NURSES' USE OF THE CRITICAL CARE PAIN OBSERVATION TOOL (CPOT) ON PATIENTS IN THE INTENSIVE CARE UNITS OF THE NATIONAL REFERRAL HOSPITAL IN TANZANIA.

Zainab K. Manji, BScN

M.Sc. Nursing (Critical Care and Trauma) Dissertation

Muhimbili University of Health and Allied Sciences

October 2021

Muhimbili University of Health and Allied Sciences

Department of Clinical Nursing

NURSES' USE OF THE CRITICAL CARE PAIN OBSERVATION TOOL (CPOT) ON PATIENTS IN THE INTENSIVE CARE UNITS OF THE NATIONAL REFERRAL HOSPITAL IN TANZANIA.

By

Zainab Karim Manji

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Nursing (Critical Care and Trauma) Of the

Muhimbili University of Health and Allied Sciences.

October 2021

CERTIFICATION

The undersigned certifies that she has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: *'Nurses' Use Of The Critical Care Pain Observation Tool (CPOT) On Patients In The Intensive Care Units Of The National Referral Hospital In Tanzania.'* in partial fulfillment of the requirements for the degree of Master of Science in Nursing (Critical Care and Trauma) of the Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam, Tanzania.

_____

Dr. Beatrice Mwilike

Supervisor

_____

Date

_____

Ms. Agnes Massae

Co-Supervisor

_____

Date

DECLARATION AND COPYRIGHT

I, Zainab K. Manji, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature _____ Date _____

ACKNOWLEDGEMENT

To the Almighty, for aligning the stars in my favour each time.

To my Parents; Karim and Siddika - for your unwavering support and belief, guiding hands, constant encouragement, love and heartfelt prayers every step along my journey.

To my Siblings; Hussein, Sabira, Ummuabiha and Siraaj – for always checking up on me, for providing the much needed relief when the going got tough and for reminding me in your own ways that I could do it. To a recent entry, a little bundle of Joy, Sahar, for lighting up my days!

To my grandmother in law – Nasim, mother in law - Sukaina, father in law - Zahir, sister in law – Amreen, brother in law – Jaffer; for your prayers and support throughout this journey. And to my nieces Aasiya & Maryam; for always cheering me up!

To a special Aunt; Nusrat - for all the countless thoughtful little things you did to make these two years a little more bearable.

To my classmates and especially to my clinical rotation group for the countless memories we made together. To a special friend, Grace Masawe – for every day that 'tumepambana' together. To my best friend Merlin and to all my cousins for always checking up on me.

To all my teachers, especially Dr. Mkoka – for reigniting the passion for my profession in me. To my Supervisor Dr. Beatrice, and Co Supervisor Ms. Agness, for your support, advice and encouragement till we held this book in hand.

To all the nurses working in the ICU's of MNH, MOI and JKCI, for your cooperation and willingness to participate in this study.

To everyone else that has played a part in my journey in one way or another, Dr. Kristina, Sr. Veneranda, Mr. Muddy, Marietta, and others I may have missed to mention - I truly appreciate the support.

Last, but not least, to my husband Mohamed. For being my punching bag, my cheerleader, my rationality and my sanity. For never letting me look back, or give up, for constantly reminding me of my aspirations and my strength. For inspiring me and for being my dream team. Without you, this would not come into fruition.

Asanteni Sana.

DEDICATION

To my Parents

Karim and Siddika,

'for raising me to believe that anything was possible'

To my Husband

Mohamed,

'for making everything possible'

To nurses working in the ICU's

'*We must never disregard our responsibility to alleviate pain and suffering'*

To the unconscious patients in the ICU,

'Because everyone has the right to the best quality of care'

ABSTRACT:

Background: Self-reporting which is the most reliable indicator of pain, is not possible to achieve in critically ill patients. Therefore, it is important to have a valid, reliable, and accurate pain assessment tool that can be used as a standard for patients unable to self-report. One such tool that has been recommended as highly valid and reliable by various critical care organizations is the Critical Care Pain Observation Tool (CPOT)

Objective: To assess nurses' knowledge and perception on feasibility of the CPOT among patients unable to self-report pain in the ICU's of the National Referral Hospital

Methodology: Single-group pretest posttest study involving 111 nurses working across six ICU's of the National Referral Hospital of Tanzania. Two questionnaires were administered to the participants, pre and post intervention, the CPOT was introduced and its correct usage taught in form of a training as an intervention. Data was analyzed using the SPSS 25.0 software with the help of descriptive statistics as well as inferential statistics.

Results: Only 20% of the respondents knew of the existence of the CPOT. Of them, only 50% reported to have used it on their patients, majority of who (63.6%) had inadequate knowledge on its appropriate use. There was however, significant improvement in their knowledge on the use of the CPOT after training (p value 0.001). Respondents perceived the CPOT as being a feasible tool for use in their current setting.

Conclusion: Majority of the respondents didn't know of the existence of the CPOT and relied on physiological parameters to assess pain. After the tool was introduced, the respondents' knowledge on its appropriate usage was adequate and they perceived it as a feasible tool. They expressed the need of having a standard tool for routine pain assessment.

Recommendations: Continuous professional education on pain assessment is required across all ICU's for nurses and also needs to be incorporated into nursing curriculums at universities. Follow up studies are required to assess nurses implementation of the CPOT. Recommendations can then be made to create standard pain assessment policies.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS:

CPOT	Critical Care Pain Observation Tool
ICU	Intensive Care Unit
JKCI	Jakaya Kikwete Cardiac Institute
MNH	Muhimbili National Hospital
MOI	Muhimbili Orthopedic Institute
MUHAS	Muhimbili University of Health and Allied Sciences

OPERATIONAL DEFINITION OF KEY TERMS:

Critical Care Pain Observation Tool (CPOT) – It is a tool designed to assess the pain of critically ill patients who are incapable of reporting their pain. It consists of four domains (facial expressions, body movements, muscle tension, and compliance with the ventilator for mechanically ventilated patients or vocalization for Nonintubated patients) rated on a scale of zero to two with a total score ranging from 0 to 8 (1,2).

Critically Ill Patients – are the ones with severe respiratory, cardiovascular and/or neurological derangement which usually leads to abnormal physiological parameters (3). *In this study*, critically ill patients are those admitted to the ICU, who are mechanically ventilated and/or sedated rendering them unconscious (have reduced arousal and/or awareness, who are unresponsive to external stimuli and may only open eyes to pain or withdraw limbs to a noxious stimuli' (4)) and therefore have impaired communication - unable to communicate in any way and unable to self-report pain

Feasibility – According to the Cambridge Dictionary, feasibility is ''the possibility that can be made, done, or achieved, or is reasonable(5)'' *In this study*, feasibility refers to ease of use, ease of understanding, and the amount of time taken for its use, given the true nature of the resources and training facilities available.

Knowledge –According to the Cambridge dictionary, knowledge is defined as ''awareness, understanding, or information that has been obtained by experience or study, and that is either in a person's mind or possessed by people generally(5)'' *In this study* knowledge may be used interchangeably with awareness and refers to the familiarity and understanding of key concepts such as the importance of pain assessment, the existence and the use of the CPOT.

National Referral Hospital – in this study, the national referral hospital includes the Muhimbili National Hospital (Upanga and Mloganzila) the Jakaya Kikwete Cardiac Centre and the Muhimbili Orthopedic Institute.

Pain - According to the International Association for the Study of Pain (Jul 2020) – ‘’Pain is an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage… inability to communicate does not negate the possibility that a human or a nonhuman animal experiences pain’’(6)

Perception – According to the Cambridge Dictionary, perception ‘’is a belief or opinion, often held by many people and based on how things seem(5)’’ *in this study* perception means the establishment of the feasibility of the CPOT for use in ICU’s based on how it seems by the nurses.

CHAPTER ONE

1.0 BACKGROUND

The International Association for the Study of Pain defines pain as an unpleasant sensory or emotional experience associated with actual or potential tissue damage (6). Pain is a major cause of discomfort for patients, particularly for critically ill patients. They experience acute pain due to trauma, underlying illnesses, dependence on life support devices and repeated painful procedures, many of which are invasive in nature (7,8).

When pain is inadequately managed, it brings about a plethora of complications for the critically ill patients, which may last for a short period of time, but may also have long lasting effects. These complications can be physiological or psychological. It has been reported that often the amount of pain is either overrated or underrated in 50% of patients by those caring for the patients(9). When the pain is underrated, and thus either untreated or inadequately treated, it can cause issues with mobility rendering the patients at a higher risk for deep vein thrombosis and thrombo embolism. It also increases the risk of developing pressure sores and muscle atrophy(7). Furthermore, inadequate pain relief causes restlessness, myocardial ischemia, slower healing, and prevents compliance with mechanical ventilator. On the other hand, due to overrating, if the pain is over treated with more analgesics than required, it can cause dangerous side effects such as hypotension, respiratory depression and difficulty to wean from mechanical ventilation. Consequently these complications lead to increased length of stay at the hospital, increased chances of acquiring infections and in turn increased mortality(9). Inadequate pain management also causes fear, anxiety, depression, fatigue and sleep disturbance in critically ill patients. This in turn leads to development of delirium and post-traumatic stress disorder in critically ill patients causing a compromise in their quality of life post hospitalization(10).

Nurses are involved in routine assessment and care of critically ill patients, it is therefore needless to say that appropriate pain assessment and its subsequent management is one of the most important responsibilities of a nurse working in the Intensive Care Unit. Nevertheless, it is reported that 64% of ICU patients do not receive pain relief before, during or after painful procedures(9). This may be due to inappropriate and inaccurate methods

commonly used by a majority of nurses (35%-55%) to assess pain in ICU patients leading to either underestimating or overestimating of the pain intensity as evidenced by literature review of several studies (9,11,12). These inappropriate methods may be because of personal judgment from nurses and relying on physiological parameters of the patient based on a nurse's personal observation. Furthermore, it may also be that because self-reporting of pain is the most reliable indicator of pain and this is not possible to achieve in critically ill patients such as those on mechanical ventilation (13), nurses end up poorly assessing pain in these patients. Therefore, it is of paramount importance that there should be valid, reliable, and accurate pain assessment tools that can be used to assess pain in ICU patients who are unable to self-report in order to achieve adequate management of pain.

When self-reporting of pain is challenging to achieve, behavioral pain scores are to be used for the assessment of pain in critically ill patients unable to self-report (14). There exist several behavioral pain scales for this purpose. In systematic reviews and studies to validate 8 behavioral pain scales, the most reliable ones were concluded to be the Behavioral Pain Scale (BPS) and the CPOT(15,16). However, the Critical Care Pain Observation Tool (CPOT) has been recommended by experts in the field. This tool is recommended for use to assess pain in adult patients with and without an endotracheal tube, who are not able to communicate verbally(9). It was developed by a critical care nurse, Dr. Celine Gelinas (17). The CPOT consists of four domains: the patient's facial expressions, body movements, compliance with ventilator (or voice use for non-intubated patients), and muscle tension. Each domain has a possible score range of 0 to 2. The total score (summing up the four domains) can vary between 0 and 8, where 0 indicates no pain and 8 indicates clear signs of pain (1,2)

The CPOT has been extensively studied and validated for its use in assessing pain in patients in the ICU who cannot self-report and has received the best scores in its quality monitoring(1,18,19). The American Society for Pain Management Nursing advocates its use in all ICU patients and has been recommended in all recent guidelines for clinical practice in assessing pain in ICU patients unable to self-report (9,14,19). In addition, a handful of studies conducted in Iran (Tehran, Azar) and Canada (Quebec, Toronto, Montreal) to measure the outcome of adopting the CPOT by nurses caring for critically ill patients report

a significant improvement in accurate assessment and subsequent accurate management of pain (9,20–24).

To be able to implement and promote the use of the CPOT by nurses caring for ICU patients, as has been recommended by recent clinical practice guidelines(9,19,25) the critical care nurses must possess sufficient knowledge on its correct use. However, in searching for studies that discuss and report the knowledge and perception of critical care nurses on the use of CPOT for assessing pain in patients in the ICU unable to self-report over the last 10-15 years; only one study conducted in Lebanon could be found. This study reports that none of the 30 critical care registered nurses interviewed knew of the existence of such a pain assessment tool, however, they had all received some education on pain assessment and management(13). This highlights that critical care nurses may not possess sufficient knowledge on the use of CPOT for pain assessment in ICU patients unable to self-report. There aren't any studies readily available reporting the use of the CPOT among nurses, especially lacking is data in the African setting.

Therefore assessing the knowledge of nurses on the use of CPOT and furthermore assessing the feasibility of using the tool for assessing pain in critically ill patients unable to self-report is crucial. This will set the stage and craft a foundation for further implementation strategies for the use of this important tool. Ultimately improving patient outcomes and providing the much needed relief from pain for critically ill patients.

1.1. PROBLEM STATEMENT:

One of the most widely reported grievance among critically ill patients in the ICU is that of pain (9,26). Pain that is not managed effectively can lead to detrimental effects for the patients, leading to grave physiologic as well psychological complications, ultimately increasing the mortality rate(2,9,27). It is therefore of paramount importance that pain is assessed precisely so that it may be managed effectively.

While self-reporting of pain is the most reliable way of correctly assessing pain and there are several validated tools for self-report of pain, these become of limited use for critically ill patients unable to self-report their pain (13,19). In these cases, nurses tend to rely on physiological parameters to assess pain in these patients. However, critically ill patients have several derangements in their physiological functions hence relying solely on physiological parameters may not necessarily be a reliable measure of pain. In addition, along with relying on physiological parameters, nurses use patient behavior as an indication to pain. These however, need to be validated and used as a standard tool as opposed to stand alone erratic behaviors(12). Owing to that, the most recommended behavioral pain scale that can be used for pain assessment in critically ill patients is the Critical Care Pain Observation Tool (CPOT) (1,28,29). Several studies report the positive outcomes of employing the CPOT as routine use in assessing pain in critically ill patients unable to self-report (9,21–24). It has been utilized around the globe and been translated into about 15 languages (17,30).

There is no documented study on the use of the CPOT by nurses in ICU for critically ill patients neither in the Tanzanian setting, nor in Africa; despite the fact that the importance of assessing pain is sufficiently known by nurses. This could perhaps be attributed to lack of awareness on the existence of such a behavioral pain scale, or knowledge deficit on the use of such a tool which is supported by literature which reports that nurses working in resource limited settings face difficulties in trying to keep up to date with new knowledge and information (10,31). However, before this tool can be introduced to be used as a routine practice and can be benefited from, it is

important that it is validated in the setting it is intended to be used in to ensure reliability (9,18,19,25).

To validate this tool in the Tanzanian setting, and furthermore introduce it for routine practice, it is first important to establish whether nurses working in the ICU's are aware of the existence of such a tool, know its correct usage, and have attempted to use it in pain assessment, but also to know whether they think it is a feasible tool for the setting of the ICU's.

1.2. RATIONALE:

There are no studies reporting specifically the use of the CPOT in pain assessment by nurses for critically ill patients who are unable to self-report in the ICU's in Tanzania. This study provides an understanding on the knowledge of nurses on the existence of such a tool and furthermore its correct usage. It also provides an understanding on the nurse's perception of the feasibility of the tool for use in the ICU's.

The information that has been obtained from this study has aided in establishing a baseline that nurses working in the ICU's are not aware of the existence of the CPOT, and still reliant on physiologic parameters for pain assessment on patients who cannot self-report. Through this study, The CPOT has been introduced to them and they have been trained on its appropriate usage. The nurses also perceive the CPOT as being feasible and hence the stage has been set for implementation and further validation of the tool as recommended by experts.

This has in turn given a platform for further studies to be done on the effectiveness of the implementation of the CPOT in the setting of ICU's in Tanzania. This would then aid policy makers to adopt an established way to improve the outcome and provide relief of pain for critically ill patients who cannot self-report their pain and incorporate the CPOT as routine assessment in the ICU by nurses.

