.1%) as shown in figure 9 below: -

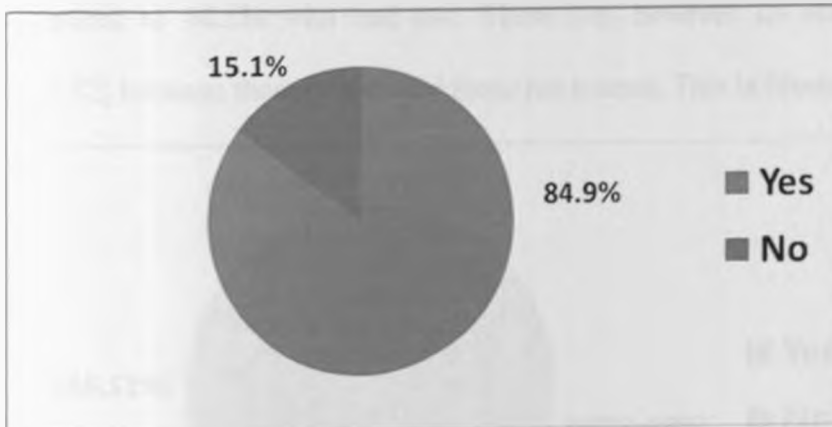


Figure 9: Training in critical care nursing (N=86)

A significantly ($P < 0.0001$) higher proportion (91.9%) of respondents are currently not pursuing any nursing related course as part of professional development compared to a proportion of 8.4%

who are pursuing different courses which include MSc. Nursing, BSc Nursing and Health management Systems. This is illustrated in figure 10 below: -

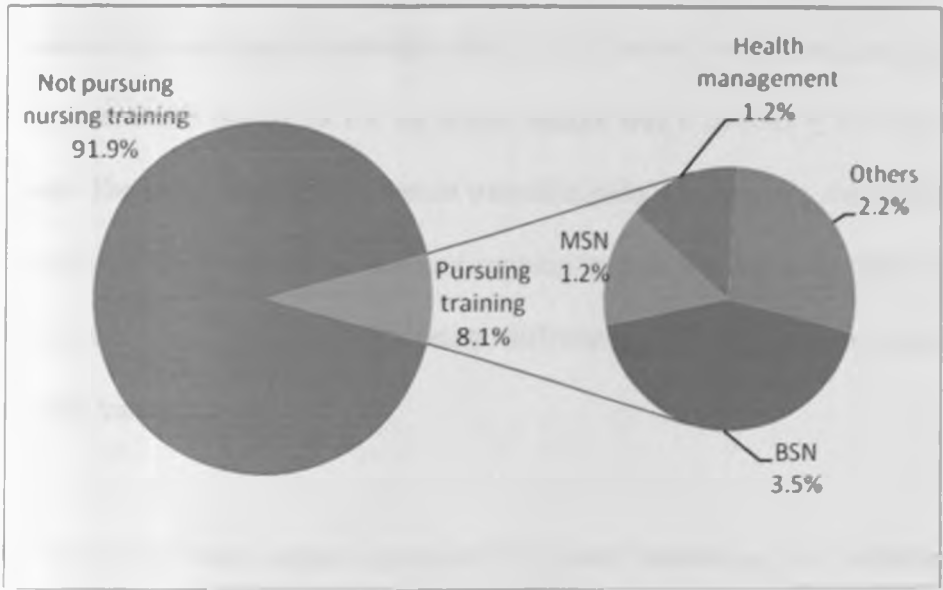


Figure 10: continuous professional development training (N=86)

Majority (53.5%) of respondents had undergone training in pain assessment and management compared to 46.5% who had not. There was however no statistical significant difference (P=0.52) between those trained and those not trained. This is illustrated in figure 11 below: -

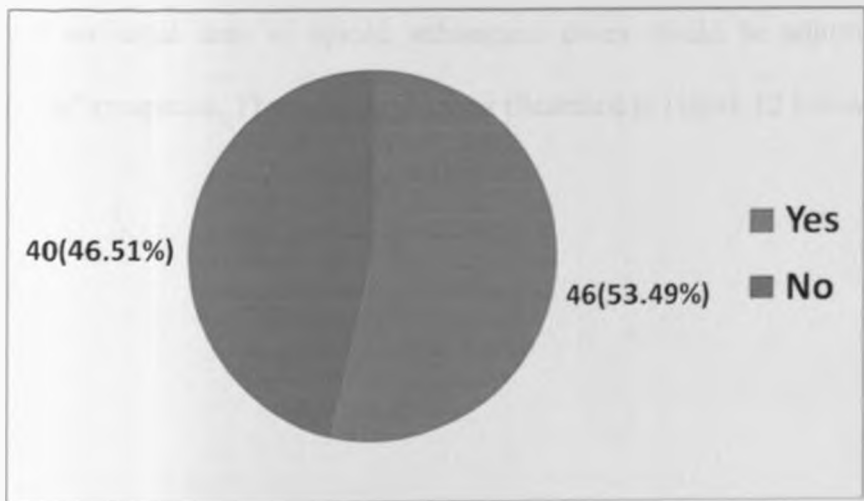


Figure 11: Training on pain management

4.2 Nurses level of knowledge

Based on responses to 18 general knowledge items, a score (range 0 to 18) was used for each nurse. A score of 9 out of 18 was considered as a pass mark. A score of 9 and above was considered as adequate knowledge while a score below 9 was considered inadequate knowledge. The mean score out of 18 for the entire sample was 8.26 (SD \pm 2.23) and a range of 2 to 13 marks. The mean score for all nurses trained in pain management was 8.46 (SD \pm 1.98) while the mean score for those nurses without training in pain management was 8.22(SD \pm 2.28). There was however no statistical significant difference (P=0.720) between those trained and those without training.

The items for which nurses displayed the lowest knowledge level included vital signs always being reliable indicators of intensity of a patients' pain (11.8%) and 650 mg of aspirin as having the same analgesic effects as 50mg of Meperidine (11.9%). The other question that was poorly answered was the duration of action of Meperidine where only 13.4% of the nurses knew that Meperidine does not act in 4-5 hours. Most nurses (85.7%) did not also know that Promethazine (Phenergan) is not a reliable potentiator of opioids. Majority of respondents (97.6%) knew that after an initial dose of opioid, subsequent doses should be adjusted according to individual patient's response, These findings are as illustrated in Figure 12 below:-

