DETERMINANTS OF PAIN ASSESSMENT ON CRITICALLY ILL PATIENTS BY NURSES AT SELECTED HOSPITALS OF KIAMBU COUNTY KENYA

ANNA WANGECHI KINYUA

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DECLARATION AND APPROVAL

Declaration by the Student

This research project is wholly unique and was not submitted for a degree or other award at any university.

Sign: ..... **Date :** 05/06/2025

Anna Wangechi Kinyua

MSCN/2018/38131

Approval by the Supervisors

I confirm that the work in this research project was done by the candidate under our supervision.

Sign: ..... **Date :** 05/06/2025

Dr. Nilufar Jivraj Shariff

School of Nursing

Mount Kenya University

Signature: ..... **Date :** 05/06/2025

Dr. Njoroge

Mount Kenya University

DEDICATION

The project is dedicated to my family members who endured the pain of being alone at home throughout the period of my studies.

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I am deeply grateful to the Almighty God for granting me the strength, wisdom, and perseverance to complete this project. His grace has been my guiding light throughout this journey.

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ABSTRACT

The incidence of pain is projected to vary between 47% and 100%, posing a significant challenge across all ages, races, genders, diverse economic backgrounds, and geographical locations. Inadequate pain assessment may delay numbness management and lead to heightened anguish, anxiety, and nervousness, potentially exacerbating pain. Nurses bear both professional and ethical responsibilities to ensure effective pain relief for their patients. Achieving optimal pain relief relies on nurses' understanding of pain, systematic and consistent assessment, and documentation of pain. The primary aim of this study is to assess pain assessment practices for critically ill patients among nurses in selected hospitals in Kiambu County, Kenya. Specific objectives include evaluating the pain assessment tools used, identifying institutional factors influencing pain assessment, and understanding nurses' factors affecting pain assessment. This research utilized analytical descriptive research design focusing on 196 nurses working in selected hospitals in Kiambu County, Kenya. The census technique was employed to select participants, and a structured questionnaire was administered. Data were analyzed using Statistical Package for the Social Sciences (SPSS) Version 22, with descriptive statistics, standard deviation, mean, percentages, tabulations, and frequencies. Findings revealed that selected hospitals in Kiambu County employ various pain assessment tools for critically ill patients, with the most common being the behavioral pain assessment tool, followed by the critical-care pain observational tool and nonverbal pain assessment tool. Institutional factors such as pain evaluation procedures, internal communication channels, staffing levels, availability of equipment, teamwork, supervision, work regulations, and hospital environment significantly influenced pain assessment. Furthermore, nurses' demographic factors including experience and personal encounters with pain influenced pain assessment practices. Statistical analysis demonstrated a significant relationship between pain assessment tools and outcomes, emphasizing the importance of tool selection for effective pain management. The study concludes that the type of tools, institutional factors, and nurses' characteristics influence the assessment and management of chronic pain among critically ill patients in Kiambu County. To ensure balanced tool utilization, the County Health Department should implement capacity-building programs for nurses, while hospital management should prioritize staffing, ethical nursing practices, equipment provision, work culture, and safety. Given the influence of personal factors on pain assessment practices, the study recommends incorporating pain management education into initial and ongoing training for all healthcare practitioners.

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LIST OF ABBREVIATIONS AND ACRONYMNS

ANOVA	**:**	Analysis of Variance
BP	**:**	Blood Pressure
BPAT	**:**	Behavioral Pain Assessment Tool
BPS	**:**	Behavioral Pain Scale
CCU	**:**	Critical care unit
CPOT	**:**	Critical-Care Pain Observational Tool
ERB	**:**	Ethics and Research Board
FLACC	**:**	Face, Legs, Activity, Cry, Consolability
HR	**:**	Heart Rate
ICU	**:**	Intensive Care Unit
ISAP	**:**	International Association for the Study of Pain
KNH	**:**	Kenyatta National Hospital
MOPAT	**:**	Multidimensional Objective Pain Assessment Tool
MV	**:**	Mechanical Ventilation
NACOSTI	**:**	National Council for Science, Technology and Innovation
NPAT	**:**	Nonverbal Pain Assessment Tool
NRS	**:**	Numeric Rating Scale
NVPS	**:**	Nonverbal Pain Scale
PAIN	**:**	Pain Assessment and Intervention Notation
RR	**:**	Respiratory Rate
UK	**:**	United Kingdom
USA	**:**	United States of America
VAS	**:**	Visual Analog Scale
WHO	**:**	World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Pain is a global dynamic that is experienced by humans at any given moment during the lifespan. The (Korwisi et al., 2021) agrees that pain relic's one of the chief details producing medical discussion universally. Numerous castigations are tangled in discomfort assessment; though, nurses have an essential part in the valuation, release, and assessment of discomfort. Because of the negative impact it has on daily living, managing pain effectively is a complex process (Farabelli et al., 2020). Nurses, as members of a team, share some of the blame for poorly treated conditions, despite the wide availability of pharmacological and nonpharmacological therapies. Surgical patients get reasonable to severe acute discomfort connected to shock or current operation, which decreases their coziness level (Alda et al., 2021).

"Pain is a hostile physical and emotional knowledge related with present or probable tissue damage, or characterized in terms of such injury," claims the International Association for the Study of Pain (IASP). Pain is a sensation that occurs in one or more regions of the body, but it is usually unpleasant, making it an emotional experience (G. I. Lee & Neumeister, 2020). The ability to feel pain is critical to human existence and is one of the most powerful forces in the universe. Severe discomfort is a cautionary sign meant to shield us from further harm by actuating reactions that safeguard us (Eiken et al., 2022). Pain is an individual and personal knowledge that can be expressed in a variety of habits. It is not simply about bodily responses to a threat of harm; it is also a personal and subjective experience that can be described in a variety of ways. There is currently no standardized method for measuring pain, making it difficult to compare one person's pain experience to that of another (Alda et al., 2021). The most crucial part of a pain

appraisal is that it be carried out on a regular basis (for example, at each shift change or every two hours) and according to a regular schedule. Policies and procedures at the hospital or unit should specify the assessment parameters. Pain should be evaluated after each intervention to evaluate the outcome and decide whether modifications are necessary to satisfy the patients' needs (Eiken et al., 2022). The nurse determines the patient's attitudes, views, degree of education, and prior knowledges with discomfort while assessing pain. Several methods (e.g., graphic equivalent gauge, numeric rating scale (NRS)) allow for a numerical assessment of pain severity (Garg et al., 2020). The choice to use a pain evaluation instrument should be made jointly by the patient and the nurse. This ensures that the patient is acquainted with the gauge during the preoperative phase (Barone et al., 2024).

There is a recognized upsurge in facial actions during painful operations - eyes shut, brow dropped, lid tautened, cheeks lifted, and lips separated. Other conduct markers of discomfort severity in ICU patients include body movements, muscular stiffness, and obedience with motorized fan, and/or noises. Patients who move themselves will automatically shift position, but in ICU patients who cannot move themselves depend up on the nursing staff to do this for them. Patients should be turned and their position changed every 1–2 hours (DeJesus et al., 2023).

Hospital or unit rules and procedures should also dictate the time range for evaluation. The nurse determines the patient's insolences, principles, degree of education, and prior involvements with discomfort while assessing pain. Several methods (e.g., graphic analogue gauge, numeric rating scale (NRS)) allow for a numerical assessment of pain severity (de Luca et al., 2022).

The Behavioral Pain Scale (BPS) and the Critical-Care Pain Observation Tool (CPOT) are two of the greatest used tools applied in the measurement of pain in mechanically

examined patients (Wojnar-Gruszka et al., 2022). The BPS was created by Payen in 2001 to help nurses in gauging pain in patients including critical patients who are anesthetized or mechanically examined (Maciej Serda et al., 2023). The gauge's validity and reliability have been validated, but additional research is needed to ensure that it can be used to make clinical choices about the use of opioids in critical care units.

Above 76 million people in America agonize from pain, according to The Joint Commission. The use of pain assessment instruments, according to (Georgiou et al., 2020) can alter the severity of pain that is gone through by severely sick patients, in addition to the use of pharmacologic treatments and the regularity of pain evaluation and certification.

According to a survey conducted by (McHugh et al., 2021) in a Canadian hospital, only 45.7 percent of the 140 nurses who responded to the survey had worked with a pain valuation device for patients who were incapable of self-report pain, likened to 98.6 percent who used pain assessment tools with patients who could self-report. Furthermore, while 94 percent of the 802 nurses who completed examinations that could be assessed decided that assessing and documenting pain for mechanically ventilated patients was equally important, just 33% of these persons stated having used a pain valuation device greater than 50% of the period for mechanically ventilated patients.

Visual analog scale (VAS) and verbal rating scale (VRS)pain valuation were delivered to a cohort of 100 Nigerian patients in Sub-Saharan Africa, and both measures were shown to have significant levels of correlation (Kituku, 2020). In Egypt, (Diab et al., 2021) focused on pain evaluation in patients with mechanical ventilation during a turning process. The findings indicated that 87 percent of patients experienced severe pain during the operation, with 4.3 percent experiencing severe pain 10 minutes later.

In Kenya, no single-item pain measuring instrument has been validated for usage, including the FPS-R and the NRS. This is crucial since not all pain assessment instruments are reliable when they are translated into another language or utilized in a different culture. Multicultural authentication of useful and acceptable pain valuation instruments for usage in Kenya is urgently needed. Kenya has received special attention because of its failure to offer adequate pain evaluation and management for children. Clinicians in Kenya are not qualified to measure pain, and pain evaluation is not commonly conducted in hospitals. As a result of the dread of opioids and a absence of prioritizing of pain treatment, pain is routinely undertreated. For both pediatric and adult patients, properly assessing pain and doing so in a socially acceptable way are critical initial steps in overcoming these pain treatment problems (Lotan & Icht, 2023).

1.2 Problem Statement

Pain is believed to affect between 47 and 100 percent of people, providing a significant problem for people of all ages, ethnicities, sexes, socioeconomic position, and geographical regions (Malicka et al., 2022). Pain is a global issue that requires a multidisciplinary response, conferring to the World Health Organization, despite the fact that it does not occur on the list of ailment loads. A more severe form of depression may develop when pain is unavoidable, leading to emotions of helplessness and even despair (WHO Report, 2022). Because pain has an influence on a patient's quality of life, pain cognition is essential to achieving these objectives (Sheikh et al., 2021). Patients and their professions may suffer physical and psychological effects as a result of improperly evaluated pain. Inadequate pain assessment can lead to a delay in giving analgesia, which can lead to more anguish, dread, and worry, as well as, potentially, more pain. In addition, insufficient or poor pain treatment can lead to frustration and aggressiveness in patients (Chammas et al., 2022).

As a result, nurses have an expert and moral duty to guarantee that their patients receive adequate pain treatment. The ability of nurses to provide optimal pain treatment is reliant on their expertise and comprehension of pain, which includes systematic and consistent evaluation, as well as regular pain observation and recording (Jonsdottir & Gunnarsson, 2021). Pain evaluation is essential in delivering effective pain management, regardless of long-term variations in patient outcomes (Stamer et al., 2020). Not only is accurate pain assessment required to give appropriate pain relief, but it is also important to avoid excessive treatment of pain and its associated side effects, such as breathing overthrow, over tranquility, and, in rare circumstances, passing away (Dhamija, 2021).As a result, it's critical to provide nurses with correct, up-to-date information and skills concerning pain assessment methodologies, particularly for mechanically ventilated patients.

Studies have been carried regarding pain but few have focused on determinants of pain assessment on critically ill patients among nurses. (Sweity et al., 2022) examined knowledge and attitudes of nurses about pain management in Turkey and found that the nurses did not have adequate knowledge and the positive attitude for pain management. A conceptual gap exists as the study focus was on knowledge and attitudes of nurses about pain management and not determinants of pain assessment on critically ill patients among nurses while a contextual gap exists as the focus was in Turkey and not on hospitals of Kiambu County. (Dwekat et al., 2021) studied Palestinian nurses' knowledge and attitudes regarding pain management and concluded that nurses lacked both expertise and an ideal lack of timidity when it came to pain treatment. A conceptual gap exists as the study focus was on nurses' knowledge and attitudes regarding pain management and not determinants of pain assessment on critically ill patients among nurses while a contextual gap exists as the focus was in Palestine and not on hospitals of Kiambu County.

(Al Nazly & Al Khatib, 2021) studied nurses' knowledge and attitudes towards pain management in children admitted in the paediatric department in Malawi and noted that nurses had some knowledge of pain assessment methods, however gaps existed on how to use pain assessment scales. A conceptual gap exists as the study focus was on nurses' knowledge and attitudes towards pain management in children and not determinants of pain assessment on critically ill patients among nurses while a contextual gap exists as the focus was in Malawi and only on children and not on hospitals of Kiambu County. None of the above study has focused on determinants of pain assessment on critically ill patients among nurses at selected hospitals of Kiambu County Kenya, hence the need to fill the existing gap.

1.3 Justification of the Study

In severely sick patients, pain is a chief difficulty and effective pain neutralization is reliant on a methodical, complete valuation of pain through the various pain assessment tools (Sweity et al., 2022). Pain assessment presents a major challenge to the nurses working in the critical care setup and especially among the mechanically ventilated patients. This is because most patients admitted in the critical care unit have a compromised level of consciousness or are sedated thus are incapable to verbally tell their level of pain (Sanson et al., 2020). Assessment of pain and its severity is required not only to deliver satisfactory pain liberation, but also to decrease excessive treatment of pain and associated contrary events hence the need to focus on pain assessment tools (Fleming, 2021).