1.5. CONCEPTUAL FRAMEWORK

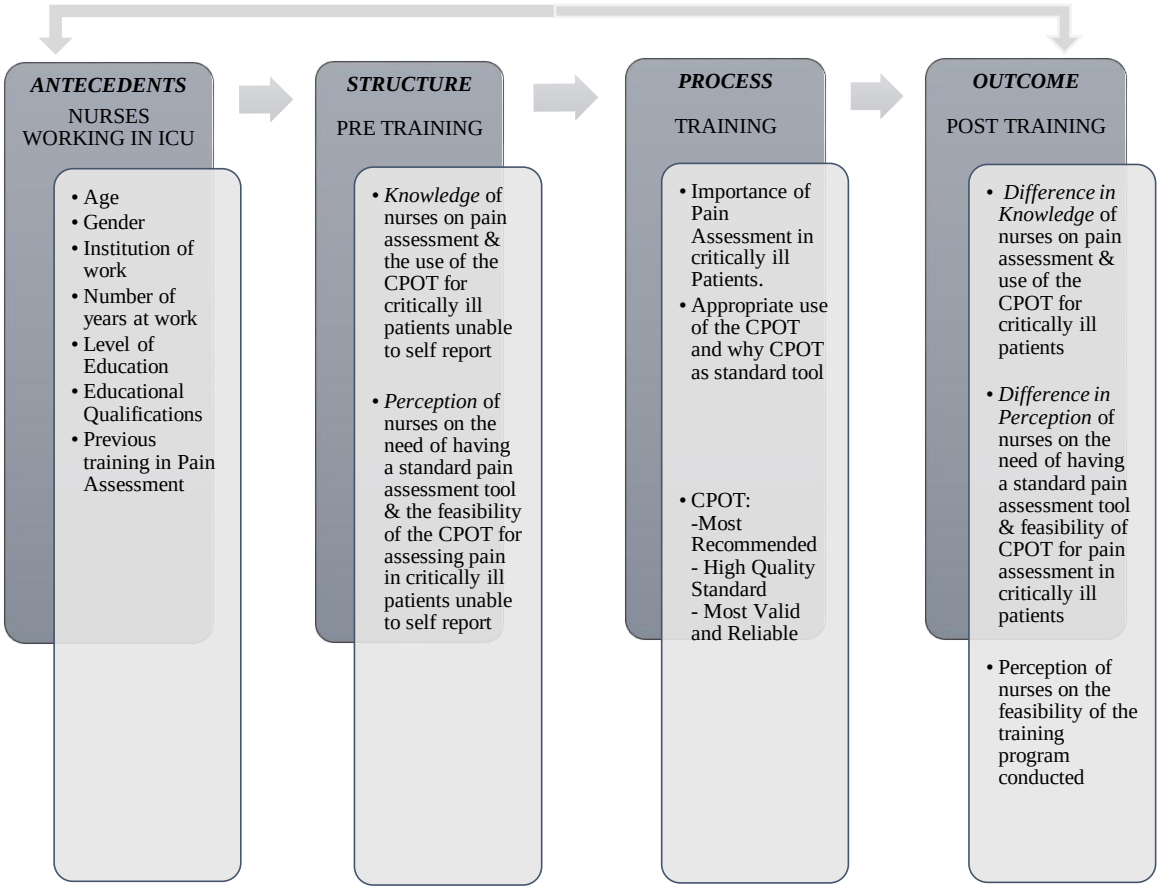


Figure 1 : Conceptual Framework: Nurses use of the CPOT on patients unable to self-report in the ICU's of the National Referral Hospital in Tanzania

Description of the conceptual framework:

This framework follows the Donabedian model (32) and was derived and structured by the principal investigator after thorough literature review. It shows an organization of the central focus of the study. Nurses with different backgrounds in terms of demographics work in the ICU caring for critically ill patients. It has been established from literature that the CPOT is the most recommended tool for assessment of pain in critically ill patients unable to self-report (2,14,28,29,33,34). Additionally; the use of the CPOT is reported to significantly improve the reporting and subsequently the management of pain in these patients (9,21–23,34). This study was therefore structured to assess the knowledge of nurses on pain assessment as well as the use of the CPOT and to establish nurses' perception on the need

of having a standard pain assessment tool as well as the feasibility of the use of the CPOT for pain assessment in critically ill patients who cannot self-report. The intervention introduced this tool for those nurses who were not aware, and augmented its appropriate use for those who had heard and used it before. After the intervention, the outcome of interest in this study was to check if there was a difference in the knowledge and perception of nurses in regards to the use of the CPOT. Additionally, the feasibility of the training was established after the training had been conducted. Furthermore, this study analyzed if there was a relationship between the antecedents of the nurses enrolled in the study and the desired outcomes of the study.

1.6. RESEARCH QUESTION:

1.6.1 Broad Research Question:

What is the nurses' 'knowledge' and 'perception on the feasibility (ease of use, ease of understanding and suitability)' on the use of CPOT for pain assessment of critically ill patients unable to self-report at the ICU's of MNH (Upanga and Mloganzila), JKCI and MOI; before and after training?

1.6.2 Specific Research Questions:

1) What is the knowledge of nurses on pain assessment of critically ill patients unable to self-report in the ICU *before and after training?*
2) What is the knowledge of nurses on the use of the CPOT on critically ill patients unable to self-report in the ICU *before and after training?*
3) What is the perception of nurses on the need of having a standard pain assessment tool for assessing pain in critically ill patients unable to self-report *before and after training?*
4) What is the perception of nurses on the feasibility (ease of use, ease of understanding and suitability) of the use of CPOT for pain assessment in critically ill patients unable to self-report, *before and after training?*
5) What is the perception of nurses on the feasibility of the training program conducted?

1.7. RESEARCH OBJECTIVES:

1.7.1 Broad objective: To assess nurses' 'knowledge' and their 'perception on the feasibility (ease of use, ease of understanding and suitability)' of the use of the CPOT for pain assessment in critically ill patients unable to self-report at the ICU's of MNH (Upanga and Mloganzila), JKCI and MOI; *before and after training.*

1.7.2 Specific Objectives:

1) To assess the knowledge of nurses on the pain assessment of critically ill patients unable to self-report in the ICU *before and after training.*
2) To determine the level of knowledge of nurses on the use of the CPOT in critically ill patients unable to self-report *before and after training*
3) To assess the perception of the nurses on the need of having a standard pain assessment tool for assessing pain in critically ill patients unable to self-report, *before and after training.*
4) To assess the perception of the nurses on the feasibility (ease of use, ease of understanding and suitability) of the use of CPOT for pain assessment of critically ill patients unable to self-report, *before and after training.*
5) To determine the perception of nurses on the feasibility of the training program conducted.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The International Association for the Study of Pain defines pain as an unpleasant sensory or emotional experience associated with actual or potential tissue damage (6,27). When pain is felt, it produces effects that cause suffering and distress; these effects have both physiological as well as psychological consequences (8).

The physiologic consequences of pain have been reported as those that increase the sympathetic responses and levels of stress hormones, it causes restricted movement of limbs, but also restricted coughing and deep breathing. Consequently, it can lead to life threatening events such as myocardial ischemia, pulmonary atelectasis and pneumonia. Furthermore, it renders the body incapable of glycemic control, increases coagubility and leads to a dysfunction in the normal immune system (2,8,9,27). Psychologically pain causes fear, anxiety, and demoralization, a feeling of helplessness, fatigue and loss of control. This then causes impaired sleeping pattern and consequently can lead to the development of injurious effects such as depression, post-traumatic stress disorder and even delirium. Ineffectively managed acute pain can develop into chronic pain syndrome (7,33). All in all, inadequate treatment of pain brings about negative effects and diminishes the patients chance at recovery, reducing the quality of life and poses a risk in increased morbidity and mortality (29).

Pain in critically ill patients is inevitable due to the presence of underlying, preexisting conditions, invasive procedures and trauma. Critically ill patients also undergo painful routine procedures such as turning, wound care, endotracheal suctioning and drain removal (29). They experience pain at rest as well as during procedures causing a major hindrance towards comfort, rest and healing. Literature highlights that as many as 70% of critically ill patients suffer moderate to severe intensity pain during their stay in the ICU (18,29). Other studies report that more than 75% of critically ill patients receive ineffective analgesia despite the fact that pain is a major contributor to stress in these patients. Even after their

discharge and after the end of their stay in the hospital, upto 70% of critically ill patients can recall the pain they experienced (7,8,35,36).

Knowledge of nurses on pain assessment of critically ill patients unable to self-report in the ICU

In order to be able to relieve patients of their pain and prevent untoward complications, what is of utmost importance is valid and reliable pain assessment. Once the intensity of pain can be established, then only pain can be adequately managed. Nurses working in the ICU's are at the cornerstone of pain management for they spend the most amount of time with critically ill patients and have been either trained exclusively for their care, or have exclusive experience in caring for them. It is also a moral and ethical duty on them that was endowed upon along with the nursing oath of alleviating pain and suffering. It is therefore imperative that nurses caring for critically ill patients are knowledgeable about methods of pain assessment and are able to employ them into practice.

A cross sectional study in Taiwan, found poor knowledge of pain assessment and management among nurses caring for critically ill patients i.e. among the 370 interviewed nurses caring for critically ill patients there was a 53.4% overall average incorrect response rate for the knowledge scale (37). In another study published by Mondol et al from Bangladesh, it was reported that of the 200 nurses enrolled in the study, more than four-fifth (80%) of the nurses had adequate knowledge about pain assessment, yet, they did not use any specific pain assessment tool but routinely assessed pain only in patients who were able to self-report (38). A study conducted across 44 ICU's in France on 3601 critically ill patients reported that pain assessment was not performed by nurses in 53% of the patients who had already received analgesia (39). Another study conducted in Mashhad also revealed similarly that nurses do not perform pain assessment in patients unable to self-report (12).

On exploration of the regional and local context (Africa and Tanzania); only one study was found reporting the Practice of Pain Assessment in Critically Ill Patients among Nurses. This was at the Tamale Teaching Hospital in Ghana. It was found that 77% of the nurses interviewed showed inadequate knowledge about pain assessment (40).

Pain is a subjective experience, and thus, for patients who are verbal, self-reporting of pain is considered the gold standard for pain assessment (18,24,41). However, the challenge lies in pain assessment for critically ill patients in the ICU who cannot self-report. These patients are unable to communicate because of the presence of life support devices such as endotracheal tubes and mechanical ventilators, sedation and decreased levels of consciousness. In this case, one cannot rely simply on physiologic parameters to assess pain because physiologic parameters do not provide valid information in indication of pain (35). Studies state that behavioral scales must be employed to be able to precisely and reliably assess the intensity of pain on such patients unable to self-report.

There are several behavioral pain scales that have been developed for assessing pain in critically ill patients unable to self-report. These include pain scales such as Pain Assessment and Training Notation (PAIN) Algorithm, Critical Care Pain Observation tool (CPOT), Behavioural Pain Scale (BPS), BPS-Nonintubated, NonVerbal Pain Scale (NVPS), NonVerbal Pain Assessment Tool (NPAT), Face, Legs, Activity, Cry, Consolability (FLACC) score, and the Pain Behavioural Assessment tool (PBAT) (16).

According to the international clinical guidelines, as well as extensive systematic review and validation of the several pain scales, the Behavior Pain Scale (BPS) and The Critical-Care Pain Observational Tool (CPOT) have the highest validity and reliability (2,15,16,33,42). In a study by Rijkenberg et al. the CPOT and the BPS were compared and it was concluded that the CPOT was a more preferable tool (28). In another similar study by Barr et al. the two tools (BPS and CPOT) were tested for their user friendliness, validity, reliability, etc and the CPOT was concluded to be the favored one (42). In addition, the American Society for Pain Management Nursing (ASPMN) recommends using the CPOT (29).

The CPOT was developed by a critical care nurse from Canada, Dr.Celina Gelinas, who won an award for developing one of the most valid and reliable behavioral pain scales for assessing pain in critically ill adult patients unable to communicate pain (17). It was formulated after extensive literature review, and discussions with critical care nurses and physicians (1,35,43). It was validated in 2006 on cardiac surgery patients in Canada (30). The CPOT has a total of four domains which are; the patient’s facial expressions, body

movements, compliance with ventilator (or voice use for non-intubated patients), and muscle tension. Each domain has a possible score of 0 to 2. The total score can vary between 0 and 8, where 0 indicates no pain behavior and 8 indicates clear signs of pain behavior (2). (The considerations and details of each domain while using the CPOT have been attached in APPENDIX IV. CPOT AND ITS DIRECTIVES OF USE).

Knowledge of nurses on the use of the CPOT on critically ill patients unable to self-report in the ICU

A study conducted in Lebanon in 2019 by Maatouk et al, reports that of all the 20 critical care nurses assessed, none of them had any knowledge that there was a validated tool (CPOT) that could be used to assess pain in critically ill patients unable to self-report, whereas 97% of them had received some form of formal education on the importance of pain assessment. This then prompted the researcher to train the critical care nurses on the use of the CPOT and carry out a post implementation study in which nurses reported being positively influenced to use the CPOT for pain assessment (13).

To our knowledge, there are no studies published in Africa and specifically in Tanzania that assess the knowledge of nurses specifically in using the CPOT for critically ill patients unable to self-report.

Perception of nurses on the need of having a standard pain assessment tool for assessing pain in critically ill patients unable to self-report

A study published in 2019 conducted in Jordan by Khaldoun Mohammad Hamdan stated that critical care nurses working in the ICU's in Jordan reported that they were more likely to use behavioral assessment tools for patients who are able to communicate rather than those who cannot communicate (44). They did not reflect the need of having a standard pain assessment tool for critically ill patients unable to self-report. And this could be due to lack of knowledge on using the tools on such patients.

In a study conducted in Ghana it was highlighted that the lack of availability of a pain assessment tools for patients who were unable to communicate pain was a major factor leading to poor pain assessment practices as reported by 80% of the nurses. This was the reason the nurses reported that obligated them to use their own clinical based judgments to

assess pain (40). Owing to this, the guidelines recommend that the CPOT should be translated into more languages, and validated in different settings so that it may be adopted as routine for pain assessment in critically ill patients (2,33,42).

In the local context, there have been no studies published exploring the nurses perception on the need of having a standard pain assessment tool for use in patients unable to self-report pain such as those in the ICU's.

Perception of nurses on the feasibility (ease of use, ease of understanding and suitability) of the use of CPOT for pain assessment in critically ill patients unable to self-report

There have not been many studies reporting the perception of nurses on the feasibility of the use of the CPOT in their settings. Globally, one such study can be found, that has been previously discussed, which was conducted in Lebanon on 30 critical care nurses. This study concluded that the perception of nurses on the feasibility of adopting the CPOT for routine use was that it was easy to use, clear and simple. Nurses were positive towards the practicality of the CPOT for routine use and anticipate that it will make routine pain assessment easier and simpler (20).

There have however been several studies globally that discuss the positive outcomes of the implementation of the CPOT. A previous study conducted in Montreal, Canada, reported that there were positive effects on pain assessment and management by critical care nurses post implementation of the CPOT in critically ill patients (22,23). In a study conducted in Quebec, Canada in 2011 by Arbour et al to explore the impact of implementation of the CPOT it was reported that there was improvement in assessment as well as management of pain by nurses and fewer complications were observed (22,39). A similar study done among nurses in 2012 at the Tehran Medical University in Iran in which the CPOT was taught to the nurses concluded that the use of the CPOT can increase nurse's sensitivity to pain in non-conscious patients and drive them to track and perform pain management (21). Furthermore, a study conducted in 2 ICU's at a hospital in Toronto, Ontario reported an increased frequency of documentation of pain assessment and timely administration of analgesics by nurses post CPOT implementation. Furthermore, an update to the same study, more recently

also reported increased frequency of pain assessment and better management of pain after implementation of the CPOT (23,24). In another similar study conducted at the Azar Medical Center in Iran in 2014 and published in 2019 by Mondaloo et al, it was reported that by introducing and using the CPOT as a pain assessment tool, there was a significant improvement in accurate assessment as well as management of pain by critical care nurses for ICU patients (9). It is noted that studies reporting such findings are a miss in the regional and local context.

All in all, nurses working in resource limited settings face difficulties in trying to keep up to date with new knowledge and information (10,31). It is therefore important to gain a baseline understanding of critical care nurse's knowledge level in regards to the use of the CPOT as a tool for pain assessment in critically ill patients unable to self-report and furthermore, their willingness to use it as routine. Once the baseline knowledge and feasibility are established, this can then set the stage for further translation, validation and implementation of the CPOT unique to the Tanzanian setting and thereafter a study to assess the effects and changes in the assessment and management of pain in critically ill patients unable to self-report.

CHAPTER THREE

3.0 STUDY DESIGN

The study design used in this study was that of a pre-experimental study of a single group – pre-test and post-test which involved a cohort of nurses working in the ICU's at the National Referral Hospital in Tanzania. This design was chosen since it is known to aid in determining the effect on an intervention as well as determining the changes pre, and post-test in the level of knowledge and perceptions (45). This study design has helped to establish a baseline feasibility, upon which further studies can be constructed in the future. How this study was carried out is illustrated in Figure 2 below (created by the Principal Investigator after literature review).