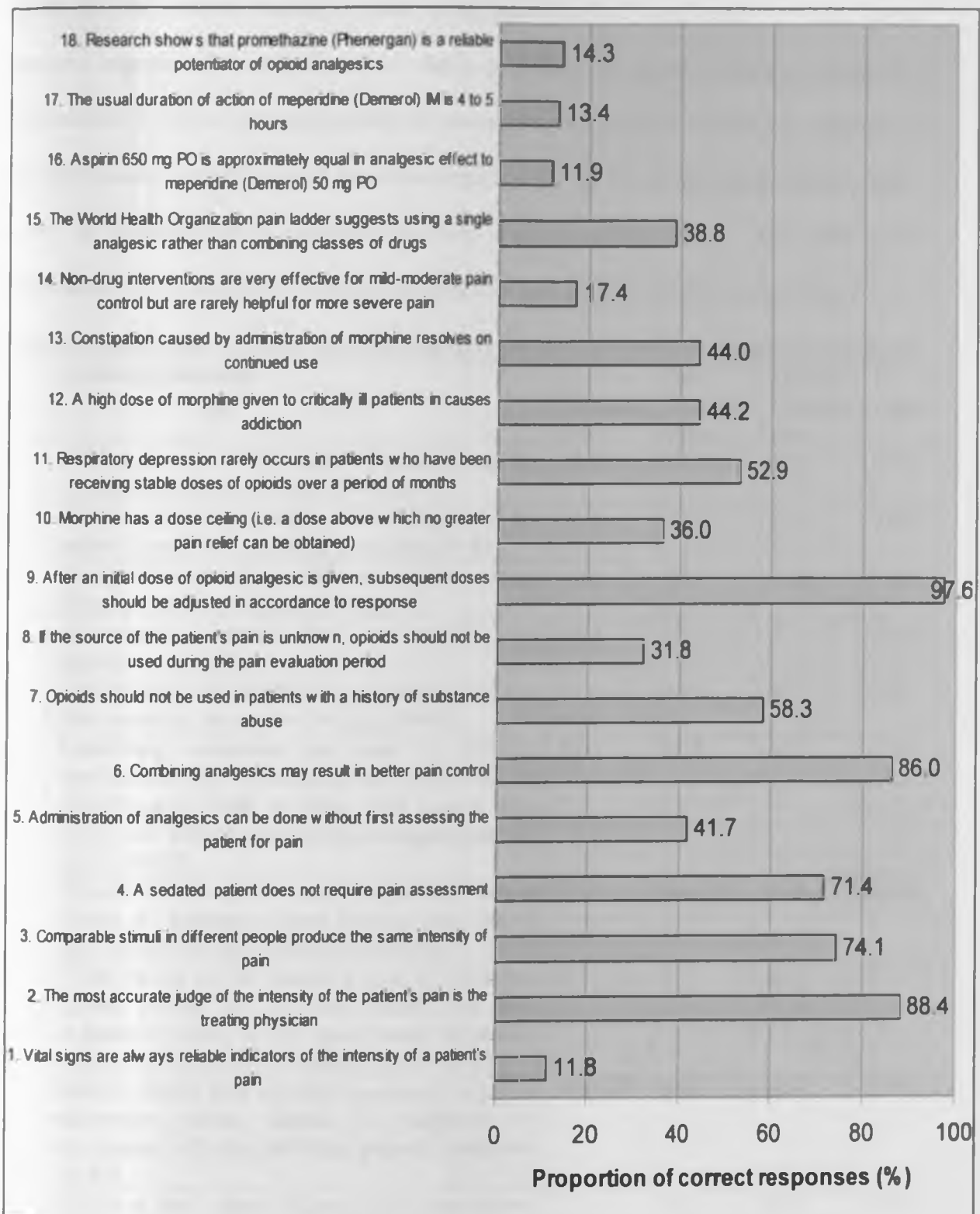


Figure 12: Nurses response to questions on general knowledge on pain assessment and management

Nurses (23.9%) without training in pain management also had significantly ($p < 0.05$) correct responses regarding Promethazine as a reliable potentiator of opioid analgesics compared to those trained (2.8%) in pain management. However, Nurses (72.2%) trained in pain management had significantly ($p < 0.05$) correct responses regarding the use of opioids among patients with a history of substance abuse compared to nurses without training (50%). The other related observations were however not statistically significant and are as detailed in table 4 below: -

Table 4: Knowledge -Correct responses amongst participants trained in pain management

	Guiding Questions	Trained (%)	Not Trained (%)	Overall Correct (%)	P-value
1.	Vital signs are always reliable indicators of the intensity of a patient's pain (N=82)	11.4	12.8	12.2	0.855
2.	The most accurate judge of the intensity of the patient's pain is the treating physician (N=84).	86.5	91.5	89.3	0.462
3.	Comparable stimuli in different people produce the same intensity of pain (N=82)	72.2	76.1	74.4	0.691
4.	A sedated patient does not require pain assessment (N=82)	69.4	73.9	72	0.655
5.	Administration of analgesics can be done without first assessing the patient for pain (N=81)	40.5	43.2	42	0.81
6.	Combining analgesics that work by different mechanisms (e.g. combining an opioid with an NSAID) may result in better pain control with fewer side effects than using a single analgesic agent (N=84)	94.6	80.9	86.9	0.064
7.	Opioids should not be used in patients with a history of substance abuse because they are at high risk for repeated addiction (N=82).	72.2	50	59.8	0.042
8.	If the source of the patient's pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain (N=83).	27	37	32.5	0.337
9	After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response (N=83).	100	97.8	98.8	0.367
10	Morphine has a dose ceiling (i.e. a dose above which no greater pain relief can be obtained) (N=84)	35.1	38.3	36.9	0.766

	Guiding Questions	Trained (%)	Not Trained (%)	Overall Correct (%)	P-value
11	Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months (N=83)	47.2	59.6	54.2	0.263
12	A high dose of morphine given to critically ill patients in causes addiction (N=84).	51.4	40.4	45.2	0.318
13	Constipation caused by administration of morphine resolves on continued use (N=82).	45.7	42.6	43.9	0.775
14	Non-drug interventions (e.g. heat, music, imagery, etc.) are very effective for mild-moderate pain control but are rarely helpful for more severe pain (N=84).	13.5	19.1	16.7	0.491
15	The World Health Organization pain ladder suggests using a single analgesic rather than combining classes of drugs (e.g. combining an opioid with a non steroidal agent) (N=83).	44.4	36.2	39.8	0.445
16	Aspirin 650 mg PO is approximately equal in analgesic effect to Meperidine (Demerol) 50 mg PO (N=82).	5.7	17	12.2	0.122
17	The usual duration of action of Meperidine (Demerol) IM is 4 to 5 hours (N=80).	14.3	13.3	13.8	0.902
18	Research shows that Promethazine (Phenergan) is a reliable potentiator of opioid analgesics (N=82).	2.8	23.9	14.6	0.007

Comparison between respondents' qualification and length of work in the critical care unit with their general knowledge on pain management was done using ANOVA which shows that level of knowledge increased with nursing qualification. Degree nurses had higher mean score (50%) of general knowledge in pain management compared to higher diploma (45.65%) and Diploma (44.4%) nurses. This was however not statistically significant ($F=0.56$; $p=0.57$).

Nurses with 5-9 years of experience in critical care nursing had a higher mean score (47.4%) of general knowledge in pain management compared to nurses with 0-4years and those with more than 10years of experience. However this was not statistically significant ($F_2=0.63$; $p=0.54$). This is as tabulated in table 5 below:-

Table 5: Knowledge –Correct responses amongst various nurse categories

	Mean (%)	SD	ANOVA
Nursing qualification			
Diploma	8.0(44.4)	2.3	F=0.56; P=0.57
Higher diploma	8.2 (45.6)	2.3	
Degree	9.0 (50.0)	1.7	
Experience in Critical Care			
0-4 years	8.18(45.4)	2.21	F = 0.63; p = 0.54
5-9 years	8.54(47.4)	1.98	
10 years and above	7.83(43.5)	2.73	

4.3 Clinical indicators of pain used by nurses in assessment of pain

Restlessness (85.9%) and vocalization (75%) were cited as the most important behavioral indicators that nurses consider influential in their decision to intervene for pain. Tachycardia (79.3%) and changes in vital signs (79.3%) were cited as the most important physiological indicators. However, there was no statistical significant difference in responses amongst nurses with varying duration of work in critical care unit. The resulting frequencies on various indicators are as shown in table 6 below: -

Table 6: Clinical indicators of pain by nurses' duration of work in critical care unit

	Clinical indicators:	No influence (%)	Neutral (%)	Strong influence (%)	P-value
1.	Behavioral indicators:				
	i. Grimacing	22.5%	16.3%	61.3%	0.051
	ii. Restlessness	8.2%	5.9%	85.9%	0.482
	iii. Muscle tone	33.3%	20.2%	46.4%	0.342
	iv. Change of facial expression	22.6%	8.3%	69.0%	0.924
	v. Sleeping	57.6%	24.7%	17.6%	0.800
	vi. Vocalization e.g. moans or cries	21.4%	3.6%	75.0%	0.273
	vii. Increased movement	25.0%	13.1%	61.9%	0.644
	viii. Decreased movement	43.9%	31.7%	24.4%	0.300
	ix. Consolability by touch or talk	37.0%	32.1%	30.9%	0.462
	x. Pulling out Endo-tracheal tube	37.3%	22.9%	39.8%	0.217
	xi. Fighting the ventilator	28.9%	20.5%	50.6%	0.205
2.	Physiological indicators:				
	i. Tachycardia	18.3%	2.4%	79.3%	0.431
	ii. Changes in vital signs	15.9%	4.9%	79.3%	0.763
	iii. Pupil dilatation	43.2%	23.5%	33.3%	0.746
	iv. Arrhythmias	28.0%	13.4%	58.5%	0.269
	v. Diaphoresis	23.5%	7.4%	69.1%	0.458
	vi. Changes in arterial blood gas readings	38.6%	22.9%	38.6%	0.300

Majority (64.9%) of nurses trained in pain management correctly identified physiological indicators in pain assessment compared to nurses (53%) without training. This was however not statistically significant ($p=0.281$).

The ability to correctly identify physiological indicators influencing pain management intervention in critically ill nonverbal patients increased with duration of nursing practice in the critical care unit (experience). Respondents (72.2%) with more than ten years correctly identified the physiological indicators compared to 60% of those with 5-9 years and 48.5% of those with

less than four years of experience in critical care nursing. This was however not statistically significant ($p=0.249$) as shown in table 7 below: -

Table 7: Physiological indicators use in those trained in pain management and by duration of practice in critical care unit

	Physiological indicator		Chi square	P value
	No	Yes		
Attained pain management course				
Yes	13(35.1)	24(64.9)	1.16	0.281
No	22(46.8)	25(53.2)		
Duration of nursing practice in Critical care unit				
0 to 4 years	17(51.5)	16(48.5)	2.78	0.249
5 to 9 years	14(40.0)	21(60.0)		
≥ 10 years	5(27.8)	13(72.2)		

Majority (23.4%) of respondents without training in pain management correctly identified behavioral indicators compared to (8.1%) of those trained in pain management. There was however no statistical significant difference ($p=0.08$) between those trained in pain management and those without training.