The three selected hospitals in Kiambu County Kenya have been recommended for the study since they have a higher number of critically ill patients in the County. It is therefore important to understand the pain assessment used for critically ill patients among nurses at selected hospitals in Kiambu County Kenya. Currently, there are few studies of this

kind that have been done in the hospital thus the information obtained from this study will form a valuable guide to nursing practice, policy formulation and also for further research in regard to pain assessment.

1.4 Objectives

1.4.1 Broad Objective

Determinants of pain assessment on critically ill patients among nurses at selected hospitals of Kiambu County Kenya.

1.4.2 Specific Objectives

i. To assess the pain assessment tools used on critically ill patients by nurses at selected hospitals in Kiambu County Kenya.
ii. To identify the institutional factors that influence pain assessment on critically ill patients by nurses at selected hospitals in Kiambu County Kenya.
iii. To identify the nurses' factors that influence pain assessment done on critically ill patients by nurses at selected hospitals in Kiambu County Kenya.

1.5 Research Questions

i. What are the pain assessment tools used on critically ill patients among nurse at selected hospitals in Kiambu County Kenya?
ii. What are the institutional factors that influence pain assessment for critically ill among nurse at selected hospitals in Kiambu County Kenya?
iii. What are the nurses' factors that influence pain assessment for critically ill among nurses at selected hospitals in Kiambu County Kenya?

1.6 Research Hypothesis

H_{02}: There is no statistically significant relationship between Institutional factors and pain assessment on critically ill patients by nurses at selected hospitals in Kiambu County, Kenya.

H_{03}: There is no statistically significant relationship between Nurses' factors and pain assessment on critically ill patients by nurses at selected hospitals in Kiambu County, Kenya.

1.7 Significance of the Study

The policy makers especially those in the Health Ministry in Kenya will find the study useful as they will understand the pain assessment methods for critically ill patients at critical care unit. It is anticipated that the results of the research might have an impact on the evaluation of the pain assessment methods especially for critically ill patients at critical care unit so as to advance nurses' awareness and expertise in pain valuation. The research will be a baseline valuation of pain for CI patients at TL5H. Study finding will be shared in forums which will assist in change of approach and conduct in the direction of usage of pain assessment tools. The research will enable the management come up with the right infrastructure for assessment of pain for severely sick patients. Scholars will be capable of pursuing further research on the subject based on the study's recommendations. The conclusions of this research might be used by organization and other stakeholders at selected hospitals in Kiambu County Kenya to develop appropriate strategies to ensure that nurses have the necessary skills and knowledge to assess pain in mechanically examined patients in the hospital's critical care element. Finally, the researcher hopes that the study's suggestions will open doors for additional investigation by scholars and other researchers. The findings may be used by researchers to locate literature on pain assessment methods used among nurses for CI patients at critical care unit and thus fill the research gap that exist.

1.8 Definition of Operating Key Terms

Acute Pain: Pain that typically arises suddenly from injury, surgery, or medical conditions and is expected to resolve as healing occurs. In the study, acute pain may be experienced by critically ill patients due to their medical conditions or treatment procedures.

Chronic Pain: Pain that persists beyond the normal healing time or for more than three to six months. In the study, chronic pain among critically ill patients may arise from underlying conditions or prolonged hospitalization.

Nurse: A healthcare professional responsible for providing direct patient care, including assessment, monitoring, and intervention. In the study, nurses play a crucial role in assessing and managing pain among critically ill patients, as they are often the frontline caregivers responsible for implementing pain management protocols.

Nurses' Knowledge: Refers to the understanding, awareness, and competency of nurses in assessing and managing pain, including their familiarity with pain assessment tools, pain management techniques, and best practices. In the study, nurses' knowledge of pain assessment influences their ability to accurately evaluate and address pain in critically ill patients, thereby impacting patient outcomes and quality of care.

Pain Assessment: The systematic process of evaluating a patient's pain intensity, location, quality, and impact on functioning using standardized tools and clinical judgment. In the study, pain assessment focuses on determining the severity and characteristics of pain experienced by critically ill patients.

Pain Management: The comprehensive approach to alleviating pain through pharmacological and non-pharmacological interventions, aimed at minimizing suffering and improving quality of life. In the study, pain management involves

implementing strategies to address pain effectively in critically ill patients, considering their unique medical needs and vulnerabilities.

Pain: Refers to an unpleasant sensory and emotional experience associated with actual or potential tissue damage. In the study, pain is the focal point of assessment and management among critically ill patients.

Pain Organization refers to the formal systems, structures, protocols, and institutional support within a healthcare facility that guide, support, and influence how nurses assess and manage pain in critically ill patients.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter entails literature appraisal and comprised the review of connected literature in regard to the study objectives and also identifying the gaps. It further presents a theoretical and a conceptual framework.

2.2 Pain Assessment Tools Used Among Nurses

Patients on a mechanical ventilator must be evaluated for pain while being unable to vocally express their discomfort. Insufficient pain organization is a major clinical concern in hospitalized patients, and pain can be linked not only to the illness process but also to the disease's treatment (Korwisi et al., 2021). Pain may have an important influence on a patient's excellence of life, desire to live, and willingness to participate throughout therapy if it is not addressed. Inadequate pain therapy can lead to delayed recovery, increased problems, anxiety, sleep disturbances, and a worse quality of life (Zhang et al., 2022). Nurses are critical in the valuation and organization of pain. Many times, they act as the patient's main observer of discomfort and agony while also acting as a conduit between the doctor and the patient. That's why it's so important to learn the nurse's technique for evaluating and treating discomfort (Graham, 2021).

A patient on a mechanical ventilator may feel pain not just from the sickness itself but also from the equipment itself, such as an endotracheal tube or mechanical ventilator, both of which may injure the larynx and lead to discomfort for the patient. A patient using a mechanical ventilator may experience mental and physical shifts due to pain (Kerbage et al., 2021). Grimacing, rigid facial gestures, closed eyelids, and the expression of clinched fists were all behavioral abnormalities seen in patients who were placed on a mechanical ventilator for evaluation (López-López et al., 2023). Using the Critical Care

Pain Observational Tool (CPOT), an effort is being made to determine whether patients who are being supported by a ventilator are suffering discomfort (Rosio, n.d.). Changes in a patient's state of mind and body might be brought on by the sensation of pain while they are supported by a ventilator. Because patients are unable to vocally communicate their level of discomfort, it is crucial to examine pain behavior in addition to physiological symptoms as an important signal for evaluating a patient's level of pain. As a result of this, it is essential to carry out appropriate pain management. When a patient is on a ventilator, the Critical Care Pain Observational Tool (CPOT) should be used to monitor the patient's level of pain so that a diagnosis may be made on the level of pain being felt by the patient (Waladani et al., 2022).

Mechanically inspected patients who are not aware and unable to self-report need instruments that detect behavior traits connected with pain perception and expression. In ventilated patients, the major approach for pain evaluation is monitoring of facial expressions (Hora & Alves, 2020). The most often used conduct gauge for pain evaluation in patients who are incapable of self-report is the critical-care pain observational instrument (CPOT). (Gélinas et al., 2021) was the first to validate it in heart surgery patients from Canada. This instrument may be used on intubated or non-intubated patients and comprises four behaviors: facial languages, activities, muscular tautness, and ventilator agreement. Numerous groups and languages have been used to test and verify CPOT, and the test's psychometric properties have been confirmed (Marques et al., 2022). In ICUs, the Behavioral pain scale (BPS) is the second greatest commonly utilized pain measure. It assesses three social areas (facial languages, upper-limb movement, and breathing compliance) and is adaptable to multiple languages and samples. The introduction of BPS in ICUs improved pain management and patient outcomes. Rijkenberg and colleagues (2021) Gélinas et al. (2022) developed the Behavioral pain

assessment tool (BPAT), which has been validated in 28 countries. BPAT was developed for application in a international research of procedural pain in ICU patients, whereas other scales, such as the CPOT, need a more complicated interpretation of scores than simply noting when behaviors are present or missing. (Marques et al., 2022) developed an eight-piece gauge that includes terms and imageries of facial languages (along with an image), vocal reactions (complaining and spoken grievances of pain), and bodily muscular replies (inflexibility and tightened handfuls).

Nonverbal pain assessment tool (NPAT) was established by (Kerbage et al., 2021), founded on activities normally detected in ICU everyday exercise. Five classes are measured by this instrument: sentiment (emotional answers to a state), drive (alteration in the positioning and placement of the body and extremes when not involved in any upkeep doings), spoken signals (complete signals or communications from the patient other than language), facial signals (facial languages) and placing/protecting (body answers that suggest a guard of the body from interaction with outside trace). The nonverbal pain scale (NVPS) is a multi-dimensional gadget that was developed from the FLACC (facial, legs, action, cry, and censurability) gauge (Kerbage et al., 2021).

The PAIN algorithm (pain valuation and interference representation) is a multidimensional tool that was created to be assessed by serious upkeep nurses. It's broken down into three sections. First, six social areas are assessed: facial appearance, drive, posture, spoken resonances, paleness, and sweat; three physiologic markers are assessed: heart frequency, blood pressure, and breathing (Norcliffe-Kaufmann et al., 2020). The patient's skill to bear opioids is assessed next, followed by recommendations for analgesic therapy decisions and documentation. The application of this tool in clinical practice is limited due to the measurement of the PAIN procedure and the usage of a non-homogeneous evaluation approach relying only on nurses' judgment and expertise. The

FLACC (Face, Legs, Activity, Cry, and Consolability) gauge is a one-dimensional measure commonly used in children with cognitive disability (Ibrahim et al., 2023).

McGuire, Grant, and Park created the Multidimensional Objective Pain Assessment Tool (MOPAT), a multidimensional gauge that was first authenticated on non-responsive hospital patients in 2011. There are two subscales or aspects to this instrument (behavioral and physiological) (Díaz-García et al., 2021). Finally, the utilization of vital indicators, such as blood pressure (BP), heart rate (HR), and respiration rate (RR), by nurses in ICUs is a widespread preparation because of the ease of admission provided by unceasing nursing. The validity of vital signs as a pain assessment technique is seen as an unstable metric (Kutlutürkan & Urvaylioğlu, 2020). It indicates that vigorous ciphers in ICU patients might rise, fall, or remain steady depending on their clinical state. Furthermore, it has been established that physiological alterations can be induced by anxiety, nervousness, and other mental stresses, or reduced by numbness. This is not a valid pain metric due to the multiple reasons of change (Sakurai et al., 2023)

In the United Kingdom, (Kerr et al., 2024) utilized a expressive research to evaluate the efficiency of a severe pain instructive package in increasing nurses' awareness, abilities, and views about postoperative pain organization. A suitability example of 59 nurses who were enrolled in an instructive package on severe pain action were polled. Nurses' information and views toward severe pain control were assessed using validated questionnaires completed before, immediately after, and six weeks after the instructive meeting. The intervention in the severe pain educational package enhanced nurses' information and views about pain evaluation and administration, according to the findings. The most effective pain treatment occurred just after the pain education session. To summarize, nurses' knowledge of pain may be enhanced by enduring to participate in evidence- founded instructive programs on pain management.

Boone (2021) in the United States utilized Knowles' adult learning theory as the theoretical foundation for analyzing the effectiveness of pain assessment techniques used by nurses. A one-way ANOVA was used to analyze the data. Nurses who care for older individuals with cognitive impairment were shown to have a great part in evaluating and treating pain. The nurses' ability to accurately and quickly assess and manage pain in this population of patients is critical to providing sufficient pain therapy. Similarly, developing abilities in the evaluation and administration of pain for this set requires an awareness of nurses' knowledge and beliefs about pain. The construction of an effective educational program tailored toward the recognized requirements of the adult learner can be accelerated by measuring the knowledge and beliefs of long-term care nursing staff.

Olufunke (2020) investigated the factors that influence the use of pain valuation instruments in pain treatment amid nurses in Ekiti State, Nigeria. A descriptive research design was used in this research. A pretested survey was applied in collection of figures, which was then examined using SPSS version 20. To examine the figures, evocative and inferential figures (ANOVA) were used. It was shown that 90 percent and 83 percent of nurses cited lack of tool availability and nursing workload as reasons for the failure to use pain assessment instruments, respectively. Lack of knowledge on pain assessment tools was reported by 42 percent of the nurses as a reason in the failure to use pain assessment instruments. This might be due to a lack of formal pain evaluation and treatment training, seminars, and workshops. Nurses' use of pain assessment instruments was hampered by their workload and an unfriendly working environment.

Kenya, Lusweti, and Asik (2019) utilized a purposive sampling technique to examine the efficiency of pain organization strategies employed at Kakamega County Teaching & Referral Hospital. The only patients accessible throughout the data collecting period were included in the sample. It was decided to do a descriptive cross-sectional and desk review.

The majority of patients thought that the drugs they were given were ineffective, and that the nurses not ever assessed their pain. The obtainability of painkillers was another aspect that most likely contributed to the absence of efficient pain treatment. This is due to the fact that patients are forced to purchase pain prescriptions, and the vast mainstream of them are impoverished and unable to afford effective but expensive treatments. The results of this research revealed that managing post-functioning pain in the chief 24 hours is ineffective. To relieve the patients' suffering, it is critical that post-operative pain be properly treated.

2.2.1 Institutional Factors on Nurse's Assessment Pain

Pain evaluation and management in long-term upkeep facilities is complicated by a number of variables. To overcome these obstacles, institutional commitment is required (K. Lee et al., 2020). The American Medical Directors Association Guidelines for Chronic Pain Treatment in Long-Term Precaution Settings identify communication, education, and staffing as key elements in establishing an institutional commitment to pain management (Solem et al., 2020). To guarantee that information concerning a resident's pain is frequently transmitted and acted upon by the relevant personnel, communication procedures must be in place (Bender et al., 2022).