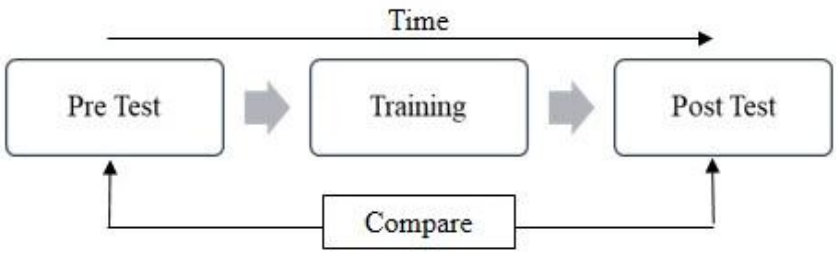


Figure 2 : Illustration of a single group pretest posttest study design

This pre-experimental study assessed the dependent variables before the intervention took place to determine and establish a baseline state of affairs of the nurses working in the ICU's of the National Referral Hospital. Furthermore, the outcome of the intervention in this pre-experimental study was assessed by determining changes in the dependent variables of the study. The outcome indicators were the changes in the:

- knowledge of nurses on how to use the CPOT for Pain Assessment in critically ill patients unable to self-report
- perception of nurses on the need to have a standard pain assessment tool for pain assessment in critically ill patients unable to self-report
- perception of nurses on the feasibility (ease of use, ease of understanding and suitability) of the use of CPOT for pain assessment in critically ill patients unable to self-report

3.1 STUDY SETTING

The Study took place in the Intensive Care Units of the National Referral Hospital. Intensive Care Unit is a unit in a hospital providing intensive care (continuous monitoring and treatment using special medical facilities, equipment, and services) for critically ill or injured patients that is staffed by specially trained medical personnel and has equipment that allows for continuous monitoring and life support. The National Referral Hospital; Dar es Salaam, Tanzania consists of the Muhimbili National Hospital (MNH) Upanga and Mloganzila, Jakaya Kikwete Cardiac Institute (JKCI) and Muhimbili Orthopaedic Institute (MOI).

MNH, JKCI and MOI are located in the Upanga ward of the Ilala district. Another branch of MNH is located in the Kibamba ward of the Ubungo district, referred to as Mloganzila. MNH has three ICUs – the Medical ICU (9 beds), Surgical ICU (18 beds) and Maternity ICU (9 beds). MNH Mloganzila has one ICU (17 beds).

MOI receives neurosurgery, orthopedics and trauma referrals from MNH and other hospitals all over the country. It has one ICU (18 beds).

JKCI is a national specialized cardiac institute and receives referrals of cardiac patients from all over the country. It has one ICU (9 beds).

All six ICU's from these four institutes within the National Referral Hospital which admit adult critically ill patients were part of this study. This is because the CPOT in this study is the one that assess pain in adult critically ill patients.

3.2. STUDY POPULATION

All Nurses working in the ICU's at MNH (Upanga: Surgical, Medical, Maternity and Mloganzila ICU's), JKCI and MOI.

- The ICU's chosen were those that admit adult critically ill patients who fit the criteria for the use of the CPOT for pain assessment (those with impaired communication due to sedation, intubation or a state of unconsciousness).

- Nurses working in the ICU were those who have undergone a formal training at the level of a Certificate, Diploma, Bachelor's Degree or a Master's Degree in Nursing. They are referred to as enrolled nurses or registered nurses. Furthermore, they are assigned with the task of caring for patients who are critically ill admitted to the ICU and have been working for 6 months or more.

The population for this study consisted of 156 nurses working in the institutions mentioned above and summarized in Table 1. The list was sought from the Nursing Director as well as the Nursing In charge of each specific ICU as of January 2021.

Table 1 : Summary of Study Population

Institute	ICU	Number of Nurses
JKCI	ICU	23
MOI	ICU	39
MNH (Upanga)	Medical ICU	26
	Surgical ICU	26
	Maternity ICU	13
MNH (Mloganzila)	ICU	29
	Total	**156**

3.3 SAMPLE SIZE ESTIMATION

Since the sample population was known and finite, the formula for calculating sample size of a finite population was used as follows;
(A Finite Population Correction has been applied to the sample size formula)

$$n = \frac{N*X}{(X + N - 1)} \qquad X = \frac{Z_{\alpha/2}^2*p*(1-p)}{MOE^2}$$

where,

- $Z_{\alpha/2}$ is the critical value of the Normal distribution at $\alpha/2$ (e.g., for a confidence level of 95%, α is 0.05 and the critical value is 1.96),
- MOE is the margin of error,
- p is the sample proportion, and
- N is the population size.

Since this was a one of its kind - feasibility study that had not been done before, the proportion could not be established from literature. Hence a proportion of 50% (0.5) was used since that is considered conservative and gives the largest sample size.

MOE was set at 5% and the population size was 156 as stated in Table 1 above.

Using these numbers in the formula:

$$X = \frac{(1.96)^2*0.5*(1-0.5)}{(0.05)^2} = 384.16 \qquad n = 156*\frac{384.16}{(384.16 + 156-1)} = 111.15 = 111$$

Therefore, the sample size for this study was 111 nurses working in the ICU's of the National Referral Hospital in Tanzania (MNH Upanga - Medical, Surgical & Maternity, MNH Mloganzila, MOI, and JKCI).

3.4 SAMPLING SELECTION

Stratified sampling was used to ensure that all the ICU's chosen for this study had an equal representation of participants. This type of sampling ensured that the sample was representative and the study translated into reliable findings (46). A proportional sample size from each ICU in the study was obtained by dividing the proportion of nurses in each ICU by the total nurses in all ICU's (that are a part of this study), and multiplying the proportion to the sample size calculated above (111). This is shown in Table 2 below.

Table 2: Proportional Sample Size from each ICU in the study

No	ICU's in the study	Total Nurses	Calculation of Proportion sample size in each ICU	Proportional sample size from each ICU
1.	MNH Upanga – Medical ICU	26	(26/156)*111=18.5	19 Nurses
2.	MNH Upanga – Surgical ICU	26	(26/156)*111=18.5	19 Nurses
3.	MNH Upanga – Maternity ICU	13	(13/156)*111=9.25	9 Nurses
4.	MNH Mloganzila - ICU	29	(29/156)*111=20.6	20 Nurses
5.	JKCI - ICU	23	(23/156)*111=16.37	16 Nurses
6.	MOI - ICU	39	(39/156)*111=27.75	28 Nurses
	Total	**156**		**111 Nurses**

After obtaining the above proportion of nurses to be included in the study from each specific ICU, convenience sampling technique was employed to choose the nurses from each ICU given that the study population is a finite one, and the sample size was relatively small for this feasibility study.

3.5 INCLUSION AND EXCLUSION CRITERIA

Inclusion Criteria:

- Enrolled Nurses and Registered Nurses working in the ICU's chosen for the study. They must have been working at the ICU's setting for at least 6 months. (This is to ensure that the nurses have some experience in caring for critically ill patients and will be able to give an informed insight into the research topic).

Exclusions Criteria:

- Nurses who were sick during the data collection period and thus unavailable.

3.6 VARIABLES

Independent Variables:

Gender, Age, Current Station of Work, Number of years worked in the ICU, Previous Training in Pain Assessment

Dependent Variables:

- Knowledge of the use of the CPOT and Pain Assessment in critically ill patients unable to self-report
- Perception on the need to have a standard pain assessment tool and on the feasibility of the CPOT for pain assessment in critically ill patients unable to self-report.

3.7 DATA COLLECTION

Table 3 : Data Collection Summary

Phases	Actions	
Recruitment of Study Participants	Permission	Written permission to conduct the study was sought from relevant authorities.
	Self-Introduction and Presenting the Study	Once permission was granted, the researcher introduced herself and the objectives of the study as well as how the study would take place to the Respondents in each of the ICU – this was done during the morning nursing rounds/reports to avail maximum number of Respondents (night shift + morning shift). The researcher answered any question the Respondents had about the study.
	Select Participants and Obtain Consent	Once the Respondents understood the study, the researcher with the help of the nursing in charge of the unit asked Respondents who were willing to participate in the study to sign the consent forms. These consent forms were collected and stored. After the consent form had been signed, the respondents were gathered in a venue close to the ICU's for ease of access.

Training Groups and Logistics	The sample population of 111 Respondents were divided into small manageable groups depending on availability of the respondents as well as the working conditions of the ICU (47). This was done with the assistance of the nursing in charge. It ensured efficient training took place but also caused minimum inconvenience to the working schedules.	
Pre-Intervention Data Collection	Administer and Collect Questionnaire	The participants had to pick a chit of paper with a unique identification number. They were asked to keep the number confidential and remember it throughout the session. Questionnaire I was administered to each participant, on which they wrote their unique ID number in place of their name to ensure confidentiality. They were given 15 minutes to fill in the questionnaire. Anyone who needed some additional time could request for it. The researcher was present at all times in case any participant had any question. The questionnaires were then collected, checked for completeness and stored by the researcher.
Training	Training was conducted in a lecture fashion using PowerPoint slides, projected onto a screen and participants were encouraged to engage in discussion. The training took place in a venue close to the working station to cause minimum disruption and acquired by the assistance of the nursing in charge. (Detailed training plan in APPENDIX VI: ELABORATE TRAINING PLAN)	

Post Intervention Data Collection	Administer and collect Questionnaire II	Questionnaire II was administered to each participant as soon as the training was over, on which they wrote write their unique ID number in place of their name to ensure confidentiality. They were given 15 minutes to fill in the questionnaire. Anyone who needed some additional time could request for it. The researcher was present at all times in case any participant had any question. The questionnaires were then collected, checked for completeness and stored by the researcher.
	Thanks	The participants were thanked. Contact details of the Principal Investigator were shared with those who may have additional questions later on, or who may be interested to know the outcome of the research.

3.8 INVESTIGATION TOOLS

Self-Administered Questionnaires: Two Questionnaires were used to collect required data from the participants.

Questionnaire I (Appendix II) developed by the Principal Investigator after literature review was used to assess the knowledge and perception of the participants *before the intervention*. It had the following components:

a. **Participant Demographic Data:**

Key demographic data - age, gender, highest level of education, Number of years at work, station of work, and previous training in Pain Assessment.

b. **Participant's knowledge:**
   Knowledge assessed on: - Importance of assessing pain, Methods of assessing pain in critically ill patients, Existence of the CPOT and The use of the CPOT

c. **Participants Perception:**
   Perception assessed on: - Need of having a standard pain assessment tool for assessing pain in critically ill patients unable to self-report, Feasibility of the use of the CPOT for assessing pain in critically ill patients unable to self-report

Questionnaire II (Appendix III) inspired from (13,20) and modified by the principal investigator after literature review was used to assess the knowledge and perception of the participants *after the intervention*. It had the following components:

a. **Participant's knowledge:**
   Knowledge was assessed on: - Importance of assessing pain, Methods of assessing pain in critically ill patients, the use of the CPOT.

b. **Participants Perception on:**
   - The feasibility of CPOT use, Need of having a standard pain assessment tool and Feasibility of the training that was conducted.

QUALITY AND ACCURACY OF DATA:

After collecting the questionnaires from the study participants, the data was transferred from the handwritten standardized questionnaires into SPSS (version 25) on a daily basis and was closely overseen by the principal investigator to maintain the quality and accuracy of the data entered.

VALIDITY AND RELIABILITY OF DATA COLLECTION TOOL

In order to ensure the data collection tools were valid; before administering the questionnaires to the participants of the study, they were administered to 5 critical care nurses (the minimum number recommended for ensuring face and content validity is 5-10 experts (48)– critical care nurses were chosen because they are experts in the field of caring

for critically ill patients who are the subject on which the CPOT is to be used). Their feedback helped to establish the time taken, the difficulties faced, recording, coding, and the analysis pathway. Additionally, the reviewers commented on the legibility and clarity of the questions as well as the ease of understanding. The feedback was incorporated. This ensured that the tool was valid for use(49).

In order to test for reliability of the data collection tools, Cronbach's Alpha was calculated for both the pretest as well as the post-test questionnaires. The Cronbach's Alpha for the pre-test was 0.94 (28 items) and for the post-test questionnaire was 0.73 (35 items), indicating excellent and high internal consistent reliability respectively(50). The difference in the Alpha values between the pre and post-test questionnaires may be due to the fact that since this was a pre experimental study with an intervention, the mean scores of participants post-test were higher than in the pretest as was expected for the outcome variables to show a difference hence reducing the inter-item correlations due to the likely effects of the intervention on participants(51). This however does not reflect on the internal consistency reliability, and therefore, the data collection tools are concluded as being reliable given the acceptable Cronbach's alpha values for both independently as stated above.

3.9 DATA ANALYSIS

Data analysis was performed using the Statistical Package for Social Science (IBM SPSS version 25, IBM, LTD, Carolina, USA). Descriptive statistics (mean, standard deviation, frequencies and percentages) were computed for continuous variables, and inferential statistics (Paired T-Test and Pearson's Chi Square Test) were computed for associations between categorical variables and outcomes of interest. Statistical significance was set at p-value < 0.05.

3.10 ETHICAL CONSIDERATIONS:

Permission to conduct the study was sought and granted from relevant ethical committees at MUHAS (Ref No DA.282/298/01./), MNH Upanga (Ref No MNH/TRCU/Perm/2021/107), MOI (Ref No AB.145/292/OIB/176), JKCI (Ref No AB. 123/307/01D/52) and MNH Mloganzila (Ref No JA.294/428/01/183). Permission was also sought and granted from relevant Directors of the ICUs as well as the Nursing Supervisors for conducting the study and the training. All participants were entered into the study after an informed consent was signed by them. The data obtained during the study was kept confidential. The data was coded to hide participant's identity and stored in computer with password known by researcher only. The written forms were kept in a safe locker accessible by the researcher only. There was no direct benefit to the participant from the study; however, information gained form this study shall aid in improvement of patient care and ultimately in quality of nursing care provided by the participant. There was no identifiable risk to the participants from this study.

CHAPTER FOUR

RESULTS

4.1 CHARACTERISTICS OF STUDY POPULATION

Of the 111 (100%) respondents who participated in this study, 60 (54%) were between the ages of 31 – 40 years, with a median age of 32 (IQR: 22 – 50). Majority, i.e. 70 (63%) of the 111 respondents were female, and 60 (54%) of the 111 respondents had a Diploma in Nursing. Furthermore, 47 (42%) of these 111 respondents had worked in the ICU between 1 – 3 years. This is shown in Table 4 below.

Table 4: Social Demographic Characteristics of respondents who participated in the study

Demographics		Frequency(N=111)	Percentage (%)
Age group	21 to 30	35	31.53
	31 to 40	60	54.05
	41 to 50	16	14.41
Gender	Female	70	63.06
	Male	41	36.94
Level of education	Diploma	60	54.05
	Degree	46	41.44
	Masters	5	4.5
Additional qualification	None	101	90.99
	PG diploma	6	5.41
	Short course	1	0.9
	BLS	1	0.9
	BLS and ACLS	1	0.9
	Anesthesia	1	0.9

Institution of work	MNH Upanga	48	43.24
	MNH Mloganzila	22	19.82
	JKCI	13	11.71
	MOI	28	25.23
Number of years	Less than one year	15	13.51
	1-3 years	47	42.34
	4-6 years	37	33.33
	7-10 years	4	3.60
	More than 10 years	8	7.21

Of the 111 respondents, 67 (60%) had received training on pain assessment of critically ill patients unable to self-report while at university and 62 (56%) of the 111 respondents stated that they had received this sort of training while at work, of which majority i.e. 32 (29%) could not remember how long ago they had this training (Table 5).

Table 5: Training received on pain assessment by respondents in the study

Information		Frequency (N =111)	Percentage (%)
Training at university	Yes	67	60.36
	No	27	24.32
	I don't remember	17	15.32
Training at work	Yes	62	55.86
	No	49	44.14
When training done	Never been trained	46	41.44
	Can't remember	32	28.83
	Within 1-3 years	16	14.41
	Less than 1 year ago	14	12.61
	More than 3 years ago	3	2.70

4.2 PERCEPTION OF NURSES ON THE IMPORTANCE OF PAIN ASSESSMENT IN CRITICALLY ILL PATIENTS UNABLE TO SELF-REPORT; BEFORE AND AFTER TRAINING

All respondents unanimously agreed that it is important to assess pain in critically ill patients who cannot self-report. They were required to indicate how important they thought it was (Very important or important). Before the training was conducted 103 (93%) of them responded that it is very important and 8 (7%) responded that it is important to assess pain in critically ill patients who cannot self-report. However, after the training, all 111 (100%) of them responded that it is very important to assess pain in critically ill patients who cannot self-report.

4.3 KNOWLEDGE OF NURSES ON PAIN ASSESSMENT IN CRITICALLY ILL PATIENTS UNABLE TO SELF-REPORT; BEFORE AND AFTER TRAINING.

Before the training, 93 (84%) of the respondents indicated that physiological parameters such as vital signs are always reliable indicators of pain in critically ill patients who cannot self-report. However, 58 (52%) of them further responded that while they were reliable, physiological parameters alone are not enough to assess pain in critically ill patients who cannot self-report (Table 7). This was followed with an open ended, optional question that asked what other means may be used to assess pain, 95 participants responded; other means included facial expressions (such as crying, tearing), motor movements such as restlessness, ventilator compliance and sweating (Table 6).

After the training, only 32 (29%) of the respondents maintained that view that vital signs are always reliable indicators of pain, whereas 72 (65%) of the respondents responded that physiological parameters are only sometimes reliable and 7 (6%) responded they were not reliable. Furthermore, 103 (93%) of respondents thought that physiological parameters alone were not enough to assess pain in critically ill patients who cannot self-report. This was followed with an open ended, optional question that asked what other means may be used to assess pain, 86 respondents answered the question; other means included Behavioural Pain Scales such as the CPOT and Behavioural Parameters to assess pain (Table 6).