The ability to correctly identify behavioral indicators influencing pain management intervention in critically ill nonverbal patients increased with duration of nursing practice in the critical care unit (experience). Only 12.1% of respondents with an experience of less than four years could correctly identify the behavioral indicators while 16.7% of those who had worked in the critical care unit for more than ten years could correctly identify behavioral indicators. However this was not statistically significant ($p=0.70$) as shown in table 8 below: -

Table 8: Behavioral indicators use in those trained in pain management and by duration of practice in critical care unit

	Behavioral indicator		Chi square	P value
	No (%)	Yes (%)		
Attained pain management course				
Yes	34(91.9)	3(8.1)	Fisher's	0.08
No	36(76.6)	11(23.4)		
Duration of nursing practice in Critical care unit				
0 to 4 years	29(87.9)	4(12.1)	Fisher's	0.70
5 to 9 years	28(80.0)	7(20.0)		
≥ 10 years	15(83.3)	3(16.7)		

A comparison made between the influence of clinical indicators to intervene for pain among critically ill nonverbal patients showed that respondents (58.1%) significantly ($p < 0.05$) considered physiological indicators as the most important indicators of pain in deciding when to intervene for pain compared to 16.28% who considered behavioral indicators.

4.4 Practice: Assessment, management and follow up

4.4.1 History taking

From observation majority of respondents (38.4%) obtained history from both the family members and other care givers. A higher proportion (20.9%) of respondents did not obtain history from any of the sources (family members, other care givers and patient's records) compared to 12.8% who obtained history from all the sources. No statistical significant difference ($P = 0.58$) between those who took history from all the sources and those who did not take history from any of the sources as shown in figure 13 below: -

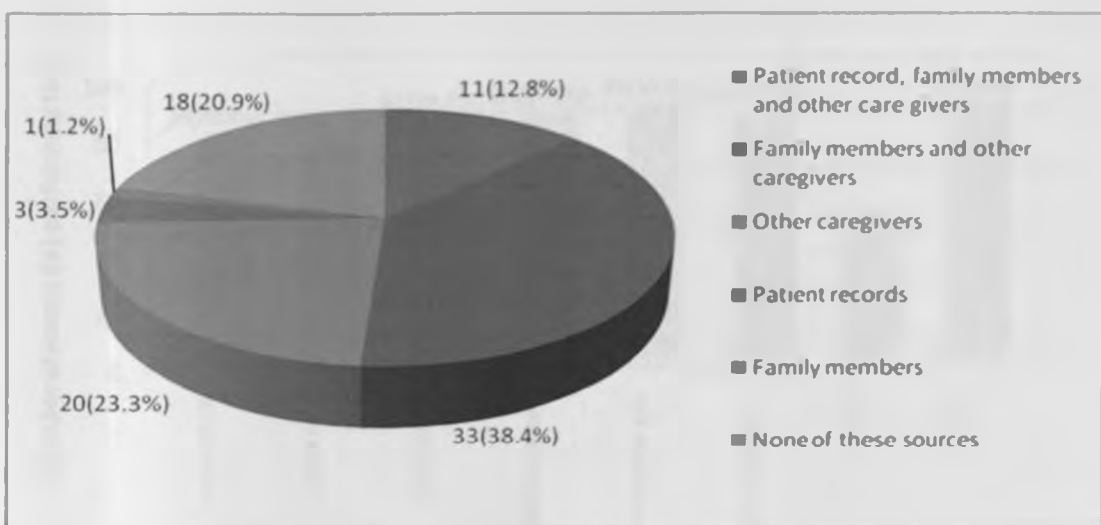


Figure 13: Sources of information on pain in nonverbal patient used by nurses during history taking

4.4.2 Physical Assessment

It was observed that majority of respondents frequently assessed physiological parameters which were well displayed on the monitor or the respirator and documented the hemodynamic checklist provided by the ward administration, but hardly identified those parameters not automatically displayed on the monitor which require manual monitoring e.g. GCS scores. It was noted that physiological indicators observed by the respondents were mainly for the purpose of hemodynamic monitoring but not for pain assessment purposes. 100% of respondents monitored ECG readings effectively while only 47.7% performed the Glasgow coma scale rating. There was however no statistical significance ($P=0.67$) between respondents who performed the GCS rating and those who did not. This is illustrated in figure 14 below: -

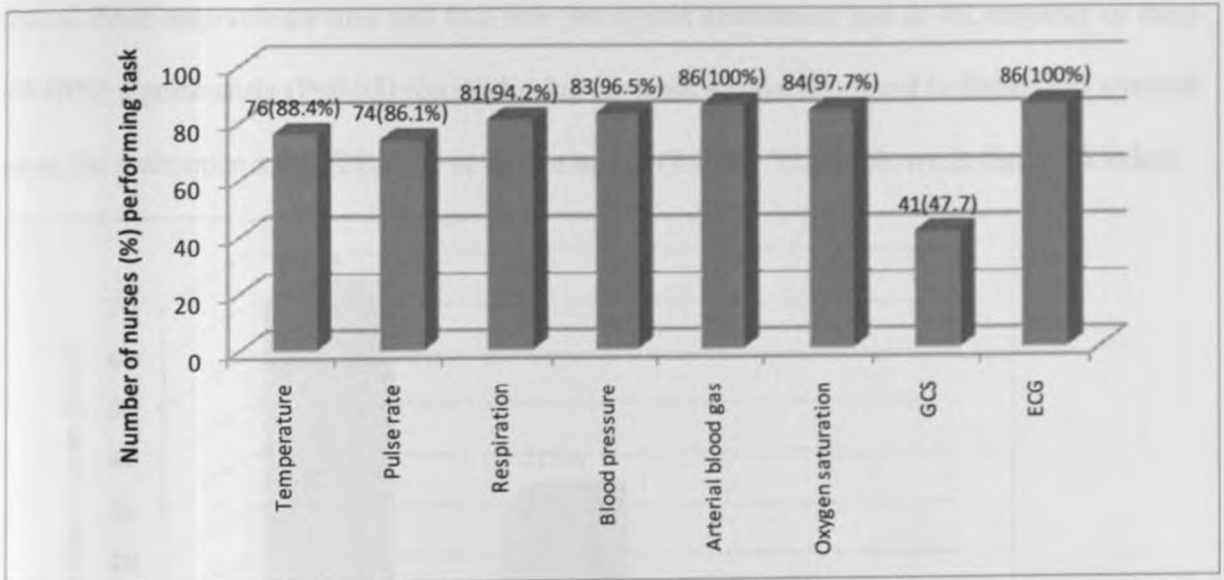


Figure 14: Observation of nurses' physical assessment for pain in nonverbal patients

4.4.3 Pain Assessment

Based on self reported use of pain assessment scale there was no significant difference ($p=0.518$) between the proportion of respondents reporting use (53.5%) and non use (46.5). This is shown in the figure 15 below: -

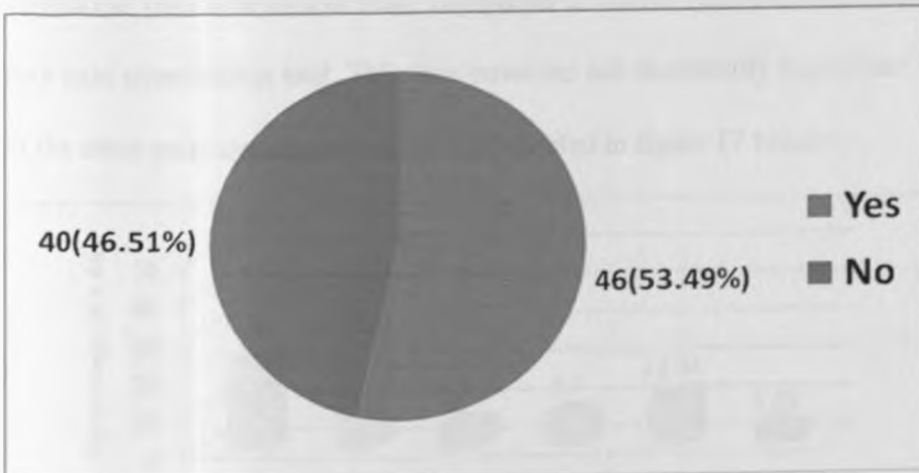


Figure 15: Use of pain assessment scale (N=86)

Out of those respondents who said that they use a pain assessment tool n=46, majority of them (68.09%) significantly ($P<0.05$) reported using the scale always compared to those who reported using the scale once a day (27.66%) or once a month (4.26%). This is shown in figure 16 below:

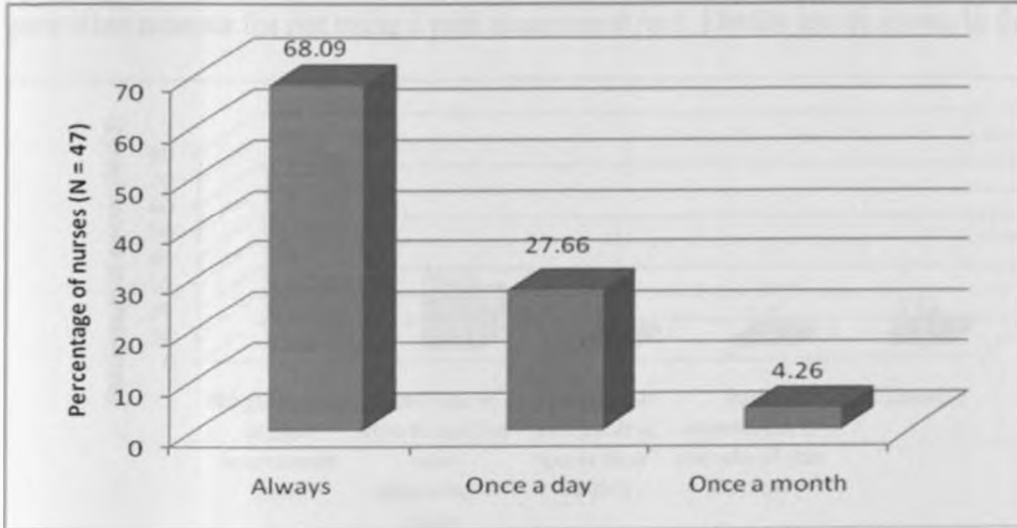


Figure 16: frequency of use of pain assessment scale

Based on self reported practice, majority (43.48%) of the participants reported use of the behavioral pain assessment scale compared to nurses (23.91%) who reported use of the critical care pain observation tool. This was however not statistically significant ($P=0.28$). Reported use of the other pain assessment scales is illustrated in figure 17 below: -

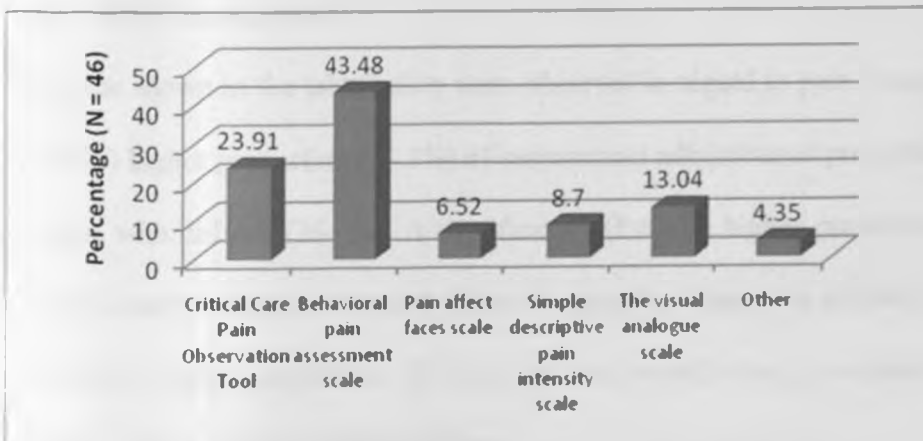


Figure 17: Pain assessment tools used by critical care nurses (self-reported)

Majority (70.27%) of respondents who reported non use of a pain assessment scale, significantly ($P<0.05$) felt that there were no guidelines or pain assessment tools in place in the critical care unit to assist in pain assessment of the critically ill non verbal patients compared to those who gave other reasons for not using a pain assessment tool. Details are as shown in figure 18 below:

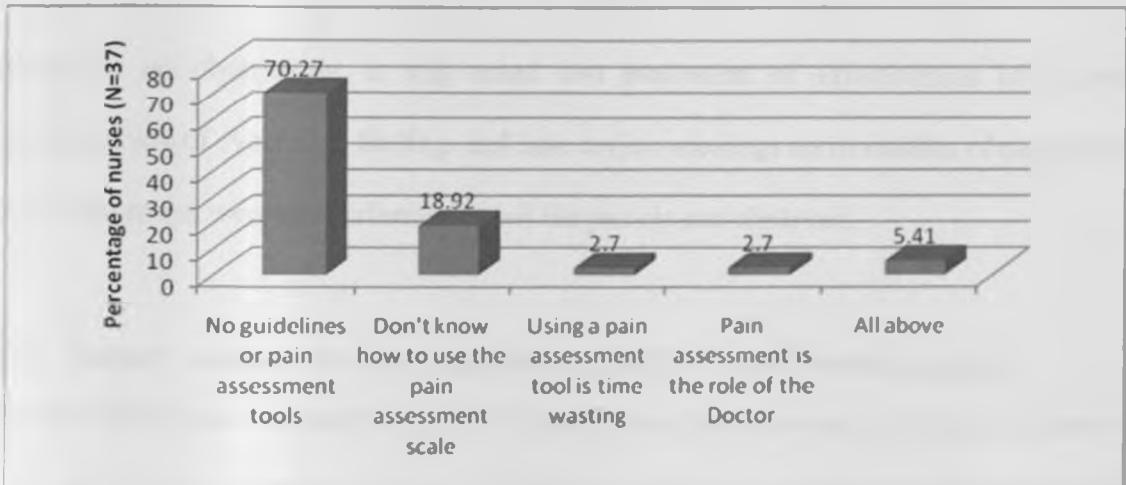


Figure 18: Reason for not using a pain assessment tool

However, it was observed that none of the respondents used a pain assessment tool to assess and rate patients' level of pain. It was evident that respondents did not rate or document patients' level of pain. The unit does not have a tool for assessing and rating patients' level of pain.

4.4.4 Pain management

The areas shown in the table below were observed in regard to pain management. A significantly ($P<0.05$) higher proportion (73.3%) of respondents administered prescribed analgesics compared to those who did not (26.7%). A significantly ($P<0.05$) higher proportion (61.6%) documented the pain intervention given to the patient compared to those who did not (38.4%). A significantly ($P<0.0001$) higher proportion (75.6%) did not provide any non pharmacological pain relief therapy. This is shown in table 9 below: -

Table 9: Pain management skills

Item	Done	Not done	p-value
Administration of analgesics	63(73.3)	23(26.7)	0.0001
Pain relief before a painful procedure	35(40.7)	51(59.3)	0.089
Show collaborative pain skills	51(59.3)	35(40.7)	0.089
Documentation of intervention	53(61.6)	33(38.4)	0.036
Non pharmacological pain relief	21(24.4)	65(75.6)	< 0.0001

Moreover, on observation, it was noted that evaluation of effectiveness of intervention, documentation of evaluation findings and case review meetings on modalities of pain assessment and management were not performed by all the participants observed.

4.5 Nurses' attitude towards pain in critically ill non-verbal patients

A three Likert scale was used to measure attitude. Based on responses to 10 guiding statements, a score of 0-10 was awarded. A score of 50% and above was considered positive attitude while any score below 50% was considered negative attitude.

There were no statistical differences in the responses amongst respondents with varying duration of work in critical care unit. The resulting frequencies on various guiding statements are as shown in table 10 below: -

Table 10: Attitude towards pain management in critically ill non-verbal patients

No	Guiding statement	Agree (n)	Neutral (n)	Disagree (n)	Respondents (N)	Proportions with right attitude
1	Sedated patients do not require pain assessment.	8	1	76	85	89%
2	Patients should be encouraged to endure as much pain as possible before using an opioid.	5	2	77	84	92%
3	Regular pain assessment in the critical care unit is not possible due to the workload.	9	7	69	85	81%
4	Pain assessment for the non verbal patient is a challenge and therefore it is not always possible	20	3	61	84	73%

No	Guiding statement	Agree (n)	Neutral (n)	Disagree (n)	Respondents (N)	Proportions with right attitude
5	Pain assessment for the sedated or intubated non verbal patient is a challenge but is as important as the traditional vital signs (respiration, temperature, pulse rate and blood pressure)	72	3	10	85	85%
6	Pain assessment and management is the role of the doctor and the clinical officer because the nurse has no authority to prescribe analgesics.	3	3	78	84	93%
7	The nurse has a vital role in pain management as he/she spends the most hours with the patient than any other member of the clinical team.	82	1	2	85	96%
8	A family member's report of a patients pain and response to an intervention is very important and should be included as one aspect of pain assessment.	58	11	12	81	72%
9	I prefer the doctors to do pain assessment because they are more knowledgeable on issues of pain management.	6	9	69	84	82%
10	Re-evaluation of the effectiveness of pain management intervention is not always possible.	15	4	65	84	77%
	Mean Attitude Score					84.0%

Participants in this study scored highly on the attitude scale (84%). This showed that nurses had a positive attitude towards pain in critically ill nonverbal patients. However, few respondents (17%) felt that re-evaluation of the effectiveness of pain management intervention is not always possible, and that pain assessment for the non verbal patient is a challenge and therefore it is not always possible (23.8%). 14.8% of the respondents did not consider family members' report of a patient's pain and response to an intervention important and so did not included it as one aspect of pain assessment.