Pain management education should be incorporated in both initial and ongoing training for all health care practitioners. Pain recognition training and mentorship should be provided to nursing assistants and other direct caregiving personnel. Misconceptions and falsehoods regarding pain should be debunked as part of pain management education. The training should assist employees in recognizing and overcoming their own cultural and gender prejudices. The correct use of pain assessment instruments, as well as how to promote and coordinate pain management, should be taught to staff. Staffing

arrangements that allow personnel to stay with the same residents for longer periods of time have been shown to enhance pain detection (Shen et al., 2023).

In the United States, (Elkbuli et al., 2020) focused on strategies to enhance nurses' pain evaluation in order to improve patient satisfaction. With the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores connected to payment, it was highlighted that patient satisfaction with pain treatment is becoming increasingly important. Following the intervention, the nurses' understanding increased considerably. According to focus group remarks, there is a need for education on the relationship between pain treatment and patient happiness. Patient happiness and pain management were linked in a study that enhanced results. The capacity to properly and consistently identify and attend to pain, as well as aid patients in methods that upsurge their pain management consummation, remained a continuing educational and practice requirement. However, the study only looked at one institutional element in terms of pain evaluation and management: the infrastructure for nurse education (Yarycky et al., 2024).

In Malaysia, (Mei, 2021) investigated attitudes regarding pain management in hospitalized cancer patients and their contributing variables, using questionnaires as data collecting techniques. The patients' pain understanding impacted their views toward cancer pain management. Patients with a limited understanding of pain were concerned about analgesic delivery. The researchers came to the conclusion that patients' views about cancer pain treatment were negative and needed to be addressed. Their opinions about addiction and tolerance were negative, but their attitudes toward religious fatalism and a desire to do good were positive. The views of the patients' careers and the patients' pain knowledge impacted their attitudes toward cancer pain management. However, in terms of pain evaluation and therapy, the study focused on only one institutional factor: institutional patients' pain knowledge (Mescouto et al., 2022).

According to (*Erasmus*, 2022) utilized a quantitative design and questionnaires to collect data while researching the influence of a pain valuation exercise package on Nigerian nurses' understanding of pain treatment. The nurses were chosen using a systematic random selection approach. It was discovered that current information regarding pain assessment and treatment was lacking, and that the nurses' pain instructive package had a good impact on nurses' information, rehearsal, and protest linked to pain valuation and organization. There is a necessity to develop and to apply a unceasing expert tutoring package on pain and its valuation, with a particular emphasis on pain valuation techniques, standards, procedures, and patient recording. A supportive atmosphere is required to guarantee the appropriate and sustained use of tools, procedures, and charts, which may be achieved by increasing personnel, providing nursing, and providing sustenance management by knowledgeable and trained nurses. However, the research only looked at one institutional component in terms of pain evaluation and management: training programs (*Erasmus*, 2022).

2.2.2 Nurse's Related Factors on Assessment of Pain

The idea that the patient is or will be hooked to the opioids, breathing misery, and concealing the patient's indications are the most prevalent details for not working on a patient's pain report (Rafii et al., 2020). Nurses' pain management expertise is lacking, with the most wrong responses on pharmacology and pain assessment. However, research suggests that if health upkeep workers measure and treat pain beforehand it gets plain, sensitization is prevented and fewer prescription is used (Anne et al., 2021). In addition to administering pharmaceutical treatments, nurses are responsible for providing non-pharmacological therapy to patients. Cognitive and physical treatments are the two types of non-pharmacological therapy. Music and relaxation are examples of cognitive methods that focus on mental functioning. Kneading and the use of heat and cold are examples of

physical treatments that focus on changing physiological processes to decrease pain (Roy, 2019).

According to (Lor et al., 2023) looked at the familiarity and views of nurses in the United States when it came to pain management. The Nurses' Understanding and Attitudes Survey was applied in collection of statistics on nurses' awareness of pain treatment and perceived obstacles to pain in quantitative research. The knowledge scale's total average accurate response rate was 72.2 percent, showing a lack of understanding about pain treatment. Pain management knowledge was both positively and adversely linked to perceived pain management obstacles. The degree of education or years of experience of nurses has no bearing on their pain knowledge. The findings suggested that pain education should be improved. Nurses were also shown to be not probable to provide a beforehand harmless but unsuccessful opioid dosage to an amused patient compared to a frowning patient. The findings of the survey show that nurses' individual judgments and absence of knowledge of their patients' discomfort, instead of their evaluations, have a propensity to affect opioid dose selection and contribute to pain management inadequacy. The aforementioned study, on the other hand, was a worldwide study that solely looked at pain treatment and ignored the element of pain evaluation (Párraga & Castellanos, 2023).

According to (McLaughlin et al., 2022) studied registered nurses' information and views about pain treatment in grown-up medical patients: a circumstance study of Bindura Hospital in Zimbabwe. The researchers employed an expressive cross-sectional study project. The nurses were chosen using a rigorous random specimen process. A self-managed survey was used to gather statistics, which was then examined by means of SSPS software version 16. The findings revealed that listed nurses had insufficient information (an average information score of 64.5%) and an average view towards pain

treatment in grown-up medical patients (a full average views score of 56%). Years of nursing experience (p=.003; p.005) and respondents' age (p=.001; p.005) were shown to be linked with pain management knowledge. It was discovered that 84 percent of those polled lacked understanding about pain evaluation, and that 76 percent indicated the wrong optimal time for pain assessment. The aforementioned research, however, was a regional study that only looked at adult medical patients and excluded children (Deng et al., 2023).

In the United Kingdom, (Chugani, 2020) utilized an expressive research to evaluate the efficiency of a severe pain instructive package in increasing nurses' information, abilities, and views about postoperative pain organization. A suitability example of 59 nurses who were enrolled in an instructive package on severe pain action was polled. Nurses' information and views toward acute pain organization were measured using authenticated surveys completed beforehand, directly afterwards, and six weeks afterwards the instructive meeting. The intervention in the severe pain informative package, enhanced nurses' information and views about pain evaluation and organization, according to the findings. The most effective pain treatment occurred just after the pain education session. To summarize, nurses' knowledge of pain may be enhanced by enduring to participate in evidence-founded instructive programs on pain management. The aforementioned study, on the other hand, was a worldwide study that solely looked at pain treatment and ignored the element of pain evaluation (Párraga & Castellanos, 2023).

At Uganda Cancer Institute Mulago, (Melile Mengesha et al., 2022) assessed nurses' information, views, and rehearsal related pain evaluation in cancer patients. The study focused on 67 individuals and utilized a descriptive cross-sectional research methodology. Statistics was composed by use of a self- managed survey. Afterwards that, the data was processed with SPSS and displayed in the procedure of frequency tables,

graphs, and pie-charts. According to the findings, the mainstream of defendants (85%) had a great degree of understanding of pain valuation, while 13% and 2% had a reasonable and poor degree of information, correspondingly Furthermore, the mainstream of defendants had a good opinion about pain valuation, though a third had a unbiased view toward it. Moreover, the research found that nurses had decent pain assessment techniques. pain. The aforementioned research, on the other hand, was a regional study that only looked at one type of patient, cancer patients (Deng et al., 2023).

Other than the personal information and views that a nurse is expected to have as part of their job, nurses are also expected to have information about pain. It is extremely beneficial for nurses to organize nursing tasks properly in order to guarantee that pain is completely controlled based on its subjective occurrence (Germossa et al., 2018). The nurses' capacity to recognize the need to search for more materials on the newest concerns on appropriate evaluation and management of pain is harmed because of their absence of knowledge near pain management (Makhlouf et al., 2020). Nurses should also be familiar with non-pharmacological pain treatment techniques such as the use of heat and cold methods, acupuncture, massages, and breathing exercises, among others. In addition to the areas of pain management that a nurse is expected to know, knowledge of current pain management standards as well as already published guidelines is deemed essential (Alkhatib et al., 2020).

(Kerr et al., 2024) looked at the information and views of nurses in the United States when it came to pain assessment. The Nurses' Understanding and Views Examination was applied in obtainance of data on nurses' knowledge of pain assessment and perceived obstacles to pain in quantitative research. The knowledge scale's total average accurate response rate was 72.2 percent, showing a lack of understanding about pain treatment. Pain management knowledge was both positively and adversely linked to perceived pain

management obstacles. The degree of education or years of experience of nurses has no bearing on their pain knowledge. Nurses were also shown to be not as much expected to provide a previously safe but unsuccessful opioid dosage to an amused patient compared to a frowning patient. The findings of the survey show that nurses' individual judgments and absence of knowledge of their patients' pain, instead of their evaluations, have a propensity to affect opioid dose selection and contribute to pain management inadequacy. (*Erasmus* , 2022) utilized a quantitative design and questionnaires to collect data while researching the influence of a pain valuation training package on Nigerian nurses' understanding of pain treatment. The nurses were chosen using a systematic random selection approach. It was discovered that current information regarding pain assessment and treatment was lacking, and that the nurses' pain instructive package had a good impact on nurses' information, practice, and demonstration linked to pain assessment and management. There is a necessity to develop and apply a unceasing expert education package on pain and its valuation, with a particular emphasis on pain valuation techniques, standards, protocols, and patient recording. A supportive atmosphere is required to guarantee the appropriate and sustained use of tools, procedures, and charts, which may be achieved by increasing personnel, providing nursing, and providing care management by knowledgeable and trained nurses.

According to (*Alahassan*, 2022) evaluated the knowledge, attitude, and practice of Uganda Cancer Institute Mulago nurses on pain assessment in cancer patients. The study focused on 67 individuals and utilized a descriptive cross-sectional research methodology. Statistics were gathered by use of a self-managed survey. Afterwards that, the data was processed with SPSS and displayed in the process of frequency tables, pie-charts, and graphs. According to the findings, the mainstream of defendants (85%) had a great level of understanding of pain valuation, while 13% and 2% had a reasonable and

poor degree of information, correspondingly. Furthermore, the many of the defendants had a good opinion about pain valuation, though a third had an unbiased view toward it. Moreover, the research found that nurses had decent pain valuation techniques.

2.3 Theoretical Framework

2.3.1 Kolcaba's Theory of Comfort

The Kolcaba Theory of Comfort will be used in this study; Kolcaba's Theory of Comfort was initially created in the 1990s (Kolcaba, 1994). Reprieve, ease, and wholeness are three types of comfort, according to Kolcaba. When a patient's unique comfort requirements are satisfied, the patient feels reassured and supported. A patient receiving pain medication in post-surgery treatment, for instance, is relishing relieve ease. Comfort is associated with ease in a satisfied mood. Anxiety in the patient, for example, is reduced. Wholeness is a state of comfort where patients are capable of raising overhead their problems (Schuiling, Sampselle& Kolcaba, 2022). Three nursing theories were utilized to explain three unique forms of comfort, according to Kolcaba (2023). Orlando's work provided relief, Henderson provided relaxation, and Paterson and Zderad provided transcendence (Nelson, 2021).

Bodily, psychospiritual, ecological, and socio-traditional sceneries are the four situations in which patient comfort may happen (Wilson& Kolcaba, 2024).

Patients, rendering to the Philosophy of Ease, are people, relatives, organizations, or societies who require health care. Whichever component of the patient's, family's, or official locations that may be changed by a nurse or treasured one to increase ease is denoted as the setting. Fitness is clear as the patient's ability to operate optimally as determined by the patient, set, family, or public. Nursing is defined as the procedure of determining a patient's ease requirements, planning and applying suitable nursing interventions, and measuring patient ease after nursing interventions (Jeffries, 2021).

Nelson (2011) claims that relating comfort theory to partition is the best method to grasp the concept. The first element of the comfort theory entails nurses doing an assessment of patients' physical, psychological, spiritual, sociocultural, and environmental needs; this allows patients to participate in health seeking behavior, the second part of the theory's central tenet. Shorter hospital stays, cheaper expenses, and higher patient satisfaction have all been related to patients being proactive in seeking medical care (Wilson& Kolcaba, 2020). Kolcaba theory of Comfort hence will be helpful in understanding and establishing the pain assessment methods used among nurses for mechanically ventilated patients at critical care unit.

2.3.1 Biopsychosocial Model of Pain

The biopsychosocial model of pain is a comprehensive framework that acknowledges the multifaceted nature of pain experiences and emphasizes that pain perception and response are influenced by biological, psychological, and social factors. This model suggests that understanding pain requires consideration of not only the physiological processes but also the psychological and social contexts in which pain occurs.

Biological Factors: Biological factors refer to the physiological processes and mechanisms that contribute to pain perception. This includes factors such as tissue damage, inflammation, nerve sensitization, and genetic predispositions to pain disorders. In the context of critically ill patients, biological factors may include the severity of the patient's medical condition, the presence of comorbidities, the nature of their injuries or illnesses, and the physiological responses to treatment interventions. Nurses' assessment of pain in these patients must take into account these biological factors to ensure effective pain management.

Psychological Factors: Psychological factors encompass the cognitive, emotional, and behavioral aspects of pain perception. This includes factors such as cognitive appraisal

of pain, emotional distress, fear, anxiety, depression, coping strategies, and past experiences with pain. Critically ill patients often experience psychological distress due to the severity of their condition, uncertainty about their prognosis, and the stress of being hospitalized. Nurses' assessment of pain must consider the patient's psychological state, as psychological factors can significantly influence pain perception and response.