Table 6: Summary of nurse's responses on 'other means' to assess pain in critically ill patients unable to self-report

PRE-TRAINING (N=95)		POST TRAINING (N=86)	
Other means to assess pain	**Frequency (%)**	**Other means to assess pain**	**Frequency (%)**
Facial Expressions (Including crying and tearing)	40 (42)	***Behavioral Parameters****	64 (75)
Motor Movements such as restlessness	20 (21)	***CPOT***	11 (13)
Ventilator Compliance	13 (14)	***Behavioral Scales***	8 (9)
Sweating	12 (13)	***Vital Signs along with Behavioral Parameters***	1 (1)
Others	10 (10)	***Others***	2 (2)

(*Muscle Tension, Body Movements, Facial Expressions and Ventilator Compliance)

Before the training, 76 (69%) of the respondents thought that behavioural parameters were always reliable whereas after the training, 106 (96%) of respondents answered that behavioural parameters were always reliable in assessment of pain in critically ill patients who cannot self-report (Table 7).

Before the training, 84 (76%) of respondents reported vital signs to be the best way to assess pain in critically ill patients who cannot self-report. However, only 7 (6%) of respondents still maintained the same view after training was conducted and the remaining 104 (94%) of the respondents reported that behavioural parameters were the best way to assess pain in critically ill patients who cannot self-report (Table 7).

Table 7: Knowledge of respondents on pain assessment in critically ill patients unable to self-report pain

		PRE-TRAINING		POST TRAINING	
Knowledge Parameters		**Frequency (N = 111)**	**Percentage (%)**	**Frequency (N =111)**	**Percentage (%)**
Are physiological parameters reliable indicators of pain	Yes	93	83.78	32	28.83
	Only sometimes	16	14.41	72	64.86
	No	2	1.8	7	6.31
Are physiological parameters alone enough	Yes	53	47.75	8	7.21
	No	58	52.25	103	92.79
Are behavioral parameters reliable indicators of pain	Yes	76	68.47	106	95.5
	Only sometimes	34	30.63	5	4.5
	No	1	0.9	0	0
Which is the best way to assess pain	Vital signs	84	75.68	7	6.31
	Behavioral Parameters	27	24.32	104	93.69

4.4 KNOWLEDGE OF NURSES ON THE USE OF THE CPOT ON CRITICALLY ILL PATIENTS UNABLE TO SELF-REPORT, BEFORE AND AFTER TRAINING.

The respondents' knowledge on the existence of the CPOT before it was introduced to them is highlighted in Table 8. Majority of them, i.e. 50% of the respondents heard about it while working in the ICU (Figure 3).

Table 8: Knowledge of respondents on the existence of the CPOT (before training)

		Frequency (N=111)	***Percentage (%)***
Do you know about the CPOT?	Yes	22	19.82
	No	89	80.18

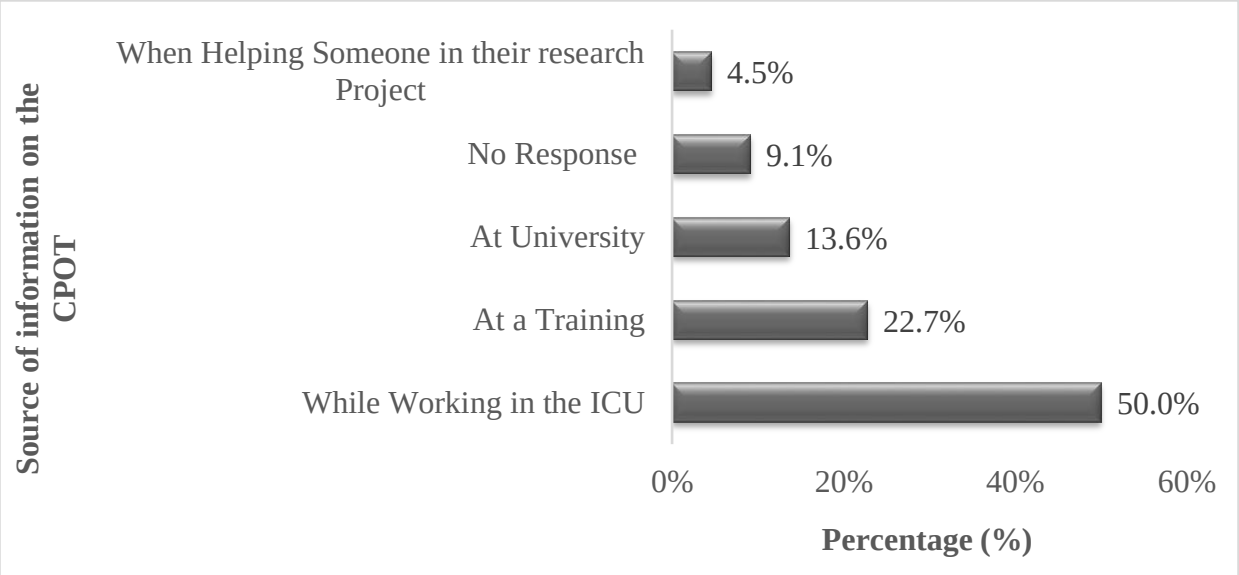


Figure 3: Where the respondents heard about the CPOT (N=22)

Of the 22 (20%) respondents who were aware of the existence of the CPOT before training was conducted, only 11 (50%) had already attempted to use it for their patients. These 11 respondents were asked 8 questions on the use of the CPOT (see appendix 6.1.1 and 6.1.2). Those who scored 50% or less (4/8 or less) were graded as having inadequate knowledge

and those who scored more than 50% (5/8 and above) were graded as having adequate knowledge. From this it was seen that of the 11 respondents, only 4 (36.36%) had adequate knowledge on the use of the CPOT. The mean knowledge score was 37.5% (standard deviation =17.67) with minimum and maximum scores of 12.5% (1/8) and 62.5(5/8) respectively.

The knowledge of all the 111 respondents who participated in this study on the appropriate use of the CPOT was assessed in a similar fashion after they had been trained. Those with adequate knowledge were 107 (96.40%) and those with inadequate knowledge were merely 4 (3.6%). The mean knowledge score was 79.95% (standard deviation=17.04) with minimum and maximum scores of 25% (2/8) and 100% (8/8) respectively.

A comparison; pre and post training in the mean of the knowledge score among the 11 respondents who had used the CPOT before the training was calculated using paired t-test. The mean score pre training was 37.5% (standard deviation=17.67) and the mean score post training had significant improvement at 65.91% (standard deviation=15.90) with t (10) =5.93, p-value of 0.001 (95% Confidence Interval). Therefore, after the training, there was significant improvement in the knowledge of respondents who stated they had used the CPOT before the training.

4.5 PERCEPTION OF NURSES ON THE NEED OF HAVING A STANDARD PAIN ASSESSMENT TOOL FOR ASSESSING PAIN IN CRITICALLY ILL PATIENTS UNABLE TO SELF-REPORT; BEFORE AND AFTER TRAINING

All the respondents perceived having a standard pain assessment tool as important. They were required to indicate how important they thought it was (Very important or important). Before the training was conducted 100 (90%) of them thought that it is very important and 11 (10%) thought it was important. However, after the training 107 (96.4%) of respondents thought it was very important and 4 (3.6%) thought it was important to have a standard pain assessment tool for pain assessment in critically ill patients who cannot self-report.

4.6 PERCEPTION OF NURSES ON THE FEASIBILITY OF THE USE OF CPOT FOR ASSESSING PAIN IN CRITICALLY ILL PATIENTS UNABLE TO SELF-REPORT; BEFORE AND AFTER TRAINING

The respondents' perceptions on the use of the CPOT was assessed by asking a set of 9 questions on its feasibility. It can be seen that those who reported to have had used the tool on their patients before the training was conducted (N=11), generally agreed that the tool was feasible for use in the setting of their ICU. Some level of disagreement can be noted among respondents when asked if the tool would be easier to use if translated in Kiswahili (Figure 4).

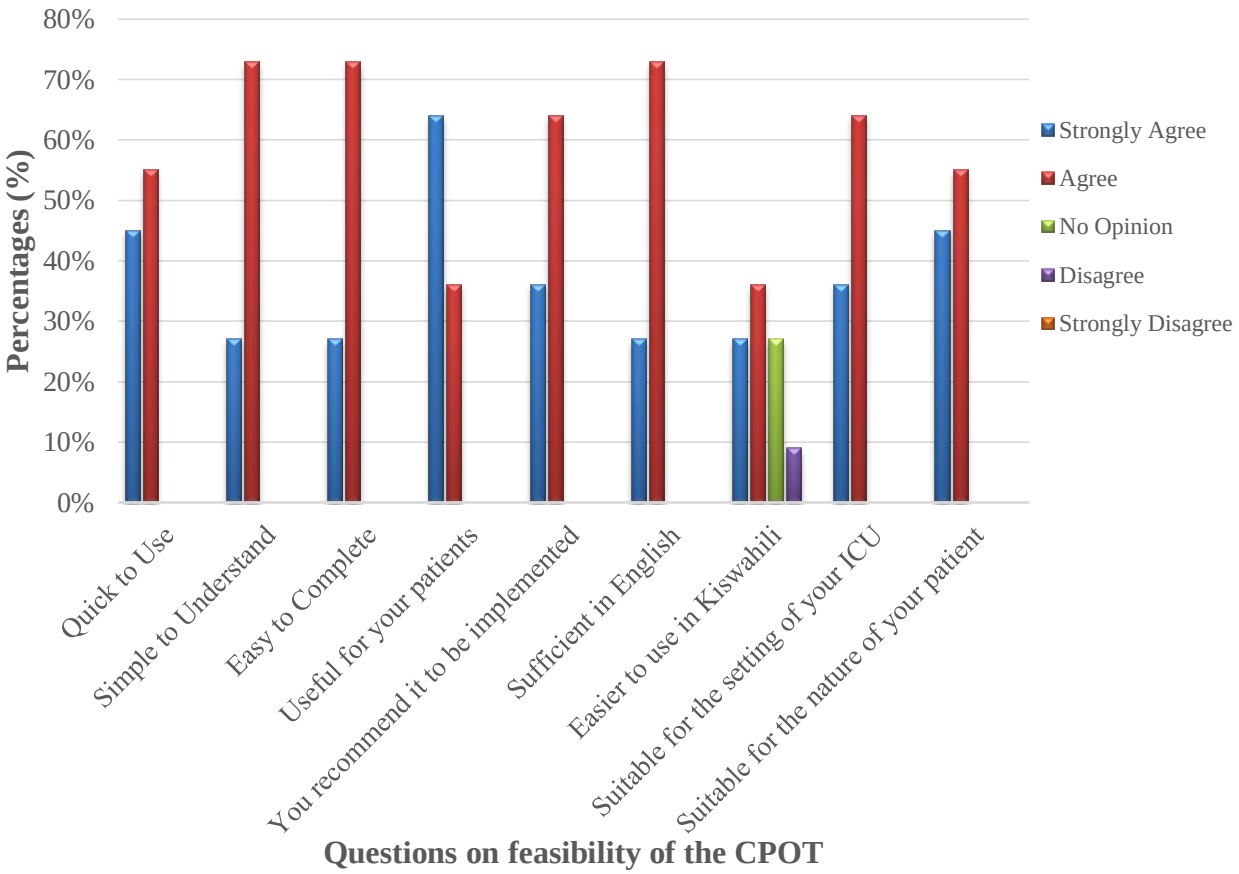


Figure 4: Perception on the feasibility of the CPOT of the 11 respondents who had reported to have used the CPOT on their patients before the training (N=11)

After the training was conducted, it can be seen that all the respondents (N=111) mostly strongly agreed that the CPOT was feasible for use in their ICU setting, again, there is similar response when asked if the tool may be easier to use if translated into Kiswahili, there is notable disagreement (25% disagree and 3% strongly disagree), and 23% of respondents had no opinion on this question (Table 9 and Figure 5).

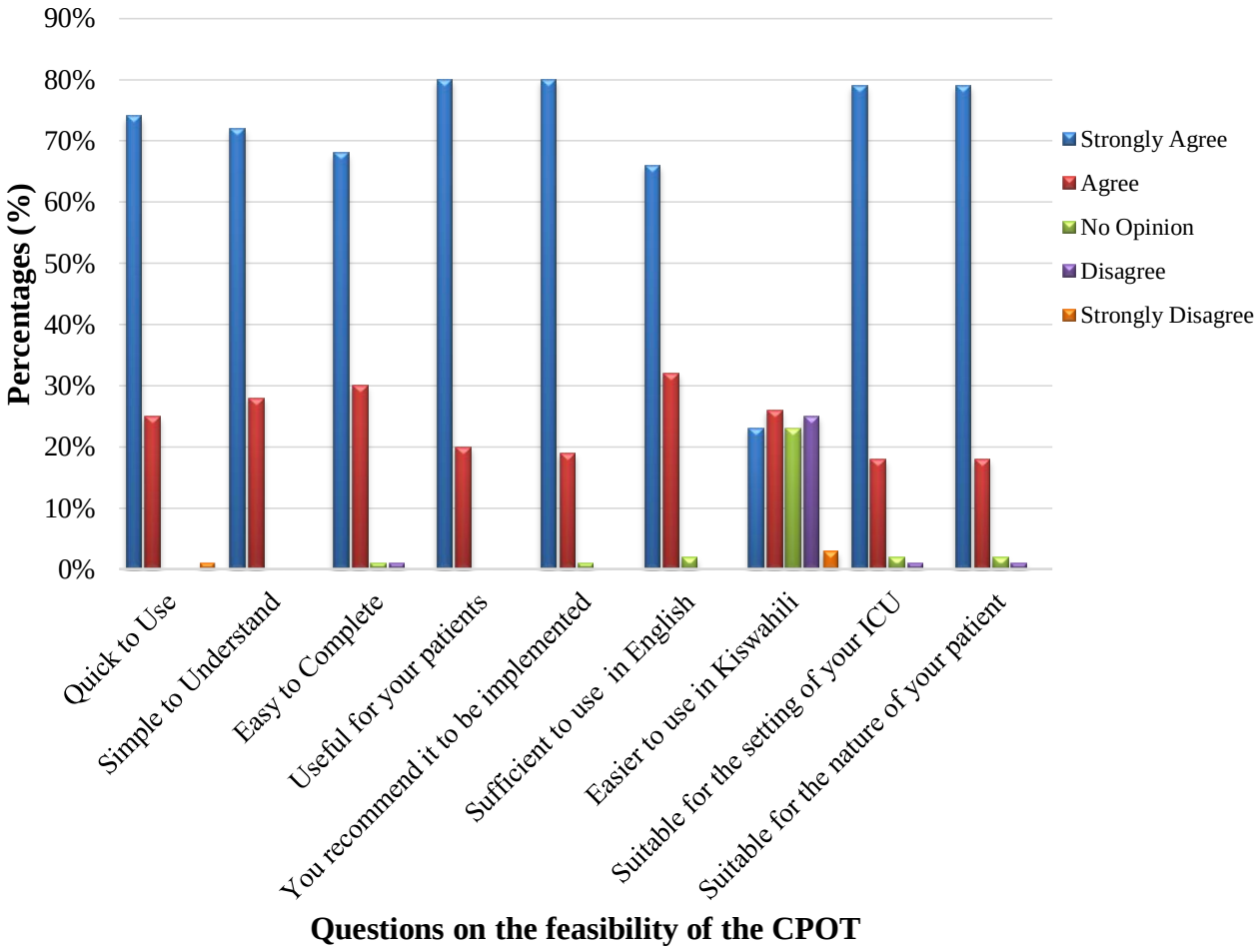


Figure 5: Perception of all respondents on the feasibility of the CPOT, after training (N=111)

Table 9: Respondents Perception on the feasibility of the CPOT (after training)

N = 111 (Percentage %)

Questions to assess the feasibility of the CPOT	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
The CPOT is Quick to Use	82 (73.9%)	28 (25, 2%)	-	-	1 (0.9%)
The CPOT is Simple to Understand	80 (72.1%)	31 (27.9%)	-	-	-
The CPOT is Easy to Complete	76 (68.5%)	33 (29.7%)	1 (0.9%)	1 (0.9%)	-
The CPOT is Useful for your patients	89 (80.2%)	22 (19.8%)	-	-	-
You recommend the CPOT to be implemented	89 (80.2%)	21 (18.9%)	1 (0.9%)	-	-
The CPOT is Sufficient to use in English	73 (65.8%)	36 (32.4%)	2 (1.8%)	-	-
The CPOT will be Easier to use in Kiswahili	26 (23.4%)	29 (26.1%)	25 (22.5%)	28 (25.2%)	3 (2.7%)
The CPOT is Suitable for the setting of your ICU	88 (79.3%)	20 (18.0%)	2 (1.8%)	1 (0.9%)	-
The CPOT Suitable for the nature of your patient	88 (79.3%)	20 (18.0%)	2 (1.8%)	1 (0.9%)	-

A comparison was made among the 11 respondents whose perception was assessed both before and after the training by assigning a score to their answers. Strongly Agree = 5, Agree = 4, No Opinion = 3, Disagree = 2, Strongly Disagree = 1. A maximum score of 45 and minimum score of 5 was possible. An independent t test score was calculated for the mean scores. The mean score of the feasibility pre training was 84.46 (standard deviation=7.53) and the mean score of the feasibility post training was 90.30 (standard deviation=8.02). While an increase in the mean score can be noted, this change was not statistically significant since the p value was at 0.167 with conditions t (10) = 1.49, 95% confidence interval.