4.6 Other perceived barriers to effective pain management

The top most cited barriers include lack of pain assessment tool to guide in pain assessment (72.6%), lack of well laid out regulations for frequent pain assessments (66.3%) and respondents perception that a previous history of alcoholism in patients makes it difficult to judge if pain medication is enough (57.6%). There were however no statistically significant differences in the responses amongst respondents of varying duration of work in critical care unit, this is as shown in table 11 below: -

Table 11: Perceived barriers to effective pain management in critically ill patients

No	Guiding Questions	Agree (%)	Neutral (%)	Disagree (%)	P-value
1.	Nursing staff are reluctant to administer analgesics	12.9%	7.1%	80.0%	0.814
2.	Nursing staff lack adequate knowledge on pain management principles.	44.7%	7.1%	48.2%	0.202
3.	Lack of adequate knowledge and skills in pain assessment.	42.4%	12.9%	44.7%	0.821
4.	When the patient is sedated or unconscious it is difficult to assess pain	42.4%	11.8%	45.9%	0.639
5.	A previous history of alcoholism makes it difficult to judge if pain medication is enough.	57.6%	10.6%	31.8%	0.158
6.	Giving proper pain prescription needs doctor's approval (The nurse has no authority to administer analgesics).	36.5%	12.9%	50.6%	0.988
7.	The hospital lacks a pain assessment tool to guide in pain assessment.	72.6%	9.5%	17.9%	0.804
8.	The critical care unit lacks manpower	24.7%	17.6%	57.6%	0.186
9.	The hospital lacks well laid out regulations for frequent pain assessments.	66.3%	10.8%	22.9%	0.242
10.	Excessive regulations regarding administration of opioids prevent easy administration.	41.2%	14.1%	44.7%	0.950

4.7 Relationship between nurse's practices with their knowledge, attitudes and other perceived barriers

In this study, it was established that nurse's practices in optimal pain management among critically ill non-verbal patients was mostly influenced by their knowledge whereas their attitudes and other perceived barriers did not have detectable effects. Effective pain management was measured based on the core tenets of nursing care, namely; correct skills, pain assessment, documentation, intervention and re-evaluation. Using the self reported practice, the following variables were selected to reflect on the above mentioned tenets: -

1. Having professional skills to accurately assess pain in a critically ill non verbal patient
2. Considering assessment of pain as important as assessment of the vital signs.
3. Documenting and reporting pain assessment findings for all patients every time assessment is done.
4. Documenting and reporting interventions and patient's response to outcomes of the intervention.
5. Having professional skills to accurately calculate and administer the prescribed dose of opioids.
6. Use of pain assessment tool to assess the critically ill non-verbal patient's pain intensity.

From the self reported practices, a positive response to each of the above items received a correct mark (one score) hence a maximum of 6 marks. A sum score of 1 to 4 was rated as sub-optimal while a sum score of 5 and 6 was rated as optimal/effective pain management. Using binary logistic regression based on optimal and sub-optimal scores (1 and 0 respectively), the resulting associative model is as shown in the tables below: -

Table 12: Classification Table on effective pain management score (self report) (weighted)^a.

	Observed	Predicted			% Correct
		Effective pain management score recorded (self report)			
		Sub optimal	Optimal		
Step 5	Effective pain management score recorded (self report)	Sub optimal	35	7	83.3
		Optimal	18	21	53.8
	Overall Percentage				69.1

a. The cut off value is .500

b. Cox & Snell R Square of 18.1% and Nagelkerke R Square of 24.4%

The table above shows that resulting associative model has a sensitivity of 53.8% (ability to correctly predict optimal care) and a specificity of 83.3% (ability to correctly predict sub-optimal care) with the following variables being the underlying predictors: -

Table 13: Variables in the Equation

Variables in the Equation	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Age			5.468	2	.065			
age(1)	.836	1.493	.314	1	.575	2.307	.124	43.048
age(2)	-.578	1.519	.145	1	.704	.561	.029	11.008
Course Nursing(1)	-1.120	1.089	1.057	1	.304	.326	.039	2.758
Duration worked in critical care unit			5.719	2	.057			
DurationCritc Recoded(1)	-1.883	1.074	3.071	1	.080	.152	.019	1.250
DurationCritc Recoded(2)	-2.910	1.221	5.685	1	.017	.054	.005	.596
Duration after critical care training			6.544	2	.038			
DurationAfterCritcTrainRecoded(1)	-.792	.714	1.230	1	.267	.453	.112	1.836
DurationAfterCritcTrainRecoded(2)	1.424	.874	2.652	1	.103	4.152	.749	23.033
Constant	1.685	1.736	.942	1	.332	5.392		

5. Variable(s) entered on step 1: age, Nursingeduc, TrainedCritc, CourseNursing, PainMgtCourse, DurationNurseRecoded, DurationCritcRecoded, DurationAfterCritcTrainRecoded

From the resulting associative model presented in the table above, it is indicative that with a constant to control for other possible determinants of effective pain management in critically ill non-verbal patients that may not have been evaluated, respondent's age ($P=0.065$), duration worked in critical care unit ($P=0.057$) and duration after critical care training ($p=0.038$) were key determinants of effective pain management. In addition, nursing highest level of education was a necessary factor that though not significant on its own ($P=0.304$), it was a key determinant of the above three variables influencing effective pain management.

CHAPTER 5: DISCUSSIONS

Research conducted on pain management in critically ill non-verbal patients shows that pain persistently remains a major problem among patients in the critical care unit and hence pain management remains a top priority amongst nurses (Watt-Watson et al. 2001). However, the challenge for critical care nurses is provision of effective pain relief, at the same time monitoring and preventing life threatening situations among critically ill patients. This study was therefore carried out to determine practices of nurses working in the critical care unit in pain management among critically ill nonverbal patients.

5.1 Pain indicators and their influence on decision to intervention

From this study, it was established that restlessness, vocalization namely; moaning, crying and facial expression were the main behavioral indicators that nurses cited as influencing their decision to intervene for pain in critically ill non verbal patients. On the other hand, sleeping and decreased movement were found to have the least influence when deciding to intervene for pain.

These findings are consistent with those of Kappesser *et al* (2006), who found that the pain behaviors most frequently reported by nurses in the critically ill abdominal or thoracic surgery patients were grimacing, frowning, wincing, vocalization and restlessness. Arif-rahul and Grap (2010) noted that one of the most frequently used pain behavior incorporated in a variety of pain scales for the non-communicative patients is facial expression. Kappesser *et al* (2006) noted that no movement was considered by a few nurses as indicating pain and hence influenced their decision in initiating intervention.

Tachycardia, changes in vital signs and diaphoresis were the physiological indicators most considered influential by the nurses in their decision to intervene for pain. A comparison made between the influence of physiological and behavioral indicators in pain management showed that nurses significantly considered physiological indicators as influential in deciding when to intervene for pain compared to behavioral indicators. This shows that nurses in this study considered physiological indicators as being more important compared to the behavioral indicators. This is inconsistent with the findings of Gelinas *et al.* (2004) who conducted a retrospective review of 183 pain episodes that occurred in the first 72 hours after the patients were intubated; where it was noted that behavioral indicators (e.g. facial expressions, agitation, movement, compliance with ventilator, etc) were identified in nurses' notes 73% of the time, whilst physiologic indicators (BP, HR, arrhythmia) were found only 24% of the time. However the validity of vital signs as an indicator of pain presence has been questioned by Payen *et al* (2001), Gelinas & Johnston (2007) and Arbour & Gelinas (2010).

This study also showed that a higher proportion of those with longer working years in the critical care unit (≥ 10 years) correctly identified the physiological indicators compared to those who had less working experience (< 4 years). In addition, a higher proportion of those who had worked for more than 10 years correctly identified the behavioral indicators as compared to only those who had less than 4 years of experience. Thus the ability to identify the most important pain indicators increased with experience in the critical care unit. These findings are consistent with the findings of Louise *et al.* (2011) who found out that experienced nurses were more confident in their ability to assess pain for patients unable to self-report.