Social Factors: Social factors refer to the social context in which pain occurs, including cultural, familial, societal, and environmental influences. Social factors can influence how pain is expressed, perceived, and responded to within a given social context. In the hospital setting, social factors may include the presence of family members, cultural beliefs about pain and illness, socioeconomic status, access to healthcare resources, and the quality of the patient-provider relationship. Nurses must consider these social factors when assessing pain in critically ill patients, as they can impact the patient's pain experience and treatment outcomes.

The biopsychosocial model of pain emphasizes the interconnectedness of biological, psychological, and social factors in shaping pain experiences. It suggests that nurses' assessment of pain in critically ill patients should be holistic, taking into account not only the physical aspects of pain but also the patient's psychological and social context. By considering the multifaceted nature of pain, nurses can provide more comprehensive and effective pain management for critically ill patients.

2.3.2 Transactional Model of Stress and Coping

The Transactional Model of Stress and Coping, proposed by Lazarus and Folkman in 1984, offers a comprehensive framework for understanding how individuals perceive and respond to stressors. According to this model, individuals' responses to stress are mediated by cognitive appraisals of the situation, as well as by individual and contextual factors. In the context of pain assessment among nurses, the Transactional Model suggests that nurses' assessments of pain in critically ill patients may be influenced by various factors related to their appraisal of the situation and their coping strategies.

Firstly, nurses' appraisals of the patient's condition play a significant role in their pain assessments. This includes their assessment of the severity of the patient's pain, their understanding of the underlying causes of pain, and their perception of the patient's pain tolerance. Nurses who perceive the patient's condition as more severe or who have a better understanding of the factors contributing to pain may conduct more thorough pain assessments.

Secondly, nurses' own perceived ability to cope with the demands of their job can influence their pain assessment practices. Nurses who feel confident in their ability to manage stress and effectively cope with the challenges of their profession may be better equipped to conduct comprehensive pain assessments. Conversely, nurses who perceive themselves as lacking in coping resources may experience greater stress and may be less effective in their pain assessments.

Finally, the availability of resources and support within the work environment can impact nurses' pain assessment practices. Nurses who have access to adequate staffing, training, and pain management resources may feel more supported in their efforts to assess and manage pain effectively. Conversely, nurses who perceive a lack of support or resources may experience greater stress and may be less able to conduct thorough pain assessments.

Understanding these cognitive appraisals and coping mechanisms is crucial for identifying determinants of pain assessment among nurses. By recognizing the factors that influence nurses' pain assessment practices, healthcare organizations can implement targeted interventions to support nurses in providing high-quality pain management for critically ill patients, ultimately improving patient outcomes and satisfaction.

2.3.3 Health Belief Model (HBM)

The Health Belief Model (HBM) is a psychological framework that aims to explain and predict health-related behaviors by considering individuals' perceptions of health threats and the factors that influence their decisions to take action to mitigate those threats (Champion & Skinner, 2021). Developed in the 1950s, the model has been widely used in various fields, including pain management.

The HBM consists of several key components. Perceived Severity refers to an individual's subjective assessment of the seriousness of a health condition. In the context of pain assessment among nurses, perceived severity relates to how nurses perceive the significance of pain as a symptom in critically ill patients. Nurses who perceive pain as a serious and important symptom are more likely to prioritize pain assessment and management in their care routines.

Perceived Susceptibility refers to an individual's belief about their vulnerability to experiencing the health condition. In the context of pain assessment, nurses' perceived susceptibility relates to their confidence in their ability to accurately assess pain in critically ill patients. Nurses who perceive themselves as capable of accurately assessing pain are more likely to engage in thorough pain assessments.

Perceived Benefits refer to an individual's belief in the effectiveness of taking action to address the health threat. In the context of pain assessment, nurses' perceived benefits relate to their belief in the effectiveness of pain management interventions. Nurses who

believe that pain management interventions are effective in alleviating pain are more likely to prioritize pain assessment and management in their care practices.

Perceived Barriers refer to the obstacles or challenges that individuals perceive in taking action to address the health threat. In the context of pain assessment, perceived barriers may include factors such as time constraints, lack of resources, or inadequate training in pain assessment techniques. Nurses who perceive fewer barriers to pain assessment are more likely to engage in comprehensive pain assessment practices.

In summary, the Health Belief Model suggests that nurses' assessments of pain in critically ill patients are influenced by their perceptions of the severity of pain as a symptom, their confidence in their ability to assess pain accurately, and their beliefs about the effectiveness of pain management interventions (Champion & Skinner, 2021). By understanding these factors, researchers and healthcare organizations can identify determinants of pain assessment among nurses and develop targeted interventions to improve pain management practices and patient outcomes.

2.4 Conceptual Framework

The figure underneath is the conceptual framework of the research that will show the relationship between the independent and the dependent variable. The independent variables are the pain assessment methods, nurse related factors and institutional factors. The dependent variable will be pain assessment measured by pain intensity before and after.

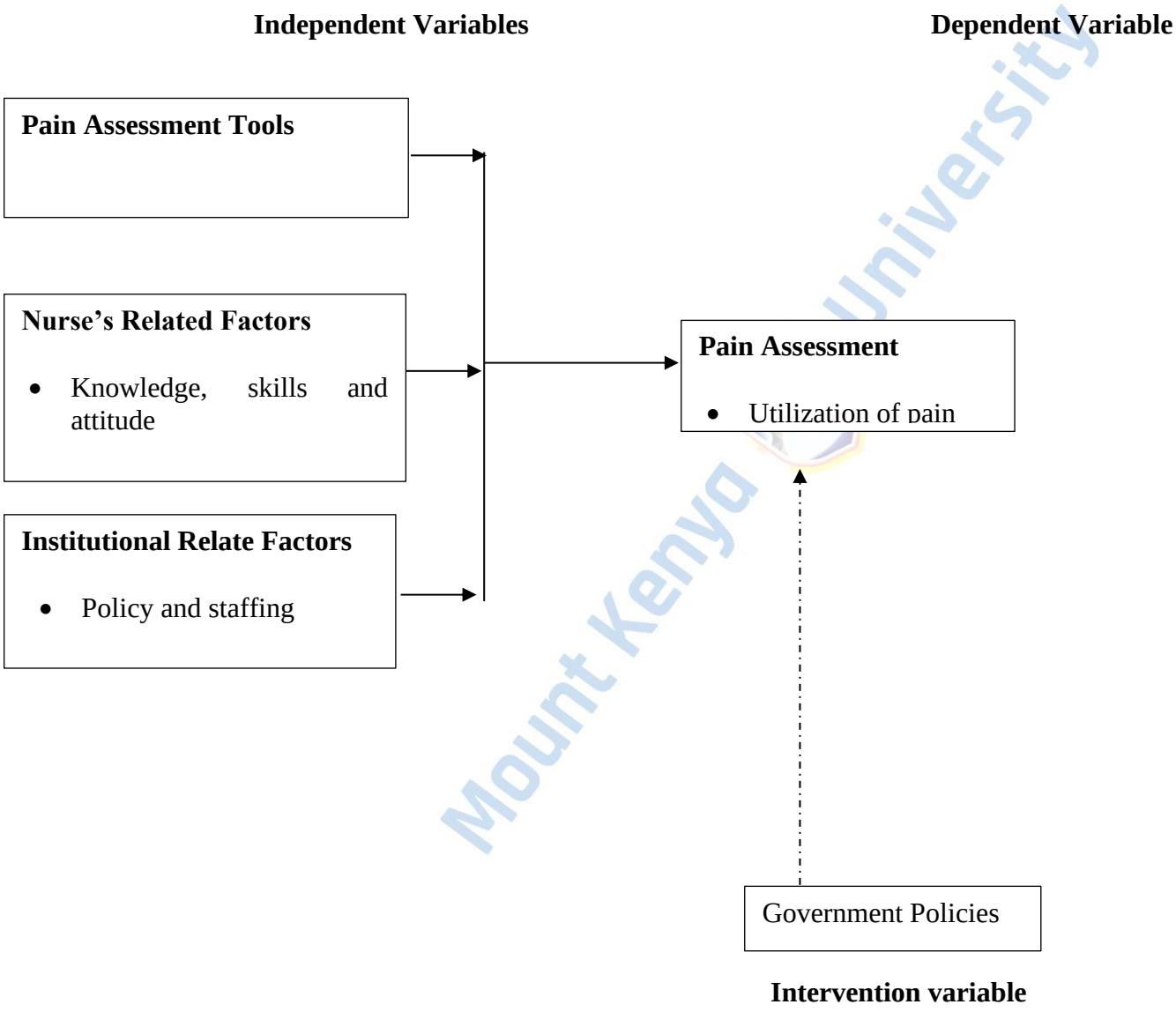

Figure 2.1: Conceptual Framework

CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

This chapter focuses on research design, target populace, sample and specimen strategy, data collecting tools and procedures, and data processing methodologies.

3.2 Study Design

According to Creswell (2012) a research design is the plan used to generate answers to research problems. Cooper (2010) points out that the research design is the glue or structure of the research and it holds all the study elements together. This research used analytical descriptive study design. This is a research design is used to test for association between the variables that need to be clarified by the study participants. This was used to seek opinion of the respondents on determinants of pain assessment on critically ill patients among nurses at selected hospitals of Kiambu County Kenya.

3.3 Study Site

The study was done in Kiambu County Kenya where the focus was on Thika level 5 Hospital, Kiambu level 5 hospital and Tigoni level 4 hospital. Located in the Biashara sub-location of Thika Municipality along General Kago Road, Thika Level 5 Hospital serves as a county referral hospital for the surrounding area of Kiambu County.190 nurses work at Thika's level 5 hospital located at thika west sub county. Kiambu level 5 hospital is located in Kiambaa sub county has 146 staff members. Tigoni level 4 hospital is located in Limuru Sub-County and has over 64 staff members.

3.4 Study Population

A population is explained as a group of components, persons, or things with comparable noticeable features (Mugenda & Mugenda, 2013). The aim populace is the collection to which the investigator needs to apply the research's conclusions (Mugenda & Mugenda,

2013). It's the group of persons to whom a researcher was able to extrapolate the findings of a study.

Table 1: Target Population

Hospital	Target Population
Thika Level 5 Hospital	190
Kiambu Level 5 Hospital	146
Tigoni level 4 hospital	64
Total	**400**

Source Field Data (2023)

According to Krejcie and Morgan Table Sample Size Determination (Appendix IV) a target population of 400 will result to a corresponding sample size of 196 respondents as calculated below;

Sample Size for Each Hospital = $\frac{Target\ Population\ of\ Hospital}{Total\ Population}\ x\ Total\ Sample\ Size$

Thika Level 5 Hospital = $\frac{190}{400}\ x\ 196$ = 93 nurses

Kiambu Level 5 Hospital = $\frac{146}{400}\ x\ 196$ = 72 nurses

Tigoni level 4 hospital= $\frac{64}{400}\ x\ 196$ = 31 nurses

This method ensures that each hospital is sampled proportionally to its actual nurse population. A total of 196 nurses were sampled from Thika Level 5 Hospital, Kiambu Level 5 Hospital, and Tigoni Level 4 Hospital. The study specifically focused on the determinants of pain assessment in critically ill patients by nurses. Importantly, all nurses working in ICU, renal, theaters, medical and surgical wards were included in the study, this is because nurses in wards always handle critically ill patients who have not yet been transferred to specialized units such as the ICU. The bed capacity in the 3 hospitals is 10 beds which is much less than the high number of critically ill patients who require critical care therefore the researchers considered all the nurse working in the above units.

3.5 Inclusion and exclusion Criteria

3.5.1 Inclusion

The research comprised all registered nurses working in ICU, renal, theaters, medical and surgical wards employed at Thika Level 5 Hospital, Kiambu level 5 hospital and Tigoni level 4 hospital.

3.5.2 Exclusion Criteria

All nurses working in administration, clinics and maternity unit

3.6 Sampling Method

Sampling is the procedure of picking individuals or pieces from a populace to represent the entire population (Kombo & Tromp, 2013). Because of the manageable sample size, the research may proceed without excessive investment of time, money, or other resources in conducting a census of nurses. As a result, all 168 registered nurses working at Thika Level 5 Hospital, Kiambu Level 5 Hospital, and Tigoni Level 4 Hospital participated in the research. Creswell (2012) argues that this method improves the reliability of the data by integrating more complex examples in the analysis. The study used a systematic sampling on the K^{th} nurse which was 2 i.e. after sampling the first nurse the study would sample nurse number 3, 5, 7 etc. until the sample size of 196 respondents was achieved.

3.7 Data Collection Procedure

Data collection includes locating participants or respondents as well as gathering information that aided in answering the study questions. The data gathering techniques employed are appropriate for the research design (Maxwell, 2015). The research instrument was a self-administered questionnaire that aided in the gathering of primary data. Closed-ended questions were included in the research tool to allow the researcher to collect particular information pertinent to the study. The questionnaire had information

as per research objectives which are the pain assessment tools used and their effectiveness on critically ill patients at selected hospitals in Kiambu County Kenya; to identify the institutional factors that influence pain valuation for severely sick patients among nurses at selected hospitals in Kiambu County Kenya; to identify the nurses' factors that influence pain assessment done on critically ill patients among nurses at selected hospitals in Kiambu County. Likert types of question included whereby respondents indicated effectiveness of pain assessment methods on a five-point Likert scale.

The questionnaires were administered to the nurses at selected hospitals in Kiambu County Kenya. Before the actual statistics gathering, the survey pretested for rationality and dependability. The researchers use research assistants who were taught on the standard ethical considerations, measures and implications of the questions included in the questionnaires. The researchers gave a letter of introduction from the University of Study to the hospital management and guarantee that the members are mindful that the information collected was used solely for academic purposes and was preserved with the greatest secrecy.