4.7 PERCEPTION OF NURSES ON THE FEASIBILITY OF THE TRAINING CONDUCTED

The overall perception of respondents was that the training conducted was feasible and 99.1% of the respondents were in agreement that they felt confident to apply the CPOT into practice (of which 77.5% strongly agreed and 21.6% agreed). In addition, all the respondents agreed that they would recommend this training to their other colleagues (83.8% strongly agreed and 16.2% agreed).

Table 10: Respondents Perception on the feasibility of the training conducted

N = 111 (Percentage %)

Questions to assess the feasibility of the training conducted	**Strongly Agree**	**Agree**	**No Opinion**	**Disagree**	**Strongly Disagree**
Trainer was knowledgeable	92 (82.9)	17 (15.3)	2 (1.8)	-	-
Timing of training was enough	71 (64)	36 (32.4)	2 (1.8)	2 (1.8)	-
Content of training was well organized	88 (79.3)	22 (19.8)	1 (0.9)	-	-

Questions to assess the feasibility of the training conducted	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
Handouts provided were useful	95 (85.6)	16 (14.4)	-	-	-
Training will be useful for practice	96 (86.5)	14 (12.6)	1 (0.9)	-	-
Location of training was convenient	76 (68.5)	32 (28.8)	2 (1.8)	1 (0.9)	-
Easy to understand the training	88 (79.3)	23 (20.7)	-	-	-
I feel confident to use the CPOT	86 (77.5)	24 (21.6)	1 (0.9)	-	-
You would recommend this training to others	93 (83.8)	18 (16.2)	-	-	-

The respondents were asked to comment on how the training could have been better, 20 (18%) of the respondents responded to the question, and there were two main suggestions; 70% of those that responded said that the training should be spread out over a few days and more time should be given and 30% of those that responded said that the demonstration of the use of the CPOT should be done on real patients instead of a video.

4.8 SOCIO DEMOGRAPHIC INFLUENCE ON THE NURSES WHO REPORTED TO HAVE HEARD ABOUT THE CPOT BEFORE THE TRAINING WAS CONDUCTED

The demographic characteristics of the 22 respondents (Table 8) who knew of the existence of the CPOT before training was conducted were analysed using Pearson's Chi Square Test to note if there was a relationship, the following was noted:

- Gender: Of those who stated to have knowledge on the existence of the CPOT before training was conducted, majority were female with statistically significant P value of 0.013 at 95% confidence interval (Table 11).

- Institution of Work: It was found that there was a relationship between those who stated to have knowledge on the existence of the CPOT before training was conducted and working at the Muhimbili Orthopaedic Institute (MOI), with a P value of <0.001 at 95% confidence interval (Table 11).

- Training at university: Majority of those who stated to have knowledge on the existence of the CPOT before training was conducted, had received some training on pain assessment for critically ill patients while at University, with a P value of 0.004, confidence interval of 95% (Table 11).

On the other hand, demographic characteristics of Age, Education level, Number of years at work and training done while at work had no relationship to the respondents' knowledge of the existence of the CPOT before training was conducted (Table 11).

Table 11: Demographic Characteristics of respondents who stated to have knowledge on the existence of the CPOT before training was conducted

		Knowledge about CPOT			
Demographics	**Categories**	**Yes**	**No**	**Total**	***P Value***
		N=22 (%)	**N=89 (%)**		
Gender	Female	19 (27.14)	51 (72.86)	70	***0.013****
	Male	3 (7.32)	38 (92.68)	41	
Age Group	Less than 31	4 (11.43)	31 (88.57)	35	0.211*
	31-40	13 (21.67)	47 (78.33)	60	
	41-50	5 (31.25)	11 (68.75)	16	
Education level	Diploma	11 (18.33)	49 (81.67)	60	0.069*
	Degree	8 (17.39)	38 (82.61)	46	
	Masters	3 (60.00)	2 (40.00)	5	
Institution of work	MNH Upanga	4(8.33)	44 (91.67)	48	***<0.001****
	MNH Mloganzila	5 (22.73)	17 (77.27)	22	
	JKCI	0 (0.00)	13(100.00)	13	
	MOI	13 (46.43)	15 (53.57)	28	
Training at university	Yes	20 (29.85)	47 (70.15)	67	***0.004****
	No	1 (3.70)	26 (96.30)	27	
	I don’t know	1 (5.88)	16 (94.12)	17	
Training at work	Yes	16 (25.81)	46 (74.19)	62	0.075
	No	6 (12.24)	43(87.76)	49	

(*Fishers Exact Test used)

From Table 12 below, it is clear that except for MNH Mloganzila, a majority of respondents working in other institutions (MNH Upanga, MOI and JKCI) have received training in pain assessment of critically ill patients while in service. However, the percentage of respondents (71.4%) who have received training while at work is higher at MOI, which correlates with the finding that a majority of respondents who had heard about the CPOT prior to the training were from MOI.

Table 12: Respondents who have received training in pain assessment while at work (n=111)

		Institute of Work			
		MOI	**JKCI**	**MNH Upanga**	**MNH Mloganzila**
Have you received training in pain assessment of critically ill patients unable to self-report while at work?	**Yes**	20 (71.4%)	9 (69.2%)	26 (54.2%)	7 (31.8%)
	No	8 (28.6%)	4 (30.8%)	22 (45.8%)	15 (68.2%)

CHAPTER FIVE

5.0 DISCUSSION

The aim of this study was to assess the knowledge of the nurses who work in the ICU's and care for critically ill patients on the use of the Critical Care Pain Observation Tool (CPOT) for pain assessment. Also, in addition to assess their perception of the feasibility of the CPOT for routine use in assessing pain, especially because to the best of our knowledge, there have been no studies found that report specifically the use of the CPOT by nurses in the ICU's in Tanzania. Furthermore, this study also established the knowledge and perception of nurses on the importance of assessing pain in critically ill patients and their perception on the need of having a standard pain assessment tool in their settings.

It was identified from this study that respondents working in the ICU's agree that not only is it necessary to assess pain in critically ill patients who cannot self-report, it is also very important to do so. This is also reflected in other studies, such as the one conducted in Ghana to asses pain assessment practices among nurses, where it was found that a great majority of the nurses knew it is important to assess pain for critically ill patients(40). Several similar studies done in Taiwan, Canada and Bangladesh also report that majority of the nurses are aware of the importance of assessing pain for patients who cannot self-report (37,38,52)

It is known from literature and critical care studies that physiological parameters (vital signs) alone cannot be relied on to give a comprehensive and reliable assessment of pain in critically ill patients who cannot self-report because changes in vital signs may be due to several factors such as fear, anxiety, sedation, metabolic and physiologic derangements especially in critically ill patients(30,35,53). However, it came to light in this study that respondents working in the ICU's still relied greatly on physiological parameters. It was strikingly noted before the training that respondents thought physiological parameters (such as vital signs) were always reliable as well as the best indicators of pain in critically ill patients unable to self-report. This is common practice seen in ICU's where an increased heart rate or elevated temperature is many times translated as pain without the use of any other means of verifying pain or its severity.

The respondents (half of those who participated in the study) did however also think that while these physiological parameters were the best and reliable, were not enough on their own to assess pain. They further indicated that facial expressions such as crying and tearing were helpful indicators of pain, while others mentioned motor movements such as restlessness and compliance with ventilators to be means that should be used along with physiological parameters to assess pain in patients unable to self-report. This corroborates with other studies in which nurses describe physiological parameters such as vital signs coupled with pain behaviours (especially facial expressions) to be reliable for assessing pain in patients who cannot self-report (7,44,52).

It is interesting to note that these other means mentioned by respondents are all infact domains of the CPOT and components of many other Behaviour Scales used to assess pain in patients unable to self-report. Respondents use these behavioural parameters separately and irregularly coupled with physiological parameters, but are not well versed that these infact translate into a tool that can be used to assess pain systematically. This also reflected in a study conducted by Gelinas and her team in 2004 where medical files from 2 health centres in Quebec, Canada were reviewed, and it was noted that nurses often noted pain behaviours without the use of a consolidated behavioural tool (54). This is also echoed in other similar studies conducted in France and Mashhad (12,39).

It is thus clear in this study that respondents still rely on their own judgement by coupling pain behaviours with physiologic parameters to assess pain in patients unable to self-report in the ICU and do not use a standard pain assessment tool which is supported by other similar studies that report the same findings (12,13,40). It was therefore no surprise to note that when asked if they know about the CPOT, only a handful of respondents reported that they had heard about it either in a previous training, while at university, or at the work place. Furthermore, only half of those who had heard about it had actually used the tool to assess pain in their patients, majority of who turned out to have inadequate knowledge on the proper use of the CPOT as established in this study. This was slightly higher than one of the only other study found which also assessed the knowledge of ICU nurses on the existence of such a tool in which none of the nurses had ever heard about the CPOT (13). Furthermore, this finding goes hand in hand with findings from other studies that nurses are more likely to use

tools to assess pain in patients able to self-report as opposed to those unable to verbalize their pain such as those unconscious (7,44,52)

It is worth to note that, despite relying on their judgement most of the time to assess pain in patients unable to self-report and despite not being aware of the existence of the CPOT to assess pain for patients unable to self-report, respondents unanimously agreed in this study that not only is it necessary, but also very important to have a standard pain assessment tool in practice to be able to assess pain for their critically ill patients who are unable to self-report their pain. This is contrary to a study conducted in Bangladesh in 2018 in which majority of the nurses stated that having a standard tool for pain assessment was minimally important (38).

The CPOT was then introduced to the respondents and they were trained on its correct usage. On assessing their knowledge after the training, majority of the respondents had adequate knowledge and therefore in a good position to apply the CPOT to assess pain for their patients. The respondents generally perceived the CPOT to be a feasible tool. Almost all of the respondents stated that they would recommend the CPOT to be used for the setting of their ICU's and that it was a useful tool hence feasible for application in the setting of their ICU's. This is in agreement with another similar study done in Lebanon, on critical care nurses who also perceived the CPOT as being a feasible tool for us in critically ill patients (13).

Some of the respondents additionally commented that the tool should be made into routine pain assessment protocol and included in the documentation chart to make it easier to use and follow. This is also echoed in a study conducted in Mashhad in 2018 which highlights lack of a standard tool in the nursing documentation chart as being a challenge in its implementation (12). Even though almost half of the respondents who participated in the study thought the tool would be easier to use if translated into Kiswahili, there was some disagreement on this by the other half of the respondents. It was expected that because Kiswahili is the national language in Tanzania, and that respondents are well versed in it, they would unanimously state that it would be easier to use in Kiswahili but this was not the case. There is therefore a need to further probe into this prominent result, especially because

the international clinical practice guidelines recommend that the CPOT be translated into the local language for use.

Moreover, after the training was conducted, there was a significant decrease in the number of respondents who agreed that physiological parameters were always reliable, and there was a significant increase in the number of respondents who thought that physiological parameters may only be reliable sometimes. In addition, what was remarkable was that, after the training, almost all the respondents now thought that behavioral parameters were indeed the best indicators of pain in patients unable to self-report in contrast to vital signs that majority had reported before the training was conducted.

The training conducted was feasible, in the sense that it was convenient, easy to understand and follow as reported by the respondents who participated in the training. A few of the respondents however further stated that perhaps breaking down the training into more number of days and spread out over more time would be more beneficial than it already was. Some of them stated that demonstration on real patients would have worked better as practical demonstration as opposed to learning through a practical video (38). Respondents also additionally commented that this training should be conducted for all the nurses working across all ICU's and not be limited to the research study so that the tool may be implemented as routine.

When analysing the demographic data of the respondents who had heard about the CPOT before the training was conducted, it came to attention that there were more female respondents who had heard about the CPOT. This could be owed to the fact that a majority of the respondents who participated in this study were female, which is supported by all the studies done among nurses. It was also seen that majority of those who had heard about the CPOT were those who stated that they had received training on pain assessment for unconscious critically ill patients while at university. And lastly, of the respondents who had heard about the CPOT before the training, a majority worked at the Muhimbili Orthopaedic Institute (MOI).

On further examining the respondents who work at MOI and participated in this study, it came to light that majority of them had been trained in pain assessment of critically ill patients while at work. It could therefore very well be the case that the training received by respondents while at work on pain assessment of critically ill patients has the potential of introducing useful knowledge on the tools that can be used to assess pain appropriately for patients who cannot self-report. However, given that the knowledge of the respondents on the correct use of the CPOT was mostly inadequate before it was taught to them as part of this study, highlights that there is need to visit these trainings conducted in service (such as the one at MOI) and perhaps conceptualize a standard training package.

5.1 IMPLICATION TO PRACTICE

This study has direct implications to the nursing practice and comfort of critically ill patients in the ICU's. As has been discussed, pain is a major cause of discomfort to critically ill patients and when pain is inadequately managed, it brings about a plethora of complications, many of which impair the healing process and recovery of these patients. It is therefore needless to say that pain must be adequately managed, and to do so, appropriate assessment must be performed by nurses caring for critically ill patients who cannot self-report. Without appropriate assessment there can be no appropriate management.

Furthermore, because critically ill patients are unable to report their pain, a valid, reliable and accurate tool must be used by nurses for assessment of pain. The most recommended tool among others, which was the subject of this study is the Critical Care Pain Observation Tool (CPOT).

Through this study, it was established that nurses working in the ICU's of the National Referral Hospital of Tanzania are not aware of the existence of the CPOT and do not use it. Rather, nurses rely on inappropriate pain assessment methods such as physiological parameter readings. They have been trained on pain assessment in critically ill patients unable to self-report and on the correct usage of the CPOT through this study. Respondents found the CPOT as being feasible to apply to their practice.

With the correct use of this tool, pain can be assessed appropriately in critically ill patients who are unable to report, giving the nurses a good idea on how to adequately manage the pain, hence, preventing any complications of inadequately managed pain and moreover promoting comfort and alleviating suffering in critically ill patients in the ICU's.

5.2. STUDY LIMITATION AND MITIGATION:

Study limitation:

This study faced limitations in the training of participants. Breaking the sample size into small manageable group may have introduced bias in terms of consistency in providing the same training at different times and several times. Moreover, the communication barrier (in terms of language and non-verbal cues) between the trainer and trainees may also have been a limitation considering that every participant's pace of learning and grasping is different as well as differences in age and education level may have contribute to ineffective learning.

Mitigation:

The principal investigator made sure to train every group herself, to ensure uniformity in content and method of delivery. Interactive delivery of the lecture using PowerPoint slides, a video, and creating an environment for participants to be able to ask questions allowed for more effective learning. The principal investigator also used a pre prepared training plan consistently for every group that was trained.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

Respondents know the importance of assessing pain in critically ill patients who are unable to self-report pain, and also agree that having a standard pain assessment tool for such patients is very important. Most of them however, were found to still rely on physiological parameters (vital signs) coupled with pain behaviours to assess pain. They did not know of the existence of a validated and reliable tool, the Critical Care Pain Observation Tool (CPOT) that is recommended by American Society for Pain Management Nursing (ASPMN) and can be used to aid them in assessing pain of critically ill patients under their care who cannot self-report pain. The few who reported to have attempted to use the CPOT were found to infact have inadequate knowledge on its correct use. The tool was introduced to the respondents working in the ICU's through this study, and their knowledge after the training was found to be adequate for correct implementation of the tool for their patients. There was also significant improvement in the knowledge of those respondents who had previously reported to have used the tool but had inadequate knowledge on its correct usage. Respondents' knowledge on the best way to assess pain in patients unable to self-report also improved significantly after the training. This was highlighted by the fact that majority of the respondents thought using behavioural scales was the best way to assess pain as opposed to relying on vital signs as they had stated before the training was conducted. Respondents perceived the CPOT as a feasible tool to be used for the setting of the Tanzanian ICU's and the nature of the patients therein, and did not think it was necessary to have the tool translated into Kiswahili. Respondents also perceived the training as feasible and felt confident to apply the CPOT in their practice. They further recommended that the training should be conducted for all the nurses working in critical care settings and that the CPOT should be incorporated as routine pain assessment in the ICU's.

6.2 RECOMMENDATIONS

TRAINING (By Nurses and Nurse Managers at the Hospitals and Universities):

- To conduct continuous professional education training programs on pain assessment for critically ill patients who cannot self-report pain across all ICU's for all the nurses who care for such patients.
- To incorporate pain assessment and pain management training specifically for critically ill patients unable to self-report pain into the nursing curriculums at school/university level across all cadres – Diploma, Degree and Masters level.