5.2 *Nurses knowledge and attitude on assessment and management of pain in critically ill nonverbal patients*

Overall, respondents' mean score for the entire knowledge scale was less than 50% indicating poor knowledge of pain management. This is in line with previous research studies done showing that participants have poor knowledge in pain assessment and management. In a study done by Hsiang-Ling and Yun-Fang Tsai (2010), the overall average correct response rate for the knowledge scale was 53.4%, indicating poor knowledge of pain management. There was however no statistical difference between those trained in pain management and those not trained which differs from the findings of Erkes *et al* (2001) who noted that after an educational program on pain management, participants' knowledge mean score improved significantly indicating that knowledge on pain assessment and management should improve on training. This could be because nurses in this study may have received inadequate training on pain management. In addition, the methodology used in this study differed from that of Erkes *et al* (2001) who did a pre training assessment followed by a post training assessment of nurses' level of knowledge.

The use of analgesics was poorly understood e.g. only a few participants knew that Aspirin 650mg given orally is approximately equal in analgesic effect to Meperidine 50mg given orally. A significantly small proportion knew that Promethazine (Demoral) is not a potentiator of opioid analgesics, a small proportion was also aware of the usual duration of Meperidine given intramuscularly. These findings are consistent with the findings of Erkes *et al* (2001) who found out that most nurses did not know that aspirin 650 mg given orally is approximately equal in analgesic effect to Demerol 50 mg given orally, that Phenergan is not a reliable potentiator of

opioid analgesics and only a few nurses were aware of the usual duration of Meperidine given intramuscularly. This shows that critical care nurses need training on use of analgesics.

5.3 Nurses' practice in assessment and management of pain in critically ill nonverbal patients

Although a higher proportion of nurses reported use of the behavioral pain assessment scale to rate patients' level of pain, on observed practice none of the nurses was using any pain assessment tool. The critical care unit did not have a standardized tool to assist the nurses in rating patient's pain intensity. Physiological pain indicators were charted from the cardiac monitor and documented by all the nurses observed, but this was clearly not for the purpose of pain monitoring but for hemodynamic monitoring. Behavioral pain indicators were not documented by all the nurses observed and none of the nurses observed documented pain assessment findings.

Pain assessment was not given priority though a significantly higher proportion of the nurses agreed that pain monitoring is as important as monitoring of the traditional vital signs and that the nurse plays a vital role in pain monitoring. This goes against the appeal made by The American Pain Society (1999) that made pain the "fifth vital sign" as a strategy to increase pain assessment and treatment. Pain assessment has been shown to reduce the duration of mechanical ventilation and ICU stay (Payen et al. 2009).

In this study majority of the nurses did not provide any pain relief before performing nursing procedures that are known to cause pain neither was there documentation done on assessment or administration of pain relief before performing procedures that are known to cause pain. This is consistent with the study done by Payen *et al.* (2007) who noted that pain assessment during known painful procedures was documented infrequently for mechanically ventilated critically ill adults.

A significantly small proportion of the participants in this study used non pharmacological pain relief measures which included reassuring the patient, and positioning than those who did. This does not supplements previous findings that non pharmacological, complementary therapies are low cost, easy to use, safe and, many clinicians can implement them with little difficulty or resources (Estad *et al.*, 2009).

Observed practice showed that majority of the nurses administered analgesics in a regular pain relief schedule as prescribed, this is consistent with the findings of Stanik-Hutt, (2003) that a regular schedule of pain relief method is preferred rather than as-needed doses for any patient expected to have pain which gives the patient around the clock reduction of pain. However, it was observed that the nurses only relied on the doctors' prescription in administration of analgesics but did not give relief depending on their own judgment of the patient's pain level. As observed, those patients without prescription of analgesics were not given regardless of whether the patient was perceived to be in pain or not. This is explained by the fact that some of the nurses felt that giving proper pain prescription needed the doctor's approval since the nurse has no authority to prescribe analgesics. In addition, there is no follow up of pain intervention

measures and documentation. Throughout the data collection period, no case review meetings on modalities of pain management were done.

5.4 Other perceived barriers to pain management in critically ill non verbal patients

The frequently cited barriers include lack of pain assessment tool to guide in pain assessment, lack of well laid out regulations for frequent pain assessments and nurses perception that a previous history of alcoholism in patients makes it difficult to judge if pain medication is enough. A few other nurses felt that nursing staff lack adequate knowledge on pain management principles and sedated patients and those with a low level of consciousness are difficult to assess for level of pain. These findings are consistent with those of Subramanian *et al* (2011) whose framework analysis showed that nurses perceived four main challenges in managing pain namely lack of clinical guidelines, lack of structured pain assessment tool, limited autonomy in decision making and the patient's condition itself.

Subramanian *et al* (2011) also found out that without proper pain assessment tool, nurses will face difficulty in assessing pain. In a study done by (Erstad *et al*. 2009), it was established that effective pain management depends on using an established pain assessment methods for ICU patients, most of whom will probably experience pain during their ICU stay.

5.5 Relationship between nursing practices in pain management and their knowledge attitude and other perceived barriers

The binary logistic regression analysis done showed that effective pain management in critically ill non-verbal patients significantly depended on the nurse's age, duration worked in critical care unit and duration after critical care training. However previous researches show that nurses' knowledge, attitude institutional and individual barriers influence the nurse's practices in pain management. This difference in findings may have been because the regression analysis done in this study considered variables from self reported practice and not observed practice. Observed practice showed that there was no pain assessment tool in use in the critical care unit, therefore assessment, rating and documentation of patient's level of pain was not performed by all observed participants. Subsequently, there was no evaluation done owing to lack of a pain scale. This goes against the WHO recommendations on best practice in pain management which stipulates that for the non-verbal patient, the facility should utilize an appropriate pain rating scale to identify and monitor the level of pain and/or the effectiveness of treatment modalities until the patient achieves consistent pain relief (health care association of New Jersey, 2006). Nurses in this study also showed poor knowledge level in general pain assessment and management. This also could have significantly affected their practice.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

This research found out that nurses in CCU had sub optimal practice in pain assessment and management. CCU nurses felt that the major reason for their suboptimal practice was the fact that the unit lacked pain assessment tools and forms appropriate for assessment of pain among critically ill nonverbal patients and there were no standard guidelines and schedules for regular pain assessment and subsequent management and evaluation of effectiveness of intervention. The research also found out that nurses in CCU had inadequate knowledge on pain assessment and management.

There were especially poor scores in questions related to analgesic use. This also could have significantly contributed to their poor pain assessment, management and evaluation practices. The nurses also relied heavily on the doctor for appropriate analgesics prescription. The nurses also felt that sedated or unconscious patients are difficult to assess for pain and patient's previous history of alcoholic use also contributed to the nurses' inability to accurately assess pain in such patients. The unit did not hold regular review meeting to discuss modalities of pain management hence pain assessment and management was not accorded the importance it deserves in critically ill nonverbal patients.

The nurses reported practice did not match the observed practice. Nurses reported use of pain assessment tools while none was in existence in the unit. Nurses did not pay attention to the patients' behavioral cues to pain while the physiological indicators were documented for hemodynamic monitoring but not for the purpose of pain monitoring.

The researcher therefore recommends that the critical care unit administration should design a standard pain assessment tool for use in the unit with well laid out guidelines on the use of the tool. This should be included in the standard operating procedure manuals that guide the nurses' practice in the critical care unit. The nurses should be trained on how to use the tool.

The nurses also need courses on pain assessment and management to improve their knowledge on the same. Regular pain management talks, seminars and CMEs should be scheduled in the unit to update the nurses on current pain management practices so as to keep abreast with the dynamic medical practices. The unit in charge should organize regular pain review meetings and provide forums for discussion on modalities of pain management practices for critically ill nonverbal patients. These forums should also include other care givers working in the critical care unit in order to harmonize the pain management practices that are best suited for the patients in CCU.

There is also need for policy change to enable critical care trained nurses prescribe analgesics based on assessment and clinical judgment without waiting for the doctor to prescribe. Nurses are also encouraged to participate in researches on pain management in order to provide evidence based patient care.

The researcher also recommends more research on the effectiveness of the pain management modalities that are currently being practiced in the critical care unit so as to enhance better pain control strategies in the critically ill non verbal patients.

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APPENDICES

Appendix 1: Informed Consent

Consent Explanation

I am Hellen *Wachera Kamotho*, a second year postgraduate student at the University of Nairobi, College of Health Sciences pursuing a Masters degree in Critical Care Nursing.

Dear participant

I intend to carry out a study on "*Practices of nurses in management of pain among critically ill non-verbal adult patients in the Critical Care Unit*" as part of my course requirement. The study seeks to evaluate nurses' skills, knowledge, attitude and other perceived barriers to pain management among critically ill nonverbal patients admitted at the critical care unit in Kenyatta National Hospital. The study has no material or monetary benefits.