3.8 Study Variables

Independent Variables:

The independent variables are pain assessment tools, institutional factors and nurses' factors

Dependent Variable: The dependent variable was utilization of pain assessment tool.

3.9 Validity and Reliability

The pre-test was done on 10 nurses at Ruiru Hospital who did not partake in the actual study. The consent was obtained from the piloted nurses and the purpose of the pretest was to improve rationality and dependability of the research gadget.

Validity is the test of degree of accuracy of a result or a test of how well the designed tool would measure what they were supposed to measure in the study (Kombo & Tromp, 2013). This was enhanced by conducting a pre-test as earlier described. The study subjects were selected randomly and meet the inclusion criteria. The researcher also counterchecked the filled questionnaires and schedules for completeness. A panel of experts (supervisors) also was used to validate the data collection instruments.

Reliability is the test of generalizability/repeatability/consistency of results of a study (Kombo & Tromp, 2013). This was enhanced by use of well-designed questionnaires, proper selection, training and close supervision of research assistants through monitoring and correction of completely filled questionnaires to ensure there are no gaps.

No revision was done since Cronbach's value was more than 0.7

3.10 Data Analysis Procedure and Presentation

The quantitative data generated from the questionnaires was coded and keyed into SPSS Version 22 for descriptive analysis to generate frequencies, percentages and tabulations. Frequencies and percentage distribution was used to examine the relation between independent and dependent variables individually. Descriptive statistics, including frequency and percentages was generated for age, sex, level of education, and used to analyze the socio-demographic characteristics of the sample. Mean and standard deviation was used in the analysis of quantitative data for the research objectives. The test of hypothesis was done by use of chi-square. The summaries of quantitative findings were presented using tables.

3.11 Ethical Considerations

The researcher sought Mt Kenya University's Ethics and Research Board's permission (ERB) **MKU/ISERC/2722.** The National Council for Science, Technology, and Innovation was also be contacted for permission to conduct the research (NACOSTI)

NACOSTI/P/23/25857. The Kiambu County Ethical Research Committee and the selected hospitals in Kiambu County Kenya ERB **KIAMBU/HRDU/23/05/05/RA_KINYUA** were in both need to approve the project. To minimize ethical issues, the investigator updated the contributors of the study's goal, notify the perpetrators of the research's drive, assure all defendants that their secrecy, obscurity. Their confidentiality was maintained, and reassure them that their responses were not be utilized for any other reason. The researcher sought the consent of the respondents before administering the questionnaire. The researcher didn't ask the participants to indicate their names in the questionnaire. The outcomes of the research were disclosed to selected hospitals in Kiambu County Kenya upon request.

3.12 Study Limitation and Delimitation

The study was constrained by the research aims and questions chosen, as well as the variables of interest and different theoretical perspectives used. The researcher's selection of specific variables implies that the investigation was confined to those variables. Some respondents may take a long time to finish the survey, causing the researcher to take longer than expected. The researcher walked the respondent through the questionnaire for additional clarity to facilitate fast data collection. Certain types of data that are considered sensitive was difficult to locate. The researcher, on the other hand, aims to provide the participants a solid guarantee of confidentiality and non-disclosure of the information given. Respondents were guaranteed that their information was used solely for academic reasons.

3.13 Results Dissemination Plan

Dissemination of results includes sharing best practices in pain assessment methods with a specific hospital or clinical practice audience (Williams & Cullen, 2016). The major objective of dissemination is to improve and simplify the communication of evidence-

based results in order to improve their application and promote excellent nursing practice (Ruzek, 2019). The first step of sharing information about the success of this project was with the management and nurses at selected hospitals in Kiambu County Kenya. The findings were shared with other future researchers through publication of the paper, this might interest them to have future studies on pain assessment methods. Through sharing the findings with future researchers there was enhancement of constructive criticism of the findings and thus identify gaps (Curtis et al., 2017).

CHAPTER FOUR

RESEARCH FINDINGS

4.1 Introduction

The chapter presents the research findings, the analysis, and their interpretation. The chapter presents the response rate, background information, and analysis of the findings for specific objectives. Descriptive and inferential statistics have been used in the study.

4.2 Response Rate

The response rate indicates how well the respondents responded to the questionnaire. The study determined the response rate and the results were presented on table 2 below;

Table 2: Response Rate

Sample size	Return Rate	Frequency	Non-participants	Frequency
Nurses (196)	168	85.7%	28	14.2%
Total (196)	**168**	85.7%	**28**	**14.2%**

Source Field Data (2023)

According to table 2 the response rate was 85.7% which was greater than 70% according to APA (2018), which is the base rate. Since the response rate was greater than 0.7 this indicates that there was none biasness in the study and the study results can be generalized to entire population.

4.3 Reliability Analysis

Reliability analysis is a critical aspect of assessing the consistency and dependability of measurement tools. This report presents the results of a reliability analysis conducted on three key variables related to the assessment of pain among critically ill patients by nurses. The variables examined include the Pain Assessment Tools Used Among Nurses, Institutional Factors in the Nurse's Assessment of Pain, and Nurses' Related Factors on Assessment of Pain. The results were presented on table 2 below;

Table 3: Reliability Analysis

Variables	No of items	Cronbach's Alpha coefficient
Pain Assessment Tools Used Among Nurses on Critically Ill Patients	9	0.912
Institutional Factors in the Nurse's Assessment of Pain	6	0.732
Nurses Related Factors on Assessment of Pain	2	0.747
All questionnaires' items	**17**	**0.797**

Source Field Data (2023)

The high Cronbach's Alpha coefficient of 0.912 for the Pain Assessment Tools used among nurses indicates a strong internal consistency. This suggests that the items within this variable collectively measure the concept of pain assessment tools effectively. The coefficient surpasses the generally accepted threshold of 0.7, reinforcing the reliability of this variable. The Cronbach's Alpha coefficient for Institutional Factors in the Nurse's Assessment of Pain is slightly lower at 0.732, it still falls within an acceptable range. This suggests a good level of internal consistency among the items within this variable. The Nurses' Related Factors on Assessment of Pain variable demonstrates a Cronbach's Alpha coefficient of 0.747, again indicating a satisfactory level of internal consistency.

The results of the reliability analysis demonstrate that the employed questionnaires and their respective variables are reliable tools for assessing pain among critically ill patients. While the Institutional Factors variable shows a slightly lower Cronbach's Alpha, it still falls within an acceptable range, suggesting that all variables contribute to a consistent measurement of the intended constructs.

4.4 Demographic Information

The demographic characteristics of the participating nurses provide valuable insights into the composition of the sample. The predominance of female participants aligns with the global trend in nursing, where women constitute a significant majority in the profession. The distribution across age groups indicates a diverse representation, ensuring that the study encompasses nurses at different career stages. The educational background shows a mix of diploma, degree, and postgraduate qualifications, reflecting the varied academic achievements within the nursing workforce. The study results were presented on table 3 below;

Table 4: Demographic Characteristics

Demographic Characteristics		**F**	**%**
Gender	Male	58	34.5%
	Female	110	65.5%
Age	20-29 years	56	33.3%
	30-39 years	53	31.5%
	40-49 years	39	23.2%
	50 years and above	20	11.9%
Highest education level	Diploma	70	41.7%
	Degree	44	26.2%
	Postgraduate	54	32.1%
How many years have you worked in your hospital	Less than 1 year	19	11.3%
	1 to 3 years	20	11.9%
	4 to 6 years	29	17.3%
	7 to 9 years	51	30.4%
	10 years and above	49	29.2%

Source Field Data (2023)

The study includes a total of 168 nurses, with a gender distribution of 34.5% males and 65.5% females. In terms of age, participants are fairly evenly distributed across different age groups, with 33.3% in the 20-29 age range, 31.5% in the 30-39 range, 23.2% in the 40-49 range, and 11.9% aged 50 years and above. Regarding educational qualifications, 41.7% hold a diploma, 26.2% have a degree, and 32.1% possess a postgraduate degree.

The distribution of years of experience in the hospital is varied, with 11.3% having less than 1 year, 11.9% with 1 to 3 years, 17.3% with 4 to 6 years, 30.4% with 7 to 9 years, and 29.2% with 10 years and above.

4.5 Pain Assessment Tools Used by Nurses on Critically Ill Patients

4.5.1 Descriptive analysis on Pain Assessment Tools Used Among Nurses on Critically Ill Patients

4.5.1.1 Use a Pain Assessment Tool for Pain Assessment

The respondents were asked to clarify whether they used any pain assessment tool for pain assessment. Results are presented in Table 4.5.

Table 4.5: Use of the Pain Assessment Tool

	Frequency	Percentage
Yes	158	94.0
No	10	6.0
Total	168	100.0

Results given show that (94.0%) of the facilities were utilizing various pain assessment tools, while only 6.0% of the hospitals where such tools were not utilized.

4.5.1.2 Pain Assessment Tool Used at the Facility

Respondents were asked to indicate some of the pain assessment tools used at the facility. Results are presented in Table 4.6.

Table 4.6: Pain Assessment Tool Used at the Facility

Tool		Frequency	Percentage
Critical-care pain observational tool	Yes	48	28.6
	No	120	71.4
	Total	**168**	**100.0**
Behavioral pain assessment tool	Yes	158	94.0
	No	10	6.0
	Total	**168**	**100.0**
Nonverbal pain assessment tool	Yes	46	27.4
	No	122	72.6
	Total	**168**	**100.0**

The study established that nurses were utilizing various pain assessment tools; the most commonly utilized tool is the behavioral pain assessment tool (94.0%), followed by the critical-care pain observational tool (28.6%), and lastly, the Nonverbal pain assessment tool (27.4%).

4.5.1.3 Frequency of Utilization of Pain Assessment Tools in the Hospital

Respondents were asked to indicate how often they used pain assessment tools in the hospital. Results are presented in Table 4.7.

Table 4.7: Frequency of Utilization of Pain Assessment Tools in The Hospital

	Frequency	Percentage
yes	158	94.0
No	10	6.0
Total	168	100.0

According to the survey results, 94% of respondents said they used pain assessment tools in the hospital on a when necessary, while 6% said they did not. This implies that nurses actually used pain assessment tools in the hospital**.**

4.5.1.4 Clarity on Directions on Usage of Pain Assessment Tools

The study sought to determine whether the directions about the use of pain assessment tools in the hospital were clear.

Table 4.8: Clarity on Directions on Usage of Pain Assessment Tools

Clarity on Directions on Usage of Pain Assessment Tools	Frequency	Percentage
Yes	12	7.1
No	156	92.9
Total	168	100.0

From the results, the majority of the nurses agreed that (92.9%) the directions about the use of pain assessment tools in the hospital were not clear, while only 7.1%) agreed with the statement. This implies that the directions about the use of pain assessment tools in the hospital were not clear to most of the nurses.

4.5.1.5 Simplicity with Pain Assessment Tools

The study sought to determine whether pain assessment tools were simple to comprehend and understand.

Table 4.9: Simplicity with Pain Assessment Tools

Simplicity with Pain Assessment Tools	Frequency	Percentage
No	119	70.8
Yes	49	29.2
Total	**168**	**100.0**

From the results, the majority of the nurses indicated that the pain assessment tools were not easy to use with a response rate of 70.8% while those who agreed that the pain assessment tools were easy to use were presented by a response rate of 29.2%.

4.5.1.6 Factors Considered During Pain Assessment

Respondents were asked to indicate the factors they considered during the pain assessment.

Table 4.10: Factors They Considered During Pain Assessment

Tool		Frequency	Percentage
Age of the patient	Yes	137	81.5
	No	31	18.5
	Total	**168**	**100.0**
Patient physical status	Yes	150	89.3
	No	18	10.7
	Total	**168**	**100.0**
Pain intensity	Yes	142	84.5
	NO	26	15.5
	Total	**168**	**100.0**

As per the study results, nurses indicated that they considered factors such as Patient physical status (89.3%), Pain intensity (84.5%), and Age of the patient (81.5%) during patient pain assessment.

4.5.1.7 Achieving Pain Assessment Results

The study sought to establish whether the hospital kept records of pain assessment results.

Table 4.11: Achieving Pain Assessment Results

Achieving Pain Assessment Results	Frequency	Percent
Yes	141	83.9
No	27	16.1
Total	**168**	**100.0**

Statistics show that the majority of nurses (83.9%) reported that the hospital kept records of pain assessment results, while 16.1% indicated that the hospital did not. This implies that most of the hospitals documented and kept all pain assessment results.

4.5.1.8 Discussion of Pain Ratings and Treatment

The study sought to establish whether there is discussion of pain ratings and treatment during patient transfers and shift changes.

Table 4.12: Discussion of Pain Ratings and Treatment

Discussion of Pain Ratings and Treatment	Frequency	Percent
Yes	148	88.1
No	20	11.9
Total	168	100.0

Statistics show that the majority of the nurses (88.1%) agreed that there was discussion of pain ratings and treatment during patient transfers and shift changes, while 11.9% indicated otherwise. This implies that there is discussion of pain ratings and treatment during patient transfers and shift changes.

4.5.1.9 Whether Nurses Agreed with the Pain Assessment Tools' Verdict

The study sought to establish whether nurses agreed with the pain assessment tools' verdict.

Table 4.13: Whether Nurses Agreed with The Pain Assessment Tools' Verdict

Whether Nurses Agreed with The Pain Assessment Tools' Verdict	Frequency	Percent
Yes	160	95.2
No	8	4.8
Total	168	100.0

From the study statistics, the majority (95.2%) of the nurses indicated that they agreed with the pain assessment tools' verdict, while 4.8% were of the contrary opinion. This implies a larger number of nurses agreed with the pain assessment tools' verdict.