FOLLOW UP STUDIES (By Nursing students as well as nurses interested in Research):

- To conduct a follow up study on the nurses who have been trained in this study to assess the implementation of the Critical Care Pain Observation Tool (CPOT) in their practice and identify any gaps or challenges faced
- To repeat this study in the setting of lower level of health facilities in order to assess the readiness of the nurses as well as the feasibility of the CPOT in such settings.
- To conduct studies to assess the impact of the use of the Critical Care Pain Observation Tool (CPOT) in management of pain in critically ill patients.

VALIDATION OF THE CPOT:

- To Validate the Critical Care Pain Observation Tool (CPOT) in the Tanzanian setting and subsequently incorporate the CPOT as routine practice for pain assessment in patients unable to self-report, such as those in the ICU's by adding the tool into the nursing documentation charts

POLICY IMPROVEMENT (By the Nursing Council and the Ministry of Health):

- To introduce this tool to stakeholders at the level of policy makers, so as to be able to create a standardized practice across the country in pain assessment of critically ill patients unable to self-report and consequently improve management of these patients.

REFERENCES

1. Gélinas C, Fillion L, Puntillo KA, Viens C, Fortier M. Validation of the critical-care pain observation tool in adult patients. American journal of critical care : an official publication, American Association of Critical-Care Nurses. 2006 Jul;15(4):420–7.
2. Storsveen A-M, Hall-Lord M-L. The CPOT – a tool for pain assessment for intensive care patients. Sykepleien Forskning. 2020;(59668):e.
3. Ostermann, M; Spriging D. Presentations in Acute Medicine. Acute Medicine: A Practical Guide to the Management of Medical Emergencies, Fifth Edition. 2017;1–8.
4. Cooksley T, Rose S, Holland M. A systematic approach to the unconscious patient. Clinical Medicine, Journal of the Royal College of Physicians of London. 2018;18(1):88–92.
5. Cambridge Dictionary [Internet]. Cambridge University Press. 2021. Available from: https://dictionary.cambridge.org/dictionary/english/knowledge
6. Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. Pain. 2020;161(9):1976–82.
7. Kizza IB, Muliira JK. Nurses' pain assessment practices with critically ill adult patients. International Nursing Review. 2015;62(4):573–82.
8. Sessler CN. Progress toward eliminating inadequately managed pain in the ICU through interdisciplinary care. Chest. 2009;135(4):894–6.
9. Modanloo M, Mohsenpour A, Rahmani H, Moghaddam S, Khoddam H. Impact of implementing the critical care pain observation tool on nurses' performance in assessing and managing pain in the critically ill patients. Indian Journal of Critical Care Medicine. 2019;23(4):165–9.
10. Kizza IB, Muliira JK, Kohi TW, Nabirye RC. Nurses' knowledge of the principles of acute pain assessment in critically ill adult patients who are able to self-report. International Journal of Africa Nursing Sciences [Internet]. 2016;4:20–7. Available from: http://dx.doi.org/10.1016/j.ijans.2016.02.001

11. De Rond MEJ, De Wit R, Van Dam FSAM, Muller MJ. A pain monitoring program for nurses: Effects on communication, assessment and documentation of patients' pain. Journal of Pain and Symptom Management. 2000;20(6):424–39.
12. Deldar K, Froutan R, Ebadi A. Challenges faced by nurses in using pain assessment scale in patients unable to communicate: A qualitative study. BMC Nursing. 2018;17(1):1–8.
13. Maatouk H, Al Tassi A, Fawaz MA, Itani MS. Nurses' evaluation of critical care pain observation tool (CPOT) implementation for mechanically ventilated intensive care patients. Data in Brief [Internet]. 2019;25:103997. Available from: https://doi.org/10.1016/j.dib.2019.103997
14. Rijkenberg S, van der Voort PHJ. Can the critical-care pain observation tool (CPOT) be used to assess pain in delirious ICU patients? Journal of Thoracic Disease. 2016;8(5):E285–7.
15. Aantaa R, Pudas-Tähkä SM, Axelin A, Lund V, Salanterä S. Pain assessment tools for unconscious or sedated intensive care patients: A systematic review. Journal of Advanced Nursing. 2009;65(5):946–56.
16. Gélinas C, Puntillo K, Joffe A, Barr J. A validated approach to evaluating psychometric properties of pain assessment tools for use in nonverbal critically ill adults. Seminars in Respiratory and Critical Care Medicine. 2013;34(2):153–68.
17. Allnurses. CPOT: Critical-Care Pain Observation Tool - NTI Interview with Celine Gelinas [Internet]. 2020 [cited 2021 Mar 8]. Available from: https://allnurses.com/cpot-critical-care-pain-observation-tool-t703234/
18. Puntillo K, Gélinas C, Chanques G, Puntillo K, Gélinas C, Chanques G, et al. Next steps in ICU pain research To cite this version : HAL Id : hal-01783557. 2020;43(9):1386–8.
19. Payen JF, Gélinas C. Measuring pain in non-verbal critically ill patients: Which pain instrument? Critical Care. 2014;18(5):4–5.
20. Gélinas C, Ross M, Boitor M, Desjardins S, Vaillant F, Michaud C. Nurses' evaluations of the CPOT use at 12-month post-implementation in the intensive care unit. Nursing in Critical Care. 2014;19(6):272–80.

21. Asadi-Noghabi AA, Gholizadeh M, Zolfaghari M, Mehran A, Sohrabi M. Nurses use of critical care pain observational tool in patients with low consciousness. Oman Medical Journal. 2015;30(4):276–82.
22. Arbour C, Gélinas C, Michaud C. Impact of the Implementation of the Critical-Care Pain Observation Tool (CPOT) on Pain Management and Clinical Outcomes in Mechanically Ventilated Trauma Intensive Care Unit Patients. Journal of Trauma Nursing. 2011;18(1):52–60.
23. Georgiou E, Hadjibalassi M, Lambrinou E, Andreou P, Papathanassoglou EDE. The Impact of Pain Assessment on Critically Ill Patients' Outcomes: A Systematic Review. BioMed Research International. 2015;2015.
24. Rose L, Haslam L, Dale C, Knechtel L, McGillion M. Behavioral Pain Assessment Tool for Critically Ill Adults Unable To Self-Report Pain. American journal of critical care. 2013;22(3):246–54.
25. Rijkenberg S, van der Voort PHJ, Modanloo M, Mohsenpour A, Rahmani H, Moghaddam S, et al. Exploring the validity of the bispectral index, the Critical-Care Pain Observation Tool and vital signs for the detection of pain in sedated and mechanically ventilated critically ill adults: A pilot study. Intensive and Critical Care Nursing [Internet]. 2019;30(1):46–52. Available from: http://www.sciencedirect.com/science/article/pii/S0964339710001047
26. Pronovost P, Goeschel C. Improving ICU care: it takes a team. Healthcare executive. 2005;20(2):14–6, 18, 20 passim.
27. Hamill-Ruth RJ, Marohn ML. Evaluation of pain in the critically ill patient. Critical Care Clinics. 1999;15(1):35–54.
28. Rijkenberg S, Stilma W, Endeman H, Bosman RJ, Oudemans-van Straaten HM. Pain measurement in mechanically ventilated critically ill patients: Behavioral pain scale versus critical-care pain observation tool. Journal of Critical Care [Internet]. 2015;30(1):167–72. Available from: http://dx.doi.org/10.1016/j.jcrc.2014.09.007
29. Gélinas C, Tousignant-Laflamme Y, Tanguay A, Bourgault P. Exploring the validity of the bispectral index, the Critical-Care Pain Observation Tool and vital signs for the detection of pain in sedated and mechanically ventilated critically ill adults: A pilot study. Intensive and Critical Care Nursing [Internet]. 2011;27(1):46–52. Available from: http://www.sciencedirect.com/science/article/pii/S0964339710001047

30. Azevedo-Santos IF, DeSantana JM. Pain measurement techniques: Spotlight on mechanically ventilated patients. Journal of Pain Research. 2018;11:2969–80.
31. Khomeiran RT, Yekta ZP, Kiger AM, Ahmadi F. Professional competence: Factors described by nurses as influencing their development. International Nursing Review. 2006;53(1):66–72.
32. Ross D. Aid coordination. Development (CIDA). 1988;7(Summer/Fall):39–41.
33. Dunwoody CJ, Krenzischek DA, Pasero C, Rathmell JP, Polomano RC. Assessment, Physiological Monitoring, and Consequences of Inadequately Treated Acute Pain. Pain Management Nursing. 2008;9(1 SUPPL):11–21.
34. Patricia Gonce Morton DKF. Critical Care Nursing - A Holistic Approach. Wolters Kluwer. 2005.
35. Gélinas C, Johnston C. Pain assessment in the critically ill ventilated adult: Validation of the critical-care pain observation tool and physiologic indicators. Clinical Journal of Pain. 2007;23(6):497–505.
36. Haonga BT, Makupa JE, Muhina RI, Nungu KS. Pain management among adult patients with fractures of long bones at Muhimbili Orthopaedic Institute in Dar es Salaam, Tanzania. Tanzania Journal of Health Research. 2011;13(4).
37. Wang HL, Tsai YF. Nurses' knowledge and barriers regarding pain management in intensive care units. Journal of Clinical Nursing. 2010;19(21–22):3188–96.
38. Mondol S, Muhammad F, Chowdhury ABMA. Nurses' knowledge and practices related to pain assessment in critically ill patients in a selected private hospital in Bangladesh. International Journal Of Community Medicine And Public Health. 2018;5(10):4219.
39. Study APMP. Current Practices in Sedation and Analgesia for. 2016;(4):687–95.
40. Imoro MA. Practice of Pain Assessment in Critically Ill Patients among Nurses at the Tamale Teaching Hospital. 2019;1(1).
41. Gélinas C, Arbour C, Michaud C, Vaillant F, Desjardins S. Implementation of the critical-care pain observation tool on pain assessment/management nursing practices in an intensive care unit with nonverbal critically ill adults: A before and after study. International Journal of Nursing Studies. 2011;48(12):1495–504.

42. Barr J, Fraser GL, Puntillo K, Ely EW, Gélinas C, Dasta JF, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. Critical Care Medicine. 2013;41(1):263–306.
43. Gélinas C. Nurses' evaluations of the feasibility and the clinical utility of the critical-care pain observation tool. Pain Management Nursing. 2010;11(2):115–25.
44. Hamdan KM. Nurses' Assessment Practices of Pain Among Critically Ill Patients. Pain Management Nursing [Internet]. 2019;20(5):489–96. Available from: https://doi.org/10.1016/j.pmn.2019.04.003
45. Allen M. One-Group Pretest–Posttest Design. In: The SAGE Encyclopedia of Communication Research Methods. 2017.
46. Taherdoost H. Sampling Methods in Research Methodology ; How to Choose a Sampling Technique for Research Hamed Taherdoost To cite this version : HAL Id : hal-02546796 Sampling Methods in Research Methodology ; How to Choose a Sampling Technique for. International Journal of Academic Research in Management (IJARM). 2016;5(2):18–27.
47. Bajah S, Bunyi G, Knott M MB, Mulusa T, Muriuki G MP, Nkuuhe J WD. Teach Your Best − A Handbook for University Lecturers. [Internet]. Frankfurt am Main; 1995. Available from: http://www.nzdl.org/cgi-bin/library
48. Johnson B. R, Christensen L. Educational Research - Quantitative, Qualitative and Mixed Approaches. Fifth. Library of Congress Cataloging-in-Publication Data; 2014.
49. Heale R, Twycross A. Validity and reliability in quantitative studies. Evidence-Based Nursing. 2015;18(3):66–7.
50. Taber KS. The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. Research in Science Education. 2018;48(6):1273–96.
51. David L. Streiner. Starting at the beginning: An introduction to coefficient alpha and internal consistency. Journal of Personality Assessment. 2003;80(1):99–103.
52. Rose L, Haslam L, Dale C, Knechtel L, Fraser M, Pinto R, et al. Survey of assessment and management of pain for critically ill adults. Intensive and Critical Care Nursing [Internet]. 2011;27(3):121–8. Available from: http://dx.doi.org/10.1016/j.iccn.2011.02.001

53. Ayasrah S. Care-related pain in critically ill mechanically ventilated patients. Anaesthesia and Intensive Care. 2016;44(4):458–65.

54. Céline Gélinas, Martine Fortier, Chantal Viens, Lise Fillion KP. Pain assessment and management in critically ill intubated patients: a retrospective study. American journal of critical care [Internet]. 2004;13(2):126–35. Available from: https://pubmed.ncbi.nlm.nih.gov/15043240/

APPENDIX I. QUESTIONNAIRE I: PRE TRAINING

Nurses' Knowledge And Perceived Feasibility On The Use Of The Critical Care Pain Observation Tool (CPOT) On Patients Unable To Self-Report In The Intensive Care Units Of The National Referral Hospital In Tanzania.

QUESTIONNAIRE 1 – (PRE TRAINING)

Participant Unique Identification Number: _____

Date: _____

No	Questions *Please read the questions carefully and answer as required in the Answer column*	Answers *Please tick the appropriate answer, or write the appropriate answer in your own words as required by the question*
	Demographics	
1	Age (in years):	
2	Gender:	☐Female ☐Male
3	Highest Level of professional Education:	☐ Certificate ☐ Diploma ☐ Degree ☐ Masters ☐ PhD
4	Additional Qualifications	_____ _____
5	Institution of Work:	☐ MNH ☐ MAMC ☐ JKCI ☐ MOI
6	Number of months or years worked in the ICU	_____ months _____ years

7	Have you received any training in Pain Assessment of unconscious, critically ill patients during your education in school/university?	☐ Yes ☐ No ☐ I don't remember
8	Have you received any training (at work, in-service) in Pain Assessment of unconscious critically ill patients while working at the ICU?	☐ Yes ☐ No
9	How long ago did you receive this training at work?	☐ Never been trained ☐ Can't remember how long ago ☐ _____ Years ☐ _____ Months
Knowledge of nurses on Pain Assessment of Unconscious critically Ill patients		
10	Is it important to assess pain in unconscious critically ill patients?	☐ Yes ☐ No
11	How important it is to assess pain in unconscious critically ill patients?	☐ Very Important ☐ Important ☐ Somewhat Important ☐ Not Important ☐ Not at all Important
12	Are physiological parameters such as vital signs (Respiratory rate, Heart rate, Temperature and Blood pressure) reliable indicators of the level of pain in unconscious critically ill patients?	☐ Yes, always ☐ Only sometimes ☐ No, never
13	Are these physiological parameters alone enough to give you a valid assessment of pain in unconscious critically ill patients? **If No,** What other means must be used to assess pain in unconscious critically ill patients?	☐ Yes ☐ No _____ _____
14	Are behavioural parameters (such as facial expression, motor movements, muscle tension, ventilator compliance) reliable indicators of the level of pain in unconscious critically ill patients?	☐ Yes, always ☐ Only sometimes ☐ No, never
15	Which is the best way to tell that your unconscious critically ill patient is in pain?	☐ Vital Signs ☐ Behavioural parameters

	Knowledge of nurses on the use of Critical Care Pain Observation Tool (CPOT) for pain assessment in unconscious critically ill patients	
16	a) Do you know about the *Critical Care Pain Observation Tool (CPOT)* that is used to assess pain in unconscious critically ill patients? b) Where did you hear about the CPOT? (Mention all sources) ***If 16 is NO skip to Question 35***	☐ Yes ☐ No _____ _____ _____
17	Have you ever used this tool to assess pain in unconscious critically ill patients?	☐ Yes ☐ No
18	The Critical Care Pain Observation Tool (CPOT) has how many domains?	☐ 5 ☐ 3 ☐ 4 ☐ 6
19	Which domain must be assessed last?	☐ Compliance with Ventilator ☐ Muscle Tension ☐ Body Movements ☐ Facial Expression ☐ Vital Sign Readings ☐ Presence of Reflexes
20	What is the minimum score that can be achieved in total on the Critical Care Pain Observation Tool (CPOT)?	☐ 0 ☐ 2 ☐ 8 ☐ 1
21	What is the maximum score that can be achieved in total on the Critical Care Pain Observation Tool (CPOT)?	☐ 0 ☐ 2 ☐ 8 ☐ 1
22	In the Critical Care Pain Observation Tool (CPOT) what is the sign that tells you that the patient is fighting the ventilator?	☐ Moving Hands ☐ Crying ☐ Coughing and activating alarms ☐ Resistance in muscle movements
23	Opening the mouth or biting the endotracheal tube is a sign of pain that falls under which domain in the Critical Care Pain Observation Tool (CPOT)?	☐ Compliance with Ventilator ☐ Muscle Tension ☐ Body Movements ☐ Facial Expression
24	Which of the domain in the Critical Care Pain Observation Tool (CPOT) is least specific behaviour in relation to pain?	☐ Compliance with Ventilator ☐ Muscle Tension ☐ Body Movements

		☐ Facial Expression ☐ Vital Sign Readings ☐ Presence of Reflexes
25	How many times must the assessment be done using the Critical Care Pain Observation Tool (CPOT)?	☐ 1 ☐ 3 ☐ 2 ☐ 5
	Perception of nurses on the feasibility of Critical Care Pain Observation Tool (CPOT) for pain assessment in unconscious critically ill Patients	
26	The Critical Care Pain Observation Tool (CPOT) is quick to use	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
27	The Critical Care Pain Observation Tool (CPOT) is simple to understand	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
28	The Critical Care Pain Observation Tool (CPOT) is easy to complete	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
29	The Critical Care Pain Observation Tool (CPOT) is useful to assess pain in unconscious critically ill patients	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
30	You would recommend the Critical Care Pain Observation Tool (CPOT) to be implemented in the ICU where you work	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
31	The Critical Care Pain Observation Tool (CPOT) is sufficiently understood and easy to use in English	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
32	The Critical Care Pain Observation Tool (CPOT) would be easier to follow and use in Kiswahili	☐ Strongly Agree ☐ Agree ☐ No Opinion

		☐ Disagree ☐ Strongly Disagree
33	The Critical Care Pain Observation Tool (CPOT) is suitable for the setting of your ICU	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
34	The Critical Care Pain Observation Tool (CPOT) is suitable for the nature of your unconscious critically ill patients	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
	Perception of nurses on the need of having a standard pain assessment tool for pain assessment in unconscious critically ill patients	
35	Do you think it is necessary to have a standard pain assessment tool that can be used by nurses in the ICU to assess pain of unconscious critically ill patients?	☐ Yes ☐ No
36	How important do you think it is to have a standard pain assessment tool that can be used by nurses in the ICU to assess pain of unconscious critically ill patients?	☐ Very Important ☐ Important ☐ Somewhat Important ☐ Not Important ☐Not at all Important
37	Why do you think it is important to assess pain in unconscious critically ill patients? (Mention all reasons you believe to be important)	_____ _____ _____ _____

APPENDIX II: QUESTIONNAIRE II: POST TRAINING
(13,20)

Nurses' Knowledge And Perceived Feasibility On The Use Of The Critical Care Pain Observation Tool (CPOT) On Patients Unable To Self-Report In The Intensive Care Units Of The National Referral Hospital In Tanzania.