Your participation is on voluntary basis and will not result in any physical or psychological harm. You will have the right to withdraw at any time without any penalty. You will be required to fill a questionnaire which will take about 30 minutes which you will be guided through. You are free to ask any questions about the study any time. Study findings will be used to develop strategies on how to improve assessment and management of pain in the critically ill nonverbal patient and improve quality of care.

The information you provide will be kept confidential and anonymous, and on that note, you will not write any of your personal particulars. Your participation will be highly appreciated

In case of any questions or clarifications feel free to contact the principal investigator on mobile number 0722-451806 or contact the Secretary to the KNH/UON- ERC at 2726300 Ext 44102.

Thank you

Hellen W Kamotho (Principal investigator)

I have read the consent explanation and understood its content. I have been given opportunity to discuss all my concerns with the investigator. I do therefore agree voluntarily to participate in the study on "*Practices of nurses in management of pain among critically ill non-verbal adult patients in the critical care unit*"

Signature of participant _____ Date _____

Signature of researcher _____ Date _____

Appendix 2: Questionnaire

Study on 'Practices of nurses in management of pain among critically ill non verbal adult patients in the critical care unit.

Date _____

Code: _____

Directions:

- Before filling in this questionnaire, ensure you have read, understood and signed the attached consent form.
- Do not write your name in any of the pages of this questionnaire.
- Read carefully the instructions at the beginning of each section of the questionnaire before answering the questions in that section.
- Answer all the questions in each section if possible.

SECTION A: Social and Demographic Data

In this section, you are requested to fill in information about some of your demographic data. Please tick the appropriate box or fill in the dashes where applicable.

1. Gender: Female 1. Male 2.

2. What is your age?

1. 20-29 yrs.

2. 30-39yrs

3. 40-49yrs

4. 50 > Yrs

3. Highest nursing education attained:

1. Certificate

2. Diploma

3. Higher diploma

4. Under graduate

5. Masters

6. Post-Masters

4. Which year did you first qualify as a nurse? _____

5. How long have you worked as a nurse? _____ years

6. How long have you worked in the critical care unit?

_____ years.

7. Have you trained as a critical care nurse?

1. Yes

2. No

8. If yes (in 7 above) please indicate the year you completed your critical care training.

Year _____

9. Is there any course you are currently pursuing related to your nursing field?

1. Yes

2. No

10. If yes (in 9 above) which course? _____

11. Have you had any training on pain management since you first qualified as a nurse?

1. Yes

2. No

12. If yes in 11 above, indicate what type of pain management training you

underwent _____

13. If yes (in 11 above) indicate how long the training took _____

SECTION B: General Knowledge on pain management

Direction: Indicate whether the following statements are **True**, **False** or you are **Not Sure** regarding pain assessment and management for the critically ill non-verbal patient. Tick the correct response in the space provided.

	Question Statement	True	False	Not Sure
1.	Vital signs are always reliable indicators of the intensity of a patient's pain.			
2.	The most accurate judge of the intensity of the patient's pain is the treating physician.			
3.	Comparable stimuli in different people produce the same intensity of pain.			
4.	A sedated patient does not require pain assessment			
5.	Administration of analgesics can be done without first assessing the patient for pain			
6.	Combining analgesics that work by different mechanisms (e.g. combining an opioid with an NSAID) may result in better pain control with fewer side effects than using a single analgesic agent.			
7.	Opioids should not be used in patients with a history of substance abuse because they are at high risk for repeated addiction.			
8.	If the source of the patient's pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain.			
9.	After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response.			
10.	Morphine has a dose ceiling (i.e. a dose above which no greater pain relief can be obtained).			
11.	Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months.			
12.	A high dose of morphine given to critically ill patients in causes addiction.			
13.	Constipation caused by administration of morphine resolves on continued use.			
14.	Non-drug interventions (e.g. heat, music, imagery, etc.) are very effective for mild-moderate pain control but are rarely helpful for more severe pain.			
15.	The World Health Organization pain ladder suggests using a single analgesic rather than combining classes of drugs (e.g. combining an opioid with a non steroidal agent).			
16.	Aspirin 650 mg PO is approximately equal in analgesic effect to meperidine (Demerol) 50 mg PO.			
17.	The usual duration of action of Meperidine (Demerol) IM is 4 to 5 hours.			
18.	Research shows that Promethazine (Phenergan) is a reliable potentiator of opioid analgesics.			

SECTION C: Nursing Practice Self Report

Instruction: Indicate by ticking the correct box either Yes or No.

	Nurses Practice	YES	NO
1.	I have professional skills to accurately assess pain in a critically ill non verbal patient		
2.	I always consider assessment of pain as important as assessment of the vital signs.		
3.	I need more training pertaining to the management of pain.		
4.	I always document and report pain assessment findings for all my patients every time I assess the patient.		
5.	I always document and report interventions and patient's response to outcomes to the intervention.		
6.	I have professional skills to accurately calculate and administer the prescribed dose of opioids.		
7.	I consider administering opioids PRN rather than frequently to prevent respiratory depression		
8.	The WHO pain ladder is not necessary in management of pain in critically ill non verbal patients		
9.	There is need for assessment of patients on morphine for constipation.		
10.	I use a pain assessment scale to assessment the critically ill non-verbal patient's pain intensity.		
	In Question 11-13, tick the appropriate response provided.		
11.	If Yes in 10 above how often do you use an assessment tool. i) Always. ii) Once a day iii) Once a week iv) Once a month		
12.	If Yes in 10 above, which of the following pain assessment tools do you use to rate the patient's pain intensity? i) Critical Care Pain Observation Tool ii) Behavioral pain assessment scale iii) Pain affect faces scale iv) The simple descriptive pain intensity scale v) The visual analogue scale vi) Other. Indicate-----		
13.	If No in 10 above, tick the appropriate reason for not using a pain assessment tool: i) There are no guidelines or pain assessment tools in place at the critical care unit to assist me in assessment of pain in the nonverbal patient? ii) I do not know how to use the pain assessment tools for the critically ill nonverbal patient. iii) Using a pain assessment tool is time wasting. iv) Pain assessment is the role of the Doctor or the clinical officer.		

SECTION D: Attitude towards pain assessment and management in critically ill nonverbal patient

Indicate to what extent you personally agree or disagree with the following questions/ statements using the five point Likert scale

1. Strongly agree (SA)
2. Agree (A)
3. Neither agree or disagree i.e. Neutral (N)
4. Disagree (D)
5. Strongly disagree (SD)

No	Question statement	SA (1)	A (2)	N (3)	D (4)	SD (5)
1	Sedated patients do not require pain assessment.					
2	Patients should be encouraged to endure as much pain as possible before using an opioid.					
3	Regular pain assessment in the critical care unit is not possible due to the workload.					
4	Pain assessment for the non verbal patient is a challenge and therefore it is not always possible					
5	Pain assessment for the sedated or intubated non verbal patient is a challenge but is as important as the traditional vital signs(respiration, temperature, pulse rate and blood pressure)					
6	Pain assessment and management is the role of the doctor and the clinical officer because the nurse has no authority to prescribe analgesics.					
7	The nurse has a vital role in pain management as he/she spends the most hours with the patient than any other member of the clinical team.					
8	A family member's report of a patients pain and response to an intervention is very important and should be included as one aspect of pain assessment.					
9	I prefer the doctors to do pain assessment because they are more knowledgeable on issues of pain management.					
10	Re-evaluation of the effectiveness of pain management intervention is not always possible.					

SECTION E: Clinical indicators of pain in critically ill non verbal patients

In the table below please indicate to what extent the following patient responses influence your decision to initiate interventions for pain relief by ticking the appropriate box.

	Clinical indicators:	No influence	moderate influence	Neutral	Strong influence	Very strong influence
1.	Behavioral indicators:					
	xii. Grimacing					
	xiii. Restlessness					
	xiv. Muscle tone					
	xv. Change of facial expression					
	xvi. Sleeping					
	xvii. Vocalization e.g. moans or cries					
	xviii. Increased movement					
	xix. Decreased movement					
	xx. Consolability by touch or talk					
	xxi. Pulling out Endo-tracheal tube					
	xxii. Fighting the ventilator					
2.	Physiological indicators:					
	vii. Tachycardia					
	viii. Changes in vital signs					
	ix. Pupil dilatation					
	x. Arrhythmias					
	xi. Diaphoresis					
	xii. Changes in arterial blood gas readings					

SECTION F: Perceived factors to effective pain management

Indicate to what extent you personally agree or disagree that the following factors are barriers to effective management of pain in critically ill non-verbal patients using the five point likert scale

1. Strongly agree (SA)
2. Agree (A)
3. Neither agree or disagree i.e. Neutral (N)
4. Disagree (D)
5. Strongly disagree (SD)

No	Question statement	SA (1)	A (2)	N (3)	D (4)	SD (5)
1	Nursing staff are reluctant to administer analgesics					
2	Nursing staff lack adequate knowledge on pain management principles.					
3	Lack of adequate knowledge and skills in pain assessment.					
4	When the patient is sedated or unconscious it is difficult to assess pain					
5	A previous history of alcoholism makes it difficult to judge if pain medication is enough.					
6	Giving proper pain prescription needs doctor's approval (The nurse has no authority to administer analgesics).					
7	The hospital lacks a pain assessment tool to guide in pain assessment.					
8	The critical care unit lacks manpower					
9	The hospital lacks well laid out regulations for frequent pain assessments.					
10	Excessive regulations regarding administration of opioids prevent easy administration.					