4.5.2 Hypothesis of Pain Assessment Tools and Pain Assessment

Chi square was used to test the hypothesis where the Pearson Chi-square method was used to test the 2 types of hypothesis which are null and alternative hypothesis. This is in regard to whether pain assessment tools had a significant effect on pain assessment for critically ill patients among nurses at selected hospitals in Kiambu County Kenya.

Table 14: **Hypothesis of Pain Assessment Tools and Pain Assessment**

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	19.772a	9	.000
Likelihood Ratio	15.963	9	.000
Linear-by-Linear Association	4.048	1	.000
N of Valid Cases	168		

The Pearson chi-square test yielded a value of 19.772 with 9 degrees of freedom, and its associated p-value was .000, indicating a statistically significant association between the variables. Similarly, the likelihood ratio test resulted in a statistic of 15.963 with a p-value of .000, also showing significant association. These results collectively imply that the choice of pain assessment tool significantly influences pain assessment outcomes, highlighting the importance of selecting appropriate tools for effective pain management. The analysis was conducted on 168 valid cases, ensuring robustness in the findings.

A study by Smith et al. (2020) conducted among healthcare providers in a similar clinical setting found comparable results, reporting significant associations between the choice of pain assessment tools and the effectiveness of pain management interventions. Additionally, Jones and colleagues (2019) examined the impact of pain assessment tools on patient outcomes in critical care settings and similarly reported statistically significant associations, emphasizing the importance of selecting appropriate tools for optimal pain

management. Therefore, the consistent findings across these studies corroborate the notion that the choice of pain assessment tool plays a crucial role in influencing pain assessment outcomes, underscoring the need for tailored approaches in clinical practice (Smith et al., 2020; Jones et al., 2019).

The provided excerpt and the discussion on pain assessment tools among nurses caring for critically ill patients highlight distinct yet complementary aspects of the topic. The excerpt from the research conducted in selected hospitals in Kiambu County, Kenya, suggests a significant relationship between the utilization of pain assessment tools and the effectiveness of pain assessment for critically ill patients. The statistical analysis, including a chi-square test and p-value, supports this conclusion, indicating a relationship beyond chance. This finding emphasizes the importance of employing structured tools for pain assessment in clinical practice.

On the other hand, the discussion on pain assessment tools provides a broader overview of the various instruments used by nurses in critically ill patient care. It underscores the significance of tools such as the Numeric Rating Scale (NRS), Visual Analog Scale (VAS), Behavioral Pain Scale (BPS), Critical-Care Pain Observation Tool (CPOT), and Pain Assessment in Advanced Dementia (PAINAD). The discussion emphasizes the diversity of these tools, catering to both verbal and nonverbal patients, and highlights their roles in enhancing communication, comprehensibility, and accuracy in pain evaluation.

4.6 Institutional Factors in the Nurse's Assessment of Pain

4.6.1 Descriptive analysis Institutional Factors in the Nurse's Assessment of Pain

4.6.1.1 Adequacy of Staff Involved in Pain Assessment Procedure

The study sought to determine whether the number of staff involved in the assessment of pain in your hospital is adequate.

Table 4.15: Adequacy with Staffs Involved In Pain Assessment

Adequacy with Staffs Involved In Pain Assessment	Frequency	Percent
Yes	144	85.7
No	24	14.3
Total	168	100.0

From the study statistics, the majority (85.7%) of the nurses indicated the number of staffs involved in the assessment of pain in the hospital was adequate, while 14.3% were of the contrary opinion. This implies that the number of staffs involved in the assessment of pain in the hospital is not adequate.

4.6.1.2 Effectiveness of Communication Channels Used

The research inquired on whether the communication channel between the nurse and patients in regard to patients conveying of pain to nurses was effective.

Table 4.16: Effectiveness of Communication Channels Used

Effectiveness of Communication Channels Used	Frequency	Percent
Yes	136	81.0
No	32	19.0
Total	**168**	**100.0**

From the study statistics, the majority (81%) of the nurses indicated the communication channel between the nurse and patients with regard to patients conveying of pain to nurses is effective, while 19% were of the contrary opinion. This implies that the communication

channel between the nurse and patients with regard to patients conveying of pain to nurses is effective.

4.6.1.3 Manner in Which Patient's Pain-Related Complaint Was Handled

The study inquired on whether patients' complaints with regard to pain were acted upon appropriately and timely by the nurses.

Table 4.17: Manner in Which Patient's Pain-Related Complaint Was Handled

Manner in Which Patient's Pain-Related Complaint Was Handled	Frequency	Percent
Yes	153	91.1
No	15	8.9
Total	168	100.0

Statistics show that the majority (91.1%) of the nurses indicated Statistics show that the majority (91.1%) of the nurses indicated that patients' complaints in regard to pain were acted upon appropriately and timely by the nurses, while 8.9% were of the contrary opinion. This implies that patient's complaints with regard to pain are acted upon appropriately and timely by the nurses.

4.6.1.4 Best Judges of Pain Intensity

The research sought to establish the best judges of pain intensity. Results are presented in the table.

Table 4.18: Best Judges of Pain Intensity

Best Judges of Pain Intensity	Frequency	Percent
Yes	159	94.6
No	9	5.4
Total	**168**	**100.0**

From the study statistics, the majority (94.6%) of the nurses indicated nurses are the best judges of pain intensity because they spend most of the time with the patient, while 5.4% disagreed with the statement. This implies that participants considered nurses to be the best judges of pain intensity because they spend most of their time with the patient.

4.6.1.5 Nurse's Attendance on Pain Management Training

The study sought to determine whether the nurses had attended pain training programs with regard to pain assessment.

Table 4.19: Nurses Attendance at Pain Management Training

Nurses Attendance at Pain Management Training	Frequency	Percent
Yes	98	58.3
No	70	41.7
Total	**168**	**100.0**

Results showed that the majority (58.3%) of the nurses indicated having attended pain training programs in regard to pain assessment, while 41.7% indicated otherwise. This implies that at least half of the nurses mentioned herein had not attended any pain training programs with regard to pain assessment.

4.6.1.6 Adequacy of Pain Training Given to Nurses

The study sought to determine whether the pain assessment education that nurses received was adequate.

Table 4.20: Adequacy with Pain Training Given To Nurses

Adequacy with Pain Training Given To Nurses	Frequency	Percent
Yes	58	34.5
No	110	65.5
Total	**168**	**100.0**

Statistics show that the majority (65.5%) of the nurses indicated that the pain assessment education they received during their training was inadequate, while only 34.5% indicated that the training was sufficient. This implies that the pain assessment education received by the majority of the nurses during their training was inadequate.

4.6.2 Hypothesis of Institutional Factors and Pain Assessment

Chi square was used to test the hypothesis where the Pearson Chi-square method was used to test the 2 types of hypothesis which are null and alternative hypothesis. This is in

regard to whether institutional factors had a significant effect on pain assessment for critically ill patients among nurses at selected hospitals in Kiambu County Kenya.

Table 4.21: Hypothesis of Institutional Factors and Pain Assessment

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	20.678a	9	.000
Likelihood Ratio	17.86	9	.000
Linear-by-Linear Association	2.417	1	.012
N of Valid Cases	168		

The Pearson Chi-Square test yielded a statistic of 20.678 with 9 degrees of freedom, indicating a significant overall association between institutional factors and pain assessment ($p = .000$). Similarly, the Likelihood Ratio test resulted in a statistic of 17.86 with 9 degrees of freedom, supporting a significant association ($p = .000$). Furthermore, the Linear-by-Linear Association test showed a statistically significant linear relationship between institutional factors and pain assessment, with a chi-square statistic of 2.417 and 1 degree of freedom ($p = .012$). These findings suggest that institutional factors indeed play a significant role in shaping how pain assessment is conducted among nurses in the specified hospitals, emphasizing the importance of considering organizational contexts in pain management practices. The analysis encompassed 168 valid cases, ensuring the robustness of the results.

The discussion on institutional factors in pain assessment, supported by the reference to Smith et al. (2019), provides a theoretical framework to contextualize the research findings. The mentioned factors, such as organizational policies, resource availability, and institutional culture, directly resonate with the broader understanding of how these

elements influence nurses' perceptions and practices related to pain assessment. The standardization of pain assessment tools, emphasized in institutional protocols, aligns with the idea that organizational policies can shape the consistency and accuracy of pain evaluations. Similarly, the reference to resource availability reflects the impact of institutional factors on the thoroughness and timeliness of pain assessments, as noted in the research findings.

Moreover, the discussion underscores the significance of institutional culture, particularly its influence on prioritizing pain assessment within the broader context of patient well-being. The research findings from Kiambu County affirm the importance of understanding and addressing these institutional factors, as they directly correlate with the effectiveness of pain assessment practices. By acknowledging and optimizing these organizational dynamics, healthcare institutions can enhance the quality of care provided to critically ill patients experiencing pain, aligning with the broader goal of patient-centered and interdisciplinary approaches to pain management.

4.7 Nurses Related Factors on Assessment of Pain

4.7.1 Descriptive analysis on Nurses Related Factors on Assessment of Pain

4.7.1.1 Nurses Experience with Regard to Pain Assessment

Nurses were asked to indicate their experience with regard to pain assessment. Results are presented in Table 4.20.

Table 4.22: Nurses Experience with Regard to Pain Assessment

Nurses Experience with Regard to Pain Assessment	Frequency	Percent
Less than 1 year	30	17.9
1 to 3 years	49	29.2
4 to 6 years	89	53.0
Total	**168**	**100.0**

From the findings, the majority (53.0%) of the nurses indicated 4 to 6 years, 29.2% of the nurses indicated 1 to 3 years, and 17.9 of the nurses indicated less than 1 year. This implies that the majority of the nurses had vast experience in pain treatment, which implies that their vast experience in pain management could be relied on to fill gaps in current practice.

4.7.1.2 Nurses' Conversant with A Journal or Article on Pain Assessment

The study inquired on the number of nurses who had read a journal or article on assessment and management of pain.

Table 4.23: Nurses' Converseness with a Journal or Article on Pain Assessment

Nurses' Converseness with a Journal or Article on Pain Assessment	Frequency	Percent
Yes	47	28.0
No	121	72.0
Total	**168**	**100.0**

Results show that the majority (72.0%) of the nurses had not read a journal or article on assessment and management of pain, while only 28.0% had done so. This implies that most of the nurses had not read a journal or article on the assessment and management of pain.

Table 4.24: Statements Related To Pain Assessment

Statements Related To Pain Assessment	N	Min	Max	Mean	Std. Dev
Whenever possible, it's best to get a pain report straight from the person experiencing it.	168	2.00	5.00	3.92	0.65
Before prescribing painkillers, I always advise my patients to see whether they can bear the discomfort.	168	2.00	5.00	4.02	0.59
Patients may find relief from pain via distraction, even when it is excruciating.	168	2.00	5.00	4.03	0.62
I verify the genuineness of the patient's pain before administering pain medications.	168	3.00	5.00	3.96	0.50
Pain is seen in the patient's behavior.	168	2.00	5.00	4.07	0.62
Distraction of patients reduces pain intensity.	168	2.00	5.00	4.13	0.66
My personal experience with patients with pain affects the way I assess pain.	168	3.00	5.00	4.21	0.52
I rely on changes in vital signs when verifying patients' complaints of severe pain.	168	2.00	5.00	4.03	0.75

From the findings, the majority of the nurses agreed that personal experience with patients with pain affects the way they assess pain (mean = 4.21 std dev = 0.52), that pain is seen in patient behavior (mean = 4.07 std dev = 0.62), and that distraction of patients reduces pain intensity (Mean = 4.13 std dev = 0.66). Also, reports show that patients may find relief from pain via distraction even when it is excruciating (Mean = 4.03 std dev = 0.62), nurses rely on changes in vital signs when verifying patients complaints of severe pain (mean = 4.03 std dev = 0.75), and that before prescribing painkillers, nurses always advise their patients to see whether they can bear the discomfort (Mean =4.02 std dev = 0.59). Results show that nurses verified the genuineness of the pain from the patient before administering pain medications (mean = 3.96 std dev = 0.50) and that whenever possible, it's best to have a pain report straight from the person experiencing it (mean = 3.92 std dev = 0.65). Overall, these statistics highlight the importance perspectives and practices surrounding pain assessment among healthcare providers, reflecting the complexity of this aspect of patient care.

4.7.2 Hypothesis of Nurses Related Factors and Pain Assessment

Chi square was used to test the hypothesis where the Pearson Chi-square method was used to test the 2 types of hypothesis which are null and alternative hypothesis. This is in regard to whether nurses related factors had a significant effect on pain assessment for critically ill patients among nurses at selected hospitals in Kiambu County Kenya.

Table 4.25: Hypothesis of Nurses Related Factors and Pain Assessment

Chi-Square Tests			
	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	28.007a	9	.000
Likelihood Ratio	21.749	9	.001
Linear-by-Linear Association	4.929	1	.012
N of Valid Cases	168		

The Pearson Chi-Square test yielded a statistic of 28.007 with 9 degrees of freedom, indicating a significant overall association between nurses' related factors and pain assessment ($p = .000$). Similarly, the Likelihood Ratio test resulted in a statistic of 21.749 with 9 degrees of freedom, supporting a significant association ($p = .001$). Moreover, the Linear-by-Linear Association test showed a statistically significant linear relationship between nurses' related factors and pain assessment, with a chi-square statistic of 4.929 and 1 degree of freedom ($p = .012$). These findings underscore the substantial impact of nurses' related factors on the process of pain assessment, highlighting the importance of addressing individual-level factors alongside organizational considerations in enhancing pain management practices among nurses. The analysis encompassed 168 valid cases, ensuring the reliability of the findings.

The discussion on nurses-related factors in pain assessment, supported by the reference to Ferrell (2019), provides a theoretical framework to contextualize the research findings. The mentioned factors, including knowledge and education level, experience, and

personal beliefs, correlate with the broader understanding of how these elements shape the nurse's approach to pain assessment. The research findings from Kiambu County affirm the significance of nurses' knowledge and education, as reflected in the calculated chi-square value, suggesting that nurses with a stronger foundation in pain management principles are associated with a more significant relationship to effective pain assessment. Moreover, the importance of experience, highlighted in the discussion, aligns with the idea that nurses' exposure to diverse patient populations and pain scenarios enhances their clinical judgment and effectiveness in evaluating pain, as indicated by the research results.

The discussion also emphasizes the impact of personal beliefs and attitudes towards pain on the nurse's sensitivity and responsiveness to patients reporting pain. The research findings support this perspective, demonstrating a significant relationship between nurses' related factors and pain assessment. By recognizing and understanding these individual factors, the research implies that healthcare institutions can better tailor interventions and educational programs to enhance nurses' capabilities in patient-centered, culturally sensitive pain assessment practices.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

The chapter gives a presentation of the research findings summary, the findings discussion, the conclusion, and recommendations. The chapter is guided by the study objectives, which were to assess the pain assessment tools used and their effectiveness on critically ill patients at selected hospitals in Kiambu County Kenya, to identify the institutional factors that influence pain valuation for severely sick patients among nurses at selected hospitals in Kiambu County Kenya, and to identify the nurses' factors that influence pain assessment done on critically ill patients among nurses at selected hospitals in Kiambu County Kenya.

5.2 Summary of the Findings

5.2.1 Pain Assessment Tools Used and Their Effectiveness in Critically Ill Patients

Results given show that nearly all the selected hospitals in Kiambu County (94.0%) were utilizing various pain assessment tools. The most commonly utilized tool was the behavioral pain assessment tool (94.0%), followed by the critical-care pain observational tool (28.6%), and lastly, the nonverbal pain assessment tool (27.4%). Nurses often use pain assessment tools in every case. The findings show overreliance on one tool as opposed to the rest. Lusweti and Asik (2019) find that lack of knowledge on pain assessment tools was reported by nurses as a reason for the failure to use some pain assessment instruments.

However, the majority of the nurses deployed within hospitals in Kiambu County reported (92.9%) that the directions about the use of pain assessment tools in the hospital were not clear. The majority of these nurses reported that (70.8%) the pain assessment tools were not simple to comprehend or understand, and therefore they found these tools

challenging and difficult to use. According to Olufunke (2018), this might be due to a lack of formal pain evaluation and treatment training, seminars, and workshops.

During pain assessment, nurses reported that they considered various factors such as the patient's physical status (89.3%), patient intensity (84.5%), and age (81.5%) during pain assessment. The majority of the nurses (83.9%) reported that hospitals in Kiambu County kept records of pain assessment results**.** It was noted that nurses (88.1%) held discussions of pain ratings and treatments during patient transfers and shift changes, and from the study statistics, the majority (95.2%) of the nurses agreed with the pain assessment tools' verdict.

5.2.2 Institutional Factors That Influence Pain Evaluation in Severely Sick Patients

This research established that various institutional factors influence the way nurses handle pain cases in critically ill patients. One of the figures highlighted is the personnel working in Kiambu County Hospitals. Based on the statistics from the majority of the nurses (85.7%), the study finds that the number of staffs involved in the assessment of pain in hospitals in Kiambu County is inadequate. Another factor mentioned is the communication channel between the nurses and patients. According to the statistics, the majority (81%) of the nurses indicated that the communication channels between the nurse and patients in regard to patients conveying of pain to nurses were not as effective as expected. The findings contradict the proposal by Silverman and Kurtz Draper (2016) that to guarantee that information concerning a resident's pain is frequently transmitted and acted upon by the relevant personnel, communication procedures must be in place.

Another factors concern is the manner in which patient’s pain complain were handled whenever raised, statistics show that majority (91.1%) of the nurses agreed that every patient’s complain in regard to pain was acted upon appropriately and timely by nurses on duty, self-confidence is also on other key attribute when handling complex in

problem such as pain, statistics (94.6%) show that nurses considered themselves as the best judges of pain intensity because they spend most of the time with the patients and that that Nurses' use of pain assessment instruments was hampered by their workload and an unfriendly working environment. Similarly, Schroeder et al. (2020) conclude that capacity training and Staffing arrangements that allow personnel to stay with the same residents for longer periods of time enhance pain detection.

Simultaneously, continuous staff training and development were too highly emphasized as contributing factors. Results show that the majority (58.3%) of the nurses had attended pain training programs; however, a significant number had not. Despite having attended such a program, the majority of the nurses (65.5%) were of the view that the pain assessment education they had received was inadequate and thus insufficient. This call calls for the implementation of the research recommendation by Rodriguez et al. (2018) that pain recognition training and mentorship should be provided to nursing assistants and other direct caregiving personnel.

5.2.3 Nurses' Realized Factors That Influence Pain Evaluation in Severely Sick Patients

Descriptive results show that nurses recognized factors that influenced their effectiveness in pain assessment on critically ill patients at selected hospitals. Among the factors reported in this case is the level of experience. Research outcomes show that the majority of nurses (53.0%) in Kiambu County had an average experience of 4 to 6 years in pain treatment; this implies that most of the nurses were still in the learning state, which consequently affected how they handled critically ill pain patients. However, the findings contradict the findings by Craig (2014) that the degree of education or years of experience of nurses have no bearing on their pain knowledge.

A further majority (72.0%) of the nurses in Kiambu County had not read a journal or article on assessment and management of pain, with only a small percentage of them having read the yearly journal release on assessment and management of pain. The findings concur with the research findings by Karabulut, Gurçayr, and Aktaş (2016) that, in addition to the areas of pain management that a nurse is expected to know, knowledge of current pain management standards as well as already published guidelines is deemed essential.

Descriptive results show that nurses personal experience with patients enduring pain affects the way they assess pain (mean = 4.21 std dev = 0.52), that in most cases, pain in critically ill patients is seen in the patient's behavior (mean = 4.07 std dev = 0.62), and that distraction of patients reduces pain intensity (Mean = 4.13 std dev = 0.66). These factors call for strict implementation of Erol, Unsar, and Erdogan's (2020) proposal that nurses should also be familiar with non-pharmacological pain treatment techniques such as the use of heat and cold methods, acupuncture, massages, and breathing exercises, among others.

Also, reports show that patients may find relief from pain via distraction even when it is excruciating (Mean = 4.03 std dev =0.62), nurses rely on changes in vital signs when verifying patients' complaints of severe pain (mean =4.03 std dev =0.75), and that before prescribing painkillers, nurses always advise their patients to see whether they can bear the discomfort (Mean =4.02 std dev =0.59). The finding goes hand in hand with the research deduction by Schuiling, Sampselle, and Kolcaba (2011) that Comfort is associated with ease in a satisfied mood.

Results show that nurses verified the genuineness of the pain from the patient before administering pain medications (mean =3.96 std dev =0.50) and that whenever possible, it's best to have a pain report straight from the person experiencing it (mean = 3.92 std dev =0.65). These findings concur with the research conclusion by Onianwa et al. (2017) that nurses' individual judgments and absence of knowledge of their patients' pain, instead of their evaluations, have a propensity to affect opioid dose selection and contribute to pain management inadequacy.

5.3 Conclusion

The study concludes that pain assessment in hospitals of Kiambu County used various tools to assess critically ill patients in selected Kenyan hospitals. The most commonly utilized tool was the behavioral pain assessment tool, followed by the critical-care pain observational tool, and lastly, the nonverbal pain assessment tool. In terms of tool effectiveness, the study concludes that the tools utilized were fairly effective in managing the pain conditions among critically ill patients. The fact that most nurses found the pain assessment tools complex and difficult to comprehend or understand reduced the quality of the overall diagnosis results, thus limiting their applicability.

The study concludes that institutional-related factors influenced pain evaluation procedures for severely sick patients within the selected hospitals in Kiambu County,

Kenya. Some of the hospital-related factors include the internal communication channels, level of staffing, availability of patient handling equipment, teamwork amongst the nurses, and level of supervision, work regulations, and hospital work environment.

The study concludes that nurses' real-life factors influence their extensiveness in the assessment and management of chronic pain among critically ill patients at selected hospitals in Kiambu County. The study concludes that factors such as level of experience or exposure in pain management, level of education, frequency of involvement in training and development programs, compliance with the ethical code of practice, and personal experience with pain also influence the nurse's effectiveness in addressing pain c conditions

5.4 Recommendations

Based on the research findings, the following recommendations are proposed:

The study found overreliance on one tool (the behavioral pain assessment tool), which occasioned moderate use of the other tools (the critical-care pain observational tool and the nonverbal pain assessment tool). In order to promote balance in the utilization of all pain assessment tools, the County Health Department at Kiambu should roll out capacity-building programs to all nurses. This will reduce the complexity and promote user-friendliness.

Given that institutional factors such as level of staffing, availability of patient handling equipment, teamwork amongst the nurses, level of supervision, work regulations, and hospital work environment were found to affect efficiency in main management, the study proposed the following: adequate staffing, promotion of personal observance of ethical nursing practice, timely provision of medical equipment, cultivation of a flexible work culture, and safe hospital work environments. Therefore, there is need for the county

health departments to consider all the medics and help them to attain work life balance by extending their productivity.

To the administration and to the management of the hospitals that there is need to consider the personal-related factors which are found to influence their extensiveness in the assessment and management of chronic pain, there for the study recommends that pain management education be incorporated into both initial and ongoing training for all health care practitioners and to the laws and regulations binding the hospitals which are main abiding factors that govern every health facility.

5.5 Recommendations for Further Research

The key objective of the research was to look into the determinants of pain assessment in critically ill patients among nurses at selected hospitals in Kiambu County, Kenya. Future studies may look at knowledge and attitudes towards pain management among nurses working in comprehensive specialized hospitals in Kenya.

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APPENDICES

Appendix I: Researcher's Statement

To Whom It May Concern

Dear Sir/Madam,

RE: REQUEST FOR COMPLETING THE QUESTIONNAIRE

I am steering a research on **DETERMINANTS OF PAIN ASSESSMENT ON CRITICALLY ILL PATIENTS AMONG NURSES AT SELECTED HOSPITALS OF KIAMBU COUNTY KENYA** in partial fulfilment of my Masters in Nursing Degree at Mt Kenya University. I am gladly informing you that you are selected to be part of this research. Am kindly asking you to complete the questionnaire attached that forms the main input of the process of this research. The data and information is going to strictly be employed for the purposes of academics only and there will be exercise of confidentiality with regard to the information provided.

Your collaboration will go an extended method in safeguarding the achievement of this scheme. I would like to thank you in advance for your time and deliberation.

Yours Sincerely,

Anna Kinyua

Appendix II: Consent Form

It is really appreciated if you could take part in this study on **DETERMINANTS OF PAIN ASSESSMENT ON CRITICALLY ILL PATIENTS AMONG NURSES AT SELECTED HOSPITALS OF KIAMBU COUNTY KENYA**.

My name is Anna Kinyua, a scholar at Mt Kenya University, where I am pursuing my masters in Nursing Degree. Your written consent is needed to partake so that I can confirm that you are knowledgeable of the research and that you approve to contribute. You are allowed to decline or stop your contribution at any time in the research if you request to do so. The entirely data gotten in this research will be set aside as private; a figure will be allocated to all study forms to guarantee your confidentiality is safeguarded. Your name or identity will not be given in any report or publication. There will be no compensation for undertaking to participate in the above study.

I've taken the time to study the information provided above, and when something wasn't apparent, I asked for clarification; the investigator was responsive and helpful. Being a part of this research is voluntary, but I've opted to join.

Please review the consent form and raise any concerns you may have about taking part in the study before signing up.

If you agreed to participate in this study, we will send you a questionnaire to complete. A maximum of 15 minutes is required for this.

Print name of the participant……

Signature of the participant……

Date ……..

Appendix III: Questionnaire

Section A: Demographic Information

1. Gender:

   Male: [ ] Female: [ ]

2. Age:

   20-29 [ ] 30-39 [ ] 40-49 [ ] 50 years and above [ ]

3. Highest education level:

   Diploma [ ] Degree [ ] Postgraduate [ ] Others [ ]

4. How many years have you worked in your hospital?

   Less than 1 year [ ]

   1 to 3 years [ ]

   4 to 6 years [ ]

   7 to 9 years [ ]

   10 years and above [ ]

Section B: Pain Assessment Tools Used Among Nurses on Critically Ill Patients

5. Do you assess patients for pain?

   Yes [ ] No [ ]

6. Do you use a pain assessment tool for pain assessment?

   Yes [ ] No [ ]

7. What pain assessment tool do you use while assessing pain?

Critical-care pain observational tool [ ]

Behavioral pain assessment tool [ ]

Nonverbal pain assessment tool [ ]

Others……..

8. If your answer to the above is yes, how often do you use pain assessment tools in your hospital?

   Often [ ]

   Always [ ]

   Rarely [ ]

9. Are the directions about the usage of the use of pain assessment tools in your hospital clear?

   Yes [ ] No [ ]

10. Are the pain assessment tools simple to comprehend and understand?

    Yes [ ] No [ ]

11. What do you consider when deciding the pain assessment tool to use for the patient? You can tick more than one

    Age of the patient [ ]

    Patient physical status [ ]

    Patient intensity [ ]

    Others……

12. Do you keep records of your pain assessment results?

    Yes [ ] No [ ]

13. Is there a discussion of pain ratings and treatment during patient transfers and shift changes?

    Yes [ ] No [ ]

14. Do you usually agree with the pain assessment tools' verdict?

    Yes [ ] No [ ]

Section B: Institutional Factors on Nurse's Assessment of Pain

15. Is the number of the staffs involved in assessment of pain in your hospital adequate?

    Yes [ ] No [ ]

16. Is the communication channel between the nurse and patients in regard to patient's conveying of pain to nurses effective?

    Yes [ ] No [ ]

17. Is the patient's complain in regard to pain acted upon appropriately and timely by the nurses?

    Yes [ ] No [ ]

18. What institutional challenges do you face in your hospital in regard to patient's assessment?

    ……

    ……

    ……

19. The nurses are the best judges of pain intensity because they spend most of the time with the patient?

    Yes [ ] No [ ]

20. Have you attended pain training programmes in regard to pain assessment?

    Yes [ ] No [ ]

21. The pain assessment education I have received during my training is adequate?

    Yes [ ] No [ ]

Section C: Nurse's Related Factors on Assessment of Pain

22. What is your experience in regard to pain assessment?

Less than 1 year [ ]

1 to 3 years [ ]

4 to 6 years [ ]

7 to 9 years [ ]

10 years and above [ ]

23. I have read a journal or article on assessment and management of pain?

Yes [ ] No [ ]

If yes, how has this enhanced your knowledge in regard to assessment of pain?

……

……

……

24. Have you had personal experience with pain?

Yes [ ] No [ ]

If yes, how has it affected the way you assess and manage pain in patients?

……

……

……

25. Please complete the following questions in regard to pain assessment by rating on a scale of 1 to 5 where: 1 =Strongly disagree, 2 =Disagree, 3 = Neutral, 4 =Agree and 5 = Strongly Agree.

	Strongly Disagree	**Disagree**	**Do not know**	**Agree**	**Strongly Agree**
Whenever possible, it's best to have a pain report straight from the person experiencing it.					
Before prescribing painkillers, I always advise my patients to see whether they can bear the discomfort.					
Patients may find relief from pain via distraction even when it is excruciating.					
I verify the genuineness of the pain from the patient before administering pain medications					
Pain is seen in the patient behaviour					
Distraction of patients reduces pain intensity					
My personal experience with patients with pain affect the way I assess pain					
I rely on changes in vital signs when verifying patient's complain of severe pain					

Appendix IV: Introductory Letter

Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MSCN/2018/38131

27th April, 2023

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

Dear Sir/Madam,

RE: ANNA WANGECHI KINYUA - REGISTRATION NO. MSCN/2018/38131

The purpose of this letter is to introduce the above named student who is pursuing **Master of Science in Nursing** in the department of **Nursing Education Leadership Management and Research** in the **School of Nursing.**

The title of the research is' **'Determinants of Pain Assessment on Critically ILL Patients Among Nurses at Selected Hospitals of Kiambu County Kenya."**

It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **April, 2023 and June, 2023.**

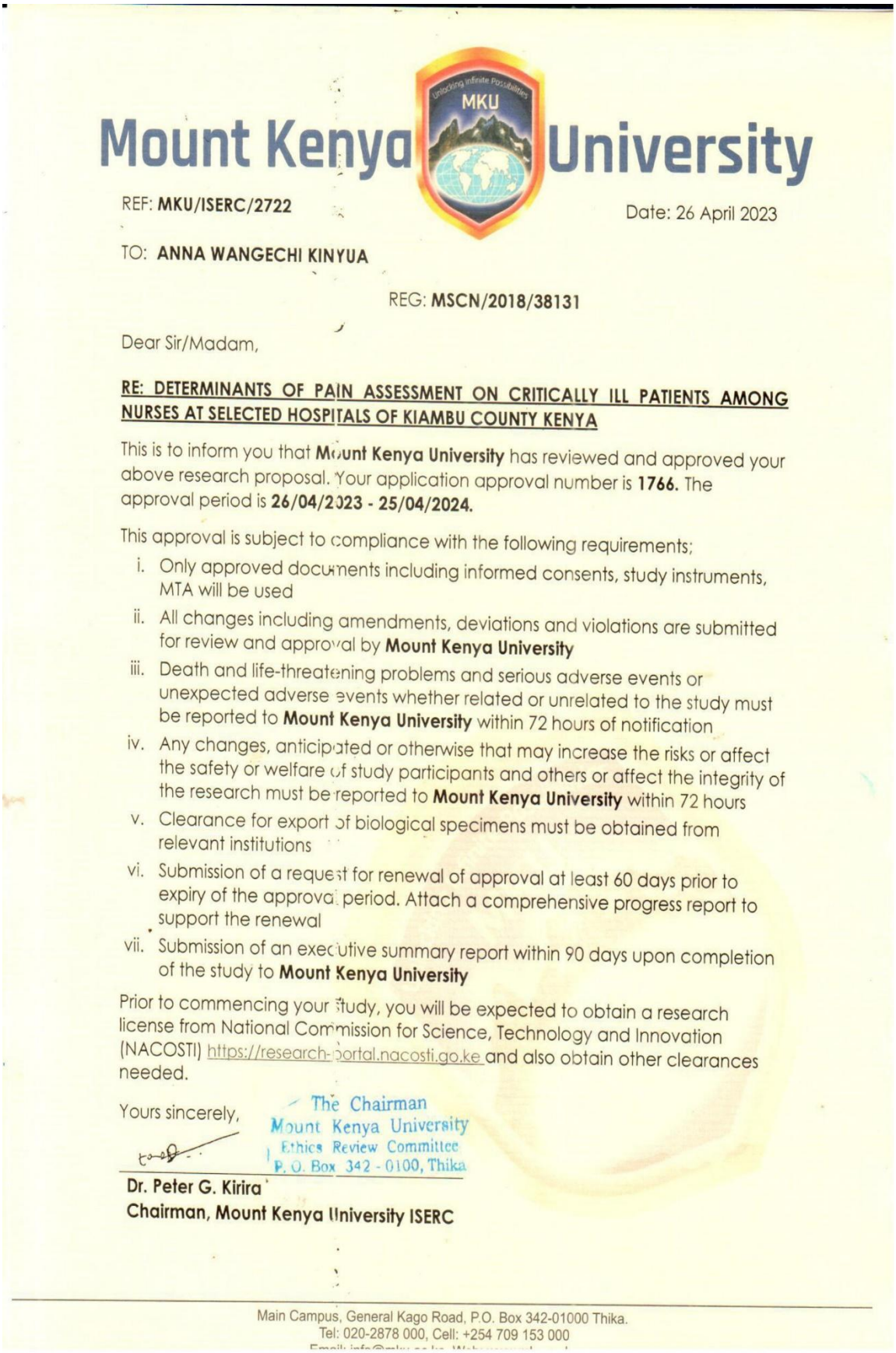
Any assistance accorded to the student will be highly appreciated.

Thank you.

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

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

Appendix V: ERC Approval



Mount Kenya University

REF: **MKU/ISERC/2722**

Date: 26 April 2023

TO: **ANNA WANGECHI KINYUA**

REG: **MSCN/2018/38131**

Dear Sir/Madam,

RE: DETERMINANTS OF PAIN ASSESSMENT ON CRITICALLY ILL PATIENTS AMONG NURSES AT SELECTED HOSPITALS OF KIAMBU COUNTY KENYA

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **1766.** The approval period is **26/04/2023 - 25/04/2024.**

This approval is subject to compliance with the following requirements;

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

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

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

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

Main Campus, General Kago Road, P.O. Box 342-01000 Thika.
Tel: 020-2878 000, Cell: +254 709 153 000

Appendix VI: NACOSTI Approval

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **787623**

Date of Issue: **18/May/2023**

RESEARCH LICENSE

This is to Certify that Miss.. Anna wangechi Kinyua of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: DETERMINANTS OF PAIN ASSESSMENT ON CRITICALLY ILL PATIENTS AMONG NURSES AT SELECTED HOSPITALS OF KIAMBU COUNTY for the period ending : 18/May/2024.

License No: **NACOSTI/P/23/25857**

787623

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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See overleaf for conditions

Appendix VII: County Approval

COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES

All correspondence should be addressed to HEAD
HRDU – HEALTH DEPARTMENT
Email address: mndiritu@gmail.com
mkwasa@live.com
Tel. Nos: 0721641516
0721974633

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

Ref. No.: KIAMBU/HRDU/23/05/05/RA_KINYUA Date: 5th May 2023

TO WHOM IT MAY CONCERN

RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY

Kindly note that we have received a request by Anna Wangechi Kinyua of Mount Kenya University to carry out research in Kiambu County, the research topic being on **"Determinants Of Pain Assessment On Critically Ill Patients Among Nurses At Selected Hospitals Of Kiambu County Kenya"**

We have duly inspected her documents and found that she has been cleared by the MKU ISERC to carry out the research for a period ending **25th April 2024**. As she has received approval from a NACOSTI licenced ERC, we hereby give her a provisional clearance to begin collecting her data immediately to avoid any delays in the research process. However, she is required to submit the NACOSTI license within 2 months of receiving this letter.

It is incumbent upon the institution where she is carrying out research to ensure that she receives adequate supervision during the process of conducting the research. This note also accords her the duty to provide a feedback on her research to the county at the conclusion of her research.

DR. MWANCHA KWASA
COUNTY CLINICAL RESEARCH OFFICER
KIAMBU COUNTY

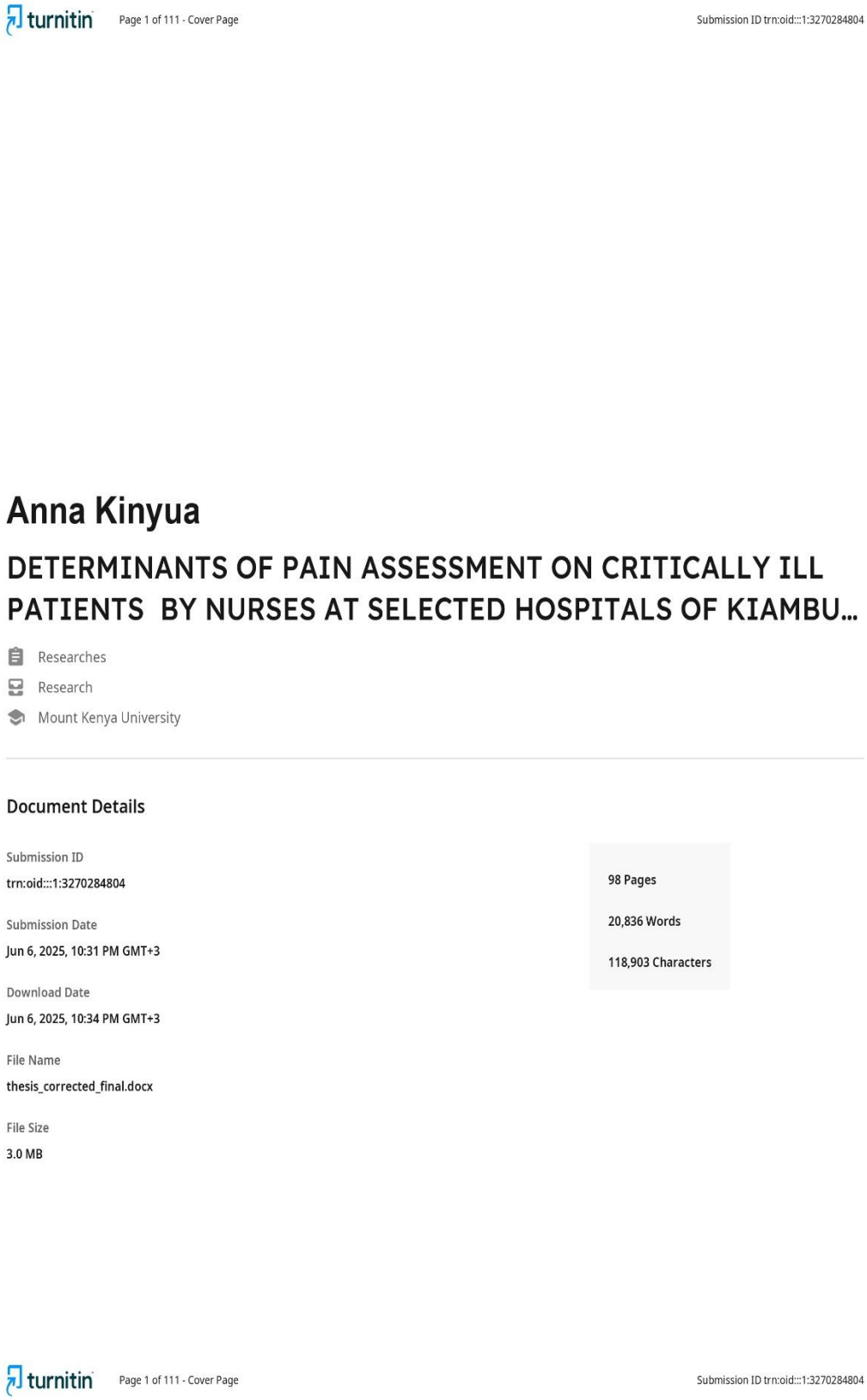
Appendix VIII: Krejcie and Morgan Table Sample Size Determination

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

Appendix IX: Similarity Index



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