QUESTIONNAIRE 2 – (POST TRAINING)

Participant Unique Identification Number: _____

Date: _____

S/ No	Questions *Please read the questions carefully and answer as required in the Answer column*	Answers *Please circle the appropriate answer, or write the appropriate answer in your own words as required by the question*
Knowledge of nurses on Pain Assessment of Unconscious critically Ill patients		
1	Is it important to assess pain in unconscious critically ill patients?	☐ Yes ☐ No
2	How important it is to assess pain in unconscious critically ill patients?	☐ Very Important ☐ Important ☐ Somewhat Important ☐ Not Important ☐ Not at all Important
3	Are physiological parameters such as vital signs (Respiratory rate, Heart rate, Temperature and Blood pressure) reliable indicators of the level of pain in unconscious critically ill patients?	☐ Yes, always ☐ Only sometimes ☐ No, never
4	Are these physiological parameters alone enough to give you a valid assessment of pain in unconscious critically ill patients? If No, What other means must be used to assess pain in unconscious critically ill patients?	☐ Yes ☐ No _____ _____ _____

5	Are behavioural parameters (such as facial expression, motor movements, muscle tension, ventilator compliance) reliable indicators of the level of pain in unconscious critically ill patients?	☐ Yes, always ☐ Only sometimes ☐ No, never
6	Which is the best way to tell that your unconscious critically ill patient is in pain?	☐ Vital Signs ☐ Behavioral parameters
	Knowledge of nurses on the use of CPOT for pain assessment in unconscious critically ill patients	
7	The Critical Care Pain Observation Tool (CPOT) has how many domains?	☐ 5 ☐ 3 ☐ 4 ☐ 6
8	Which domain must be assessed last?	☐ Compliance with Ventilator ☐ Muscle Tension ☐ Body Movements ☐ Facial Expression ☐ Vital Sign Readings ☐ Presence of Reflexes
9	What is the minimum score that can be achieved in total on the Critical Care Pain Observation Tool (CPOT)?	☐ 0 ☐ 2 ☐ 8 ☐ 1
10	What is the maximum score that can be achieved in total on the Critical Care Pain Observation Tool (CPOT)?	☐ 0 ☐ 2 ☐ 8 ☐ 1
11	In the Critical Care Pain Observation Tool (CPOT) what is the sign that tells you that the patient is fighting the ventilator?	☐ Moving Hands ☐ Crying ☐ Coughing and activating alarms ☐ Resistance in muscle movements
12	Opening the mouth or biting the endotracheal tube is a sign of pain that falls under which domain in the Critical Care Pain Observation Tool (CPOT)?	☐ Compliance with Ventilator ☐ Muscle Tension ☐ Body Movements ☐ Facial Expression
13	Which of the domain in the Critical Care Pain Observation Tool (CPOT) is least specific behaviour in relation to pain?	☐ Compliance with Ventilator ☐ Muscle Tension ☐ Body Movements ☐ Facial Expression ☐ Vital Sign Readings ☐ Presence of Reflexes

14	How many times must the assessment be done using the Critical Care Pain Observation Tool (CPOT)?	☐ 1 ☐ 3 ☐ 2 ☐ 5
Perception of nurses on the feasibility of Critical Care Pain Observation Tool (CPOT) for pain assessment in unconscious critically ill Patients		
15	The Critical Care Pain Observation Tool (CPOT) is quick to use	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
16	The Critical Care Pain Observation Tool (CPOT) is simple to understand	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
17	The Critical Care Pain Observation Tool (CPOT) is easy to complete	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
18	The Critical Care Pain Observation Tool (CPOT) is useful to assess pain in unconscious critically ill patients	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
19	You would recommend the Critical Care Pain Observation Tool (CPOT) to be implemented in the ICU where you work	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
20	The Critical Care Pain Observation Tool (CPOT) is sufficiently understood and easy to use in English	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
21	The Critical Care Pain Observation Tool (CPOT) would be easier to follow and use in Kiswahili	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree

22	The Critical Care Pain Observation Tool (CPOT) is suitable for the setting of your ICU	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
23	The Critical Care Pain Observation Tool (CPOT) is suitable for the nature of your unconscious critically ill patients	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
	Perception of nurses on the need of having a standard pain assessment tool for pain assessment in unconscious critically ill patients	
24	Do you think it is necessary to have a standard pain assessment tool that can be used by nurses in the ICU to assess pain of unconscious critically ill patients?	☐ Yes ☐ No
25	How important do you think it is to have a standard pain assessment tool that can be used by nurses in the ICU to assess pain of unconscious critically ill patients?	☐ Very Important ☐ Important ☐ Somewhat Important ☐ Not Important ☐Not at all Important
26	Why do you think it is important to assess pain in unconscious critically ill patients? (Mention all reasons you believe to be important)	_____ _____ _____
	Perception of nurses on the feasibility of the training conducted	
27	The trainer was knowledgeable on the topic of the training	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
28	The length of the training was sufficient (timing was enough)	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
29	The content of the training was well organised	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree

30	Questions and Interactions were encouraged	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
31	Hand outs provided were useful	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
32	The training will be useful for my work and practice	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
33	The location of the training was convenient	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
34	It was easy to understand and follow what was being taught	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
35	I feel confident to try to apply the CPOT on my patients after the training	☐ Strongly Agree ☐ Agree ☐ No Opinion ☐ Disagree ☐ Strongly Disagree
36	I would recommend other colleagues to join this training	☐ Strongly Agree ☐ Agree ☐ No Opinion☐ Disagree ☐ Strongly Disagree
37	How has this training helped you?	_____ _____ _____
38	What could have been done better in this training, how can it be improved?	_____ _____ _____ _____

APPENDIX III: INFORMED CONSENT FORM:

INFORMED CONSENT FORM

Greetings. My name is Zainab Manji, a postgraduate student in Critical Care and Trauma Nursing, conducting a study on the use of the Critical Care Pain Observation Tool (CPOT) for pain assessment in unconscious, critically ill patients in the ICU by nurses. You are eligible to take part in this research project because you have been taking care of such patients. This form gives you important information about the study. It describes the purpose of the study, and the risks and possible benefits of participating in the study.

Please take time to review this information carefully. If you have any queries, do not hesitate to consult me. Once you understand the information in this form, please sign below if you agree to take part in the study.

Study Title: Nurses' Knowledge And Perceived Feasibility Of The Use Of The Critical Care Pain Observation Tool (CPOT) On Unconscious Patients In The Intensive Care Units Of The National Referral Hospital In Tanzania.

Researcher: *Sr. Zainab K. Manji*, RN, School of Nursing, Muhimbili University of Health and Allied Sciences.

Purpose of this study: The purpose of this study is to assess whether nurses working in the ICU think it is important to assess pain in critically ill, unconscious patients, and whether nurses working in the ICU are aware of the existence of the Critical Care Pain Observation Tool. Also, this study aims to assess the perception of nurses on the feasibility of employing the CPOT in the Tanzanian setting and the perception of nurses on the need of having a standard pain assessment tool for use in critically ill patients.

Who can take part in this study? This study is for all nurses working at the ICU. Participation in this study is entirely voluntary. You may leave this study at any time without any harm on you. You will not lose any benefits, nor will it affect your work at the ICU if you decide not to take part in this study.

What will happen in this study? There will be three parts to this study. If you consent, you will be enrolled for a 3 hour training program along with other nurses who have agreed to be part of this study. You will be informed of the time, date and venue of the training. On the day of the training, first, a questionnaire will be given to you with 37 questions. You will be required to fill it in to the best of your knowledge and give it back to the researcher. Following that, the training will be conducted relating to the topic of this research by the researcher. After the training is complete, immediately, you will be given another questionnaire with 38 questions to be filled and returned.

Are there any risks of taking part in this study? There are no risks for you for participating in this study. There may be some inconvenience for your time dedicated for attending the training and filling the questionnaires.

Are there any benefits of taking part in this study? You will not receive any personal benefits from being in this study. However, any new information that will be learned in this study will be used to improve efficiency of nursing care and improve overall outcome of patients in your care.

Are there any costs or fees for entering this study? There will be no additional costs to you. All the reference materials will be provided to you at no cost.

Is there confidentiality in this research project? The individual information obtained from this study will not be shared. The results will not be directed to any individual, rather as general outcomes. The results of this study could be published in an article for other researchers to read but would not include any information that would let others know who you are.

Your signature below means you have read the above information, understood it well and are voluntarily ready to participate in *all the three* steps of this study.

Signature of Participant **Date**

_____ _____

Thank you for agreeing to participate in the study. Please do not hesitate to contact me or any of the contact persons below for clarification about your participation or more information should such a need arise.

Contact Information:

Sr. Zainab K. Manji,

Principal Investigator.
School of Nursing, MUHAS

Mobile No: +255 789 736 511
Email: zainab.karim4@gmail.com

Dr. Beatrice Mwilike (Ph.D.)
Study Supervisor, HOD - Community Health Nursing,
School of Nursing, MUHAS.
Tel No: +255 712620924; Email: beatricemwilike@yahoo.com

Dr. Bruno Sunguya
Director of Research and Publication,
PO Box 65001 – MUHAS
Tel No: +255 -022-2152489
Email: drp@muhas.ac.tz

APPENDIX IV. CPOT AND ITS DIRECTIVES OF USE

TO BE USED FOR TRAINING PURPOSES AND GIVEN OUT TO PARTICIPANTS AT THE END OF THE TRAINING FOR FUTURE USE.

(1,29,35,41,43)

The Critical-Care Pain Observation Tool (CPOT)
(Gélinas et al., 2006)

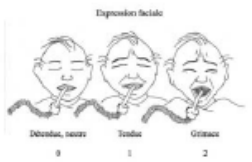
Indicator	Score		Description
Facial expression  Caroline Arbour, RN, B.Sc., PhD(student) School of Nursing, McGill University	Relaxed, neutral	0	No muscle tension observed
	Tense	1	Presence of frowning, brow lowering, orbit tightening and levator contraction or any other change (e.g. opening eyes or tearing during nociceptive procedures)
	Grimacing	2	All previous facial movements plus eyelid tightly closed (the patient may present with mouth open or biting the endotracheal tube)
Body movements	Absence of movements or normal position	0	Does not move at all (doesn't necessarily mean absence of pain) or normal position (movements not aimed toward the pain site or not made for the purpose of protection)
	Protection	1	Slow, cautious movements, touching or rubbing the pain site, seeking attention through movements
	Restlessness/Agitation	2	Pulling tube, attempting to sit up, moving limbs/thrashing, not following commands, striking at staff, trying to climb out of bed
Compliance with the ventilator (intubated patients)	Tolerating ventilator or movement	0	Alarms not activated, easy ventilation
	Coughing but tolerating	1	Coughing, alarms may be activated but stop spontaneously
	Fighting ventilator	2	Asynchrony: blocking ventilation, alarms frequently activated
OR			
Vocalization (extubated patients)	Talking in normal tone or no sound	0	Talking in normal tone or no sound
	Sighing, moaning	1	Sighing, moaning
	Crying out, sobbing	2	Crying out, sobbing
Muscle tension Evaluation by passive flexion and extension of upper limbs when patient is at rest or evaluation when patient is being turned	Relaxed	0	No resistance to passive movements
	Tense, rigid	1	Resistance to passive movements
	Very tense or rigid	2	Strong resistance to passive movements or incapacity to complete them
TOTAL	___ / 8		

Figure 6 : The Critical Care Pain Observation Tool (CPOT)

Brief description of each CPOT behavior:

Facial expression: The facial expression is one of the best behavioral indicators for pain assessment. A score of 0 is given when there is no muscle tension observable in the patient's face. A score of 1 consists of a tense face which is usually exhibited as frowning or brow lowering. A score of 2 refers to grimacing, which is a contraction of the full face including eyes tightly closed and contraction of the cheek muscles. On occasion, the patient may open his or her mouth, or if intubated, may bite the endotracheal tube. Any other change in facial expression should be described in the chart, and given a score of 1 if different from a relaxed (0) or grimacing (2) face.

Body movements: A score of 0 is given when a patient is not moving at all or remains in a normal position as per the nurse's clinical judgment. A score of 1 refers to protective movements, meaning that the patient performs slow and cautious movements, tries to reach or touch the pain site. A score of 2 is given when the patient is restless or agitated. In this case, the patient exhibits repetitive movements, tries to pull on tubes, tries to sit up in bed, or is not collaborative. Of note, body movements are the less specific behaviors in relation with pain, but are still important in the whole evaluation of the patient's pain.

Compliance with the ventilator: Compliance with the ventilator is used when the patient is mechanically ventilated. A score of 0 refers to easy ventilation. The patient is not coughing nor activating the alarms. A score of 1 means that the patient may be coughing or activating the alarms but this stops spontaneously without the nurse having to intervene. A score of 2 is given when the patient is fighting the ventilator. In this case, the patient may be coughing and activating the alarms, and an asynchrony may be observed. The nurse has to intervene by talking to the patient for reassurance or by administering medication to calm the patient down.

Vocalization: Vocalization is used in non-intubated patients able to vocalize. A score of 0 refers to the absence of sound or to the patient talking in a normal tone. A score of 1 is given when the patient is sighing or moaning, and a score of 2 when the patient is crying out (Aïe! Ouch!) Or sobbing.

Muscle tension: Muscle tension is also a very good indicator of pain, and is considered the second best one in the CPOT. When the patient is at rest, it is evaluated by performing a passive flexion and extension of the patient's arm. During turning, the nurse can easily feel the patient's resistance when she is participating in the procedure. A score of 0 is given when no resistance is felt during the passive movements or the turning procedure. A score of 1 refers to resistance during movements or turning. In other words, the patient is tense or rigid. A score of 2 consists of strong resistance. In such cases, the nurse may be unable to complete passive movements or the patient will resist against the movement during turning. The patient may also clench his/her fists.

Directives of use of the CPOT

1. The patient must be observed at rest for one minute to obtain a baseline value of the CPOT.
2. Then, the patient should be observed during nociceptive procedures (e.g. turning, wound care) to detect any changes in the patient's behaviors to pain.
3. The patient should be evaluated before and at the peak effect of an analgesic agent to assess whether the treatment was effective or not in relieving pain.
4. For the rating of the CPOT, the patient should be attributed the highest score observed during the observation period.
5. The patient should be attributed a score for each behavior included in the CPOT and muscle tension should be evaluated last, especially when the patient is at rest because the stimulation of touch alone (when performing passive flexion and extension of the arm) may lead to behavioral reactions.

Observation of patient at rest (baseline).