Appendix 3: Observation Checklist

OBSERVATION CHECKLIST ON THE MANAGEMENT OF PAIN AMONG CRITICALLY ILL NONVERBAL PATIENTS

Indicate whether the following activities were **done**, **not done** or **not necessary** by ticking the appropriate box. Provide comment on the performance if any,

(The observation checklist should be filled by the research assistants and the researcher)

Check list item	Done	Not Done	Not Applicable	Comment(s)/ Remarks
History Taking:				
From other care givers				
From family members, relatives and other visitors				
From patient's previous records				
Physical assessment				
i. Temperature				
ii. Pulse rate				
iii. Respiration				
iv. Blood pressure				
v. Arterial blood gas levels				
vi. Oxygen saturation levels				
vii. Glasgow coma scale				
Pain Assessment:				
i. Use of pain assessment tools to rate patient's pain intensity.				
ii. Identification of patient's pain of pain indicators.				
iii. Accurate rating of patient's pain intensity				
iv. Documentation of patient's level of pain				
Management of pain:				
i. Administration of prescribed analgesics				
ii. Use of non- pharmacological pain relieving measures				
iii. Documentation of pain management interventions.				
Evaluation:				
i. Evaluation of effectiveness of intervention.				
ii. Documentation of evaluation findings.				

Appendix 4: Letter to KNH/UoN Ethics and Research Committee

Hellen Wachera Kamotho,

University of Nairobi,

School of Nursing Sciences.

To,

The Chairperson,

KNH/UoN Ethics & Research Committee,

P.O. Box 20723-00202,

Nairobi.

Dear Sir/Madam,

RE: RESEARCH AUTHORISATION REQUEST

I am a second year postgraduate student pursuing Masters in Critical Care Nursing (MscN). I am writing to request your permission to carry out research on "*Practices of nurses in Management of Pain among Critically ill Non-verbal adult patients in the critical care unit*". The study will be carried out in Kenyatta National Hospital.

Your kind consideration will be highly appreciated and it will go a long way in facilitating completion of my study. The research findings will be utilized both locally and internationally in improving provision of quality patient care.

Thank you.

Yours faithfully

Hellen W. Kamotho

Appendix 5: Letter of Approval from KNH/UoN Ethics and Research Committee



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P.O. BOX 19676 Code 00202
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KNH/UON-ERC
E-mail: unhnh_erc@unhnh.ac.ke
Website: www.unhnh.ac.ke
Link: www.unhnh.ac.ke/activities/KNHUoN



KENYATTA NATIONAL HOSPITAL
P.O. BOX 20723 Code 00202
Tel: 254 200 9
Fax: 725272
Telegrams: MFDN P, Nairobi

Ref: KNH-ERC/A/55

15th March 2012

Kamotho W. Hellen
School of Nursing Sciences
College of Health Sciences
University of Nairobi

Dear Hellen

RESEARCH PROPOSAL: "PRACTICES OF NURSES IN MANAGEMENT OF PAIN AMONG CRITICALLY ILL NON-VERBAL ADULT PATIENTS IN THE CRITICAL CARE UNIT, KENYATTA N.HOSPITAL"(P76/02/2012)

This is to inform you that the KNH/UoN Ethics & Research Committee (ERC) has reviewed and **approved** your above cited research proposal. The approval periods are 15th March 2012 to 14th March 2013.

This approval is subject to compliance with the following requirements

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used
- All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation
- Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period (Attach a comprehensive progress report to support the renewal)
- Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment
- Submission of an executive summary report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism

For more details consult the KNH/UoN- ERC website www.uonbi.ac.ke/activities/KNHUoN

Yours sincerely

PROF. A.N. GUANTAI
SECRETARY, KNH/UON-ERC

- c.c. The Deputy Director CS, KNH
The Principle, College of Health Sciences, UON
The Director, School of Nursing Sciences, UON
The HOD, Records, KNH
Supervisors
Mrs. Margaret Murva, School of Nursing Sciences, UON
Mrs. Minam Wagoro, School of Nursing Sciences, UON
Mr. Samuel T. Kimani, School of Nursing Sciences, UON

Appendix 6: Letter to the Ministry of Education, Science and Technology

Hellen Wachera Kamotho,
University of Nairobi,
School of Nursing Sciences.

To,

The Chairperson,

The Ministry of Education, Science and Technology,

P.O. Box 20723-00202,

Nairobi.

Dear Sir/Madam,

RE: RESEARCH AUTHORISATION REQUEST

I am a second year postgraduate student pursuing Masters in Critical Care Nursing (MscN). I am writing to request your permission to carry out research on "*Practices of nurses in Management of Pain among Critically ill Non-verbal adult patients in the critical care unit*". The study will be carried out in Kenyatta National Hospital.

Your kind consideration will be highly appreciated and it will go a long way in facilitating completion of my study. The research findings will be utilized both locally and internationally in improving provision of quality patient care.

Thank you.

Yours faithfully

Hellen W. Kamotho.

Appendix 7: Letter of Approval from Ministry of Education, Science and Technology

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471, 2241349
254-020-310571, 2213123, 2219470

Fax: 254-020-318245, 318249

When replying please quote

secretary@ncst.go.ke

NCST/RCID/12A/012/81

P.O. Box 30623-00100

NAIROBI, KENYA

Website: www.ncst.go.ke

30th May 2012

Our Ref:

Hellen Wachera Kamotho
University of Nairobi
P.O.Box 30197-00100
Nairobi.

Date:

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *"Practices of nurses in management of pain among critically ill non-verbal adult patients in the critical care unit, Kenyatta National Hospital."* I am pleased to inform you that you have been authorized to undertake research in Nairobi Province for a period ending 31st August, 2012.

You are advised to report to the Provincial Commissioner, the Provincial Director of Education and the Provincial Director of Medical Services, Nairobi Province before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

DR. M. K. RUGUTT, PhD, FSC.
DEPUTY COUNCIL SECRETARY

Copy to:

The Provincial Commissioner
The Provincial Director of Education
The Provincial Director of Medical Services
Nairobi Province.

Appendix 8: Work Plan in Gantt chart

Month →	Nov 2011	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep 2012
Activity ↓											
Concept paper development											
Proposal development											
Forwarding of proposal for approval to KNH-ERC											
Correction of final proposal and forwarding to KNH-ERC											
Training of research assistants and pre-testing questionnaires											
Data collection											
Data processing and analysis											
Report writing											
Draft report presentation and correction											
Final report presentation and submission											
Thesis Defense											

Appendix 9: Budget

COMPONENT	ACTIVITY DESCRIPTION	ITEM	UNIT OF MEASUREMENT	UNIT COST (KSH)	TOTAL (KSH)	
Literature review	Search for literature in libraries	Transport and subsistence	15 days	@300	4,500	
	Internet services	Browsing for 5 hours in cyber cafe	40 days	@200	8,000	
	Stationeries	A 4 notebook	4		@100	400
		Foolscaps	2 reams		@250	500
		Photocopy papers	5 reams		@450	2250
		Proposal typing	4 drafts		@400	1600
		Proposal printing	4 drafts		@400	1600
		Photocopying	200 pages		@2	400
Approvals		KNH ethics committee			1,000	
		Ministry of Science and technology			1,000	
Sub-total					21,850	
Research	Pre-testing	Transport and subsistence	1 day	600	600	
		Typing, Printing	20 copies	@40	800	
	Questionnaires	Photocopying	400 copies	@2	800	
	Data Collection	Transport and subsistence	30 days	@600	18,000	
		2 research assistance allowance	30 days	200x2 persons		12,000
	Data processing and analysis					25,000
Sub-total					57,200	
Reports	Draft reports	Typing, printing	200	@20	4,000	
		Photocopying	5 copies	@400	2,000	
	Final reports	Correction and printing	200 pages	@ 20	4,000	
		photocopying	5 copies	@ 400	2,000	
		Binding	5 copies	@ 500	2,500	
Sub-total					14,500	
		Contingencies 10%			9,350	
Grand total					102,700	