NURSES' KNOWLEDGE AND PRACTICE ON ELECTROCARDIOGRAM LEAD PLACEMENT AND INTERPRETATION AT THREE CONSULTANT HOSPITALS IN DAR ES SALAAM, TANZANIA.

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NURSES' KNOWLEDGE AND PRACTICE ON ELECTROCARDIOGRAM LEAD PLACEMENT AND INTERPRETATION FROM SELECTED CRITICAL CARE SETTING AT THREE CONSULTANT HOSPITAL IN DAR ES SALAAM, TANZANIA.

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of critical care and trauma of the

Muhimbili University of Health and Allied Science
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 Knowledge and Practice on Electrocardiogram Lead Placement and Interpretation at Three Consultant Hospitals in Dar es salaam, Tanzania"** in (partial) fulfilment for the requirement for Masters of Science in Nursing (Critical Care and Trauma) of Muhimbili University of Health and Allied Science.

……

Prof Lilian T Mselle

(Supervisor)

Date: ……

……

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(Co-supervisor)

Date: ……

DECLARATION AND COPYRIGHT

I, **Lucia Kabeya**, declare that this is my own work and that it has not submitted to any other university or academic institution for a similar purpose of academic award

Signature…… Date…….

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DEDICATION

This dissertation is dedicated to my lovely husband and beloved son who has been constantly supporting me during the development of this dissertation. Also, I would like to dedicate it to the MUHAS School of nursing department for providing me with the knowledge that has enabled me to accomplish this work.

ABSTRACT

Background:

Electrocardiography is a commonly used, non-invasive procedure for recording electrical changes in the heart. ECG plays a crucial role in helping to diagnose, follow-up and detect any abnormalities in patients' conditions. Nurses' knowledge and practice of ECG might be useful in improving their knowledge level and enhancing initiation management to become more professional in ECG interpretation. More than 50% of nurses do not know the correct ECG lead placement or basic interpretation of ECG. Therefore, this paper present results of nurse's knowledge and practice on ECG lead placement and interpretation at the JCKI, MOI, and MNH

Aim: The aim of this study was to assess nurses' knowledge and practice on electrocardiogram lead placement and interpretation at three Consultant hospitals in Dar es Salaam, Tanzania

Methodology: Analytical cross-sectional design was conducted at Muhimbili Orthopaedic Institute, Jakaya Kikwete Cardiac Institute, and Muhimbili National Hospital in Dar es Salaam. A simple random sampling method was used to select 179 registered nurses working in critical care setting. Data was collected by using a self-administered questionnaire from the registered nurse after they met an inclusion criterion to participate in the study. Data was then analysed using descriptive statistics, and Pearson Chi-Square. P-value of <0.05 was considered statistically significant.

Results: The findings of this study present a low level of ECG interpretation. At the same time, it was revealed that low practice of ECG among the nurses. From the data, nurses' working experience present with significant association with the P value of 0.02. training had a significant association with the P value of 0.09. perceived competency with P value of 0.01, and level of education on ECG interpretation had a significant association with the P value of 0.00. respectively other variable studied didn't had significant association with the target

variable, nurse's practice on ECG interpretation relay on working experience with significant of (P value of 0.01) which is 3.08 times higher odds.

Conclusion: The results of this study showed a low level of ECG interpretation. At the same time, it was revealed that low practice of ECG among the nurses. nurse's practice on ECG interpretation relay on working experience with significant.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
aVF	Augmented Vector Foot
aVL	Augmented Vector Left
aVR	Augmented Vector Right
CCU	Coronary care unity
ECG	Electrocardiogram
EMD	Emergency department
HDU	High dependent unity
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unity
JKCI	Jakaya Kikwete Cardiac Institute
MAICU	Maternity ICU
MNH	Muhimbili National Hospital
MOI	Muhimbili Orthopedic Institute
PICU	Pediatric intensive care unity
RN	Registered Nurse
SA	Sinoatrial Node AV
SPSS	Statistical Package Social Sciences

DEFINITION OF TERMS

Electrocardiogram stands for ECG. It is a tool used to detect a wide range of heart dysrhythmias using waveforms on a monitor (1).

Critical care setting is the settings including emergency medicine and intensive care units, It is a place of specialized care for patients whose conditions are life-threatening and who require comprehensive care and constant monitoring(2) .

Knowledge: is information acquired through sensory input, reading, watching, listening, touching, etc. The concept of knowledge refers to familiarity with factual information and theoretical concept, knowledge can be transferred from one person to another or it can be self acquired through observation(3) .

Practice: Is the repeated exercise in or performance of an activity or skill so as to acquire or maintain proficiency in it(4).

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Electrocardiography is a non-invasive procedure usually used for recording electrical changes in the heart. An electrocardiogram (ECG) record displays series of waves that relate to the electrical impulses that occur all through each beat of the heart. Nowadays ECG is an important initial evaluation for patients presenting with cardiac problems and it is considered as the first diagnostic tool in chest pain and it provides objective information about the structure and function of the heart (5).

Several components of an electrocardiogram (ECG) like P wave, QRS complex, and T wave provide different distinctive amplitudes and frequencies. Devices recording these signals are required to use various algorithms for signal filtering and amplification to produce a clinically useful signal at the same time eliminating unwanted signals. Normally, the standard 12-lead ECG is done when a patient quietly lies in a supine position. Care to a patient undergoing ECG should be enhanced to ensure that the skin is clean and too many hairs shaved in areas where the leads are to be placed. Sometimes a mildly abrasive pad can be applied to prepare the skin in these areas to help in the apposition of the leads (6).

It is recommended that the leads of standard limb be positioned one on each limb distal to the shoulders and hips though not necessarily should be as far distal as the wrists and ankles, then it followed by precordial leads; care should be taken so as to be as precise as possible in their positioning. Lead V1 is placed at the fourth intercostal space at the right sternal border. Lead V2 is placed at the left sternal border directly across from lead V1, also in the fourth intercostal space. Lead V4 is placed in the fifth intercostal space at the mid-clavicular line and then lead V3 can be placed midway between leads V2 and V4. Lead V6 is placed in the horizontal plane of V4 at the mid-axillary line and then lead V5 is placed in the same horizontal plane as that of lead V4 in the anterior axillary line or midway between leads V4 and V6 when the anterior axillary line is not freely palpable (6).

The placement of precordial electrodes in women with large breasts can be challenging based on complications of landmarks (7) Thus, it is recommended the placement of electrodes be placed beneath, rather than overlying the breast. Improper placement of the leads can give a tracing that shows the appearance of disease where none is present or vice versa A better understanding of the disease also prompts healthcare experts to use ECG interpretation skills in diseases indirectly related to the cardiac patient. The monitoring of ECG is increasingly being implicated in mental health because of the Q–T interval-prolonging effect of many antipsychotic medications. Therefore, it is now becoming necessary that all nurses have a basic understanding of ECG (1,6) Electrocardiogram (ECG) is used in recording the electrical activity of the heart within a time using electrodes placed over the chest. As known the heart has four chambers two atria and two ventricles. The electrical discharge generated from the sinoatrial node (SA node) and move through atrial muscle fibers delay while the depolarization to the atrioventricular node (AV node) then passes through the bundle of His to the right and left bundle branch among Purkinje fibers. The contraction of atria is associated with the ECG wave called P wave when ventricular is depolarized causing QRS complex finally when ventricular repolarization T wave occurs (4,8) .

In the 12-lead standard ECG, ten electrodes are placed on