The nurse looks at the patient's face and body to note any visible reactions for an observation period of one minute. She gives a score for all items except for muscle tension. At the end of the one-minute period, the nurse holds the patient's arm in both hands – one at the elbow, and uses the other one to hold the patient's hand. Then, she performs a passive flexion and extension of the upper limb, and feels any resistance the patient may exhibit. If the movements are performed easily, the patient is found to be relaxed with no resistance (score 0). If the movements can still be performed but with more strength, then it is concluded that the patient is showing resistance to movements (score 1). Finally, if the nurse cannot complete the movements, strong resistance is felt (score 2). This can be observed in patients who are spastic.

Observation of patient during turning.

Even during the turning procedure, the nurse can still assess the patient's pain. While she is turning the patient on one side, she looks at the patient's face to note any reactions such as frowning or grimacing. These reactions may be brief or can last longer. The nurse also looks out for body movements. For instance, she looks for protective movements like the patient trying to reach or touching the pain site (e.g. surgical incision, injury site). In the mechanically ventilated patient, she pays attention to alarms and if they stop spontaneously or require that she intervenes (e.g. reassurance, administering medication). According to muscle tension, the nurse can feel if the patient is resisting to the movement or not. A score 2 is given when the patient is resisting against the movement and attempts to get on his/her back.

The link to the training video: http://sccmmedia.sccm.org/video/Webcast/Pain-Critical-Care-Observation-Tool.mp4

APPENDIX V: POCKET SIZE TOOL

Critical-Care Pain Observation Tool

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

Figure 7: Pocket Size CPOT

APPENDIX VI: ELABORATE TRAINING PLAN

Table 13: Elaborate Teaching Plan

Timing	Activity	Details
2 mins	Greetings and Picking a Unique Identification number	The trainer will introduce herself and greet all the participants. The participants will have to pick a chit of paper with a unique identification number. These chits will be numbered from 1 – 111 (total number of participants to be enrolled into the study). They will be asked to keep the number confidential and remember it throughout the session.
15 mins	Administering and Collection of Questionnaire I	Questionnaire I will be administered to each participant along with a pen, on which they will write their unique ID number in place of their name to ensure confidentiality. They will be given 15 minutes to fill in the questionnaire. Anyone who needs some additional time can request for it.
3 mins	Collecting Questionnaires	The questionnaires will then be collected, checked for completeness and put in an envelope which will be sealed.
2 mins	Sharing of Training Objectives	The Training objectives will be shared with the participants which are as follows: By the end of the training, the participants will: - be able to define Pain according to the standard definition -be able to state reasons as to why it is important to assess pain in unconscious critically ill patients -be able to differentiate pain assessment methods between conscious patients and unconscious patients -be able to mention a few behavioral pain scales that are in use -be able to describe the CPOT and its use on unconscious critically ill patients
3 mins	Definition of pain	The International Association for the Study of Pain defines pain as an unpleasant sensory or emotional experience associated with actual or potential tissue damage (6).
5 mins	Importance of assessing pain in critically ill patients	Pain is a major cause of discomfort for patients, in particular for critically ill patients. They experience acute pain due to trauma, underlying illnesses, dependence on life support devices and repeated painful procedures, many of which are invasive in nature (7,8). Pain in critically ill patients is inevitable due to the presence of underlying, preexisting conditions, invasive procedures and trauma. Critically ill patients also undergo painful routine procedures such as turning, wound care,

		endotracheal suctioning and drain removal (29). They experience pain at rest as well as during procedures causing a major hindrance towards comfort, rest and healing. Literature highlights that as many as 70% of critically ill patients suffer moderate to severe intensity pain during their stay in the ICU(18,29). Other studies report that more than 75% of critically ill patients receive ineffective analgesia despite the fact that pain is a major contributor to stress in these patients. Even after their discharge and after the end of their stay in the hospital, upto 70% of critically ill patients can recall the pain they experienced(7,8,35,36). When pain is inadequately managed, it brings about a plethora of complications for the critically ill patient, which may last for a short period of time, but may also have long lasting effects. These complications can be physiological or psychological. The physiologic consequences of pain have been reported as those that increase the sympathetic responses and levels of stress hormones, it causes restricted movement of limbs, but also restricted coughing and deep breathing. Consequently, it can lead to life threatening events such as myocardial ischemia, pulmonary atelectasis and pneumonia. Furthermore, it renders the body incapable of glycemic control, increases coagubility and leads to a dysfunction in the normal immune system(2,8,9,27). It can cause issues with mobility rendering the patients at a higher risk for deep vein thrombosis and thrombo embolism. It also increases the risk of developing pressure sores and muscle atrophy(7). Furthermore, inadequate pain relief causes restlessness, myocardial ischemia, slower healing, and prevents compliance with mechanical ventilator. On the other hand, due to overrating, if the pain is over treated with more analgesics than required, it can cause dangerous side effects such as hypotension, respiratory depression and difficulty to wean from mechanical ventilation. Consequently these complications lead to increased length of stay at the hospital, increased chances of acquiring infections and in turn increased mortality(9). Psychologically pain causes fear, anxiety, and demoralization, a feeling of helplessness, fatigue and loss of control. This then causes impaired sleeping pattern and consequently can lead to the development of injurious effects such as depression, post-traumatic stress disorder and even delirium. Ineffectively managed acute pain can develop into chronic pain syndrome (7,33). Inadequate pain management also causes fear, anxiety, depression, fatigue and sleep disturbance in critically ill patients. This in turn leads to development of delirium and post-traumatic

		stress disorder in critically ill patients causing a compromise in their quality of life post hospitalization(10). All in all, inadequate treatment of pain brings about negative effects and diminishes the patients chance at recovery, reducing the quality of life and poses a risk in increased morbidity and mortality(29)
5 mins	Difference between pain assessment in conscious vs. unconscious patients	Because pain is a subjective experience, for patients who are verbal, self-reporting of pain is considered the gold standard for pain assessment(18,22,24). However, the challenge lies in pain assessment for unconscious critically ill patients in the ICU. These patients are unable to communicate because of the presence of life support devices such as endotracheal tubes and mechanical ventilators, sedation and decreased levels of consciousness. In this case, one cannot rely simply on physiologic parameters to assess pain because physiologic parameters do not provide valid information in indication of pain(35). Studies state that behavioral scales must be employed to be able to precisely and reliably assess the intensity of pain on such unconscious patients.
5 mins	Behavioral Pain Scales	There are several behavioral pain scales that have been developed for assessing pain in unconscious critically ill patients in the ICU. These include pain scales such as Pain Assessment and Training Notation (PAIN) Algorithm, Critical Care Pain Observation tool (CPOT), Behavioral Pain Scale (BPS), BPS-Nonintubated, NonVerbal Pain Scale (NVPS), NonVerbal Pain Assessment Tool (NPAT), Face, Legs, Activity, Cry, Consolability (FLACC) score, and the Pain Behavioural Assessment tool (PBAT)(16).
5 mins	Introduction and history of CPOT	According to the international clinical guidelines, as well as extensive systematic review and validation of the several pain scales, the Behavior Pain Scale (BPS) and The Critical-Care Pain Observational Tool (CPOT) have the highest validity and reliability(2,15,16,33,42). In a study by Rijkenberg et al. the CPOT and the BPS were compared and it was concluded that the CPOT was a more preferable tool because it had a better discriminate validity(28). In another similar study by Barr et al. the two tools (BPS and CPOT) were tested for their psychometric properties such as user friendliness, validity, reliability, etc and the CPOT was concluded to be the favored one(42). In addition, the American Society for Pain Management Nursing (ASPMN) recommends using the CPOT(29). The CPOT was developed in the year 2019/2020 by a critical care nurse from Canada, Dr.Celina Gelinas, who won

		an award for developing one of the most valid and reliable behavioral pain scales for assessing pain in critically ill adult patients unable to communicate pain(17). It was formulated after extensive literature review, and discussions with critical care nurses and physicians(1,35,43).
15 mins	Use of CPOT	The CPOT has a total of four domains which are; the patient's facial expressions, body movements, compliance with ventilator (or voice use for non-intubated patients), and muscle tension. Each domain has a possible score of 0 to 2. The total score can vary between 0 and 8, where 0 indicates no pain behavior and 8 indicates clear signs of pain behavior(2) (the considerations and details of each domain while using the CPOT have been attached in the appendix IV and V).
10 mins	Video on the practical use of CPOT	Freely accessible for use as a training package by the Kaiser Permanente Northern California Research (Allnurses, 2020). This video will be projected on the screen for everyone to view and good quality speakers will be used to ensure everyone can hear well. The trainer will give a commentary as the video goes on to ensure everyone understands well. The link to the video is attached in Appendix IV.
5 mins	Question, Answer and Discussion	There will be room for questions and answers to ensure everyone has achieved what was intended from the training. Participants will be asked to raise their hands, and one by one, the questions will be answered. In other cases, students will be asked to discuss their fellow participant's questions so as to generate a discussion. If the number of questions are not that many, the researcher shall ask a few questions to ensure that the participants have understood. These questions will be formulated by the trainer on the spot depending on the situation of the class at the time.
5 mins	Summary	One participant will be asked to voluntarily summarize the most important take home messages of the training. The trainer will ensure these are in line with the objectives of the training.
15 mins	Administering of Questionnaires	After summarizing the training and concluding. Questionnaire II will be administered to each participant, on which they will write their unique ID number in place of their name to ensure confidentiality. They will be given 15 minutes to fill in the questionnaire. Anyone who needs some additional time can request for it. The researcher and research assistant will be available in case any participant has any question.

3 mins	Collecting Questionnaires and giving handouts	The questionnaires will then be collected, checked for completeness and stored in a sealed envelope by the researcher. Printed Handouts (attached in appendix IV and V) will be given out to all the participants on the use of the CPOT for their own future reference
2 mins	Thanks	The participants will be thanked. Contact details of the Principal Investigator will be shared with those who many have additional questions later on, or who may be interested to know the outcome of the research.

APPENDIX VII: ETHICAL CLEARANCE (MUHAS)

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR - RESEARCH AND PUBLICATIONS

Ref. No.DA.282/298/01.C/ Date: 22/04/2021

MUHAS-REC-04-2021-561

Zainab Karim Manji
Shool of Nursing
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: NURSES' USE OF CRITICAL CARE PAIN OBSERVATION TOOL (CPOT) ON UNCONSCIOUS PATIENTS IN THE INTENSIVE CARE UNITS OF THE NATIONAL REFERRAL HOSPITAL IN TANZANIA.

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 22/04/2021
EXPIRATION DATE OF APPROVAL: 22/04/2022

STUDY DESCRIPTION:
Purpose:
The purpose of this single group pretest posttest study is to assess nurses' 'knowledge' and their 'perception on the feasibility (ease of use, ease of understanding and suitability)' of the use of CPOT for pain assessment in unconscious, critically ill patients at the ICU's of MNH (Upanga and Mloganzila), JKCI and MOI; before and after training.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%20653.pdf and in the MUHAS archives.

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1038; Direct Line:+255-22-2152489;Telefax:+255-22-2152489;E-mail:drp@muhas.ac.tz;Web:https://www.muhas.ac.tz

APPENDIX VIII: PERMISSION LETTER FROM MNH - UPANGA

THE UNITED REPUBLIC OF TANZANI

MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN

MUHIMBILI NATIONAL HOSPITAL

In reply please quote;

Ref. No.: MNH/TRCU/Perm/2021/107 Date: 03rd May, 2021

Block Manager
- Mwaisela
- General ICU
- Maternity I

Muhimbili National Hospital

RE: PERMISSION TO COLLECT DATA AT MNH.

Name of Student	**Zainab Karim Manji**
Title	**"Nurses' Use of Critical Care Pain Observation Tool (CPOT) On Unconscious Patients in The Intensive Care Units of the National Referral Hospital in Tanzania."**
Institution	Muhimbili University of Health and Allied Sciences
Supervisor	Dr. Beatrice Mwilike
Co - Supervisor	Agness Massae
Period	03rd May 2021, to 30th, June, 2021

Approval has been granted to the above mentioned student to collect data at MNH.

Kindly ensure that the student abide to the ethical principles and other conditions of the research approval.

Sincerely,

Reid B. Mchome
Coordinator –Teaching, Research and Consultancy Unit

TEACHING, RESEARCH & CONSULTANCY UNIT * MUHIMBILI NATIONAL HOSPITAL * P.O. Box 65000 DAR-ES-SALAAM

c.c DNS
c.c **Zainab Karim Manji**

Upanga West, Kalenga Street, Plot No. 10480/3, P.O. BOX 65000, Dar es Salaam, Tanzania.
Telephone: +255-22-2151367-9, Telephone: +255-22-2151351-2
Email: info@mnh.or.tz, Website: www.mnh.or.tz

APPENDIX IX: PERMISSION LETTER FROM MOI

MOI
MUHIMBILI ORTHOPAEDIC INSTITUTE

P.O. Box 65474; DAR ES SALAAM, TANZANIA, MUHIMBILI COMPLEX
Executive Director: +255-022-2153359
General lines: +255-022-2151298/2152937/2152938
FAX: +255-022-2151744
E-Mail: info@moi.ac.tz
Website: www.moi.ac.tz
OFFERING SERVICES IN ORTHOPAEDICS, NEUROSURGERY AND TRAUMATOLOGY

AB.145/292/OIB/176 **23rd April, 2021**

Director, Postgraduate studies
MUHAS
P.O.BOX 650001
DAR ES SALAAM.

RE: APPROVAL FOR PERMISSION FOR DATA COLLECTION

Reference is made to your letter dated 20th April, 2021 with reference NO: HD/MUH/T.498/2019 regarding the subject above.

On behalf of the management of the Institute (MOI), I would like to officially inform you request for Zainab Karim Manji to collect titled '*Nurses use of critical care pain observation tool on unconscious patients in the intensive care units of the referral Hospitals in Tanzania*' at Muhimbili Orthopaedic Institute has been approved.

Therefore you are requested to inform Ms.Zainab Karim Manji start to collect data as requested.

It's my hope that you will provide enough cooperation regarding this matter.

Abdallah Mbuguni
For: Executive Director.

Cc: MD-MOI

APPENDIX X: PERMISSION LETTER FROM JKCI

UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN

JAKAYA KIKWETE CARDIAC INSTITUTE (JKCI)

JAKAYA KIKWETE CARDIAC INSTITUTE

In reply, please quote; **Ref:** AB.123/307/01D/52 Date: 07/05/2021

Zainab Karim Manji
Msc. Nursing Critical Care
MUHAS

RE: PERMISSION TO CONDUCT RESEARCH

Reference is made to your letter. Your request to conduct a study titled, ***"Nurses' Use of Critical Care Pain Observation Tool (CPOT) On Unconscious Patients in the Intensive Care Units of the National Referral Hospital in Tanzania".*** Granted, institutional permission.

This letter serves as an official document that permits you to collect your data at JKCI for the prescribed duration as per your ethical clearance. It is our sincere hope that you will abide to the rules and regulations of good clinical practice and the declaration of Helsinki. We wish you the very best and hope that your stay at JKCI will be fruitful.

You are required to provide a copy of your final project upon completion and submit it to Department of Research and Training JKCI.

In addition, your local contact person at JKCI will be Sr. Salma Wibonela, (lease with her before you start your data collection).

Best Regards,

Dr.Naizihijwa, MAJANI
Head of Research Training & Consultancy
CC: DIRECTOR NURSING SERVICES

Jakaya Kikwete Cardiac Institute (JKCI); Upanga East Plot No. 1048, Kalenga Street, Malik Road, P. O. Box 65141 - Dar es Salaam; Telephone Number + 255 -22- 2152392 Email:info@jkci.or.tz, Website: ww.jkci.or.tz.

APPENDIX XI: PERMISSION LETTER FROM MNH - MLOGANZILA

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN

MUHIMBILI NATIONAL HOSPITAL
MLOGANZILA

In reply please quote;

Ref. No.: JA.294/428/01/183 **Date: 26/05/2021**

Ass. Director of Nurse Services
Ag. Block Manager Emergency Services and Critical Care
MNH-Mloganzila

RE: PERMISSION TO COLLECT DATA AT MNH - MLOGANZILA

Name of Principal Investigator	Ms. Zainabu Karim Manji
Title	"Nurses Use of Critical Care Pain Obervation Tool (CPOT) on Unconscious Patients in the Intensive Care Units of the National Referral Hospital in Tanzania"
Institution	Muhimbili University of Health and Allied Sciences
Supervisor	Dr. Beatrice Mwilike
Period	2 months

Permission has been granted to **Ms. Zainabu Karim Manji** to collect data for the above study.

Please ensure that the researcher abide to the ethical principle and other condition.

Mirriam K. Herman
FOR: EXECUTIVE DIRECTOR
MUHIMBILI NATIONAL HOSPITAL - MLOGANZILA

c.c. Ms. Zainabu Karim Manji

Mloganzila, Kibamba – Ubungo, P.O. BOX 65000, Dar es Salaam, Tanzania.
Telephone: +255-22-222215715, Telephone: +255-22-2215701,
Email: info@Mloganzila.or.tz, Website: www.mnh.or.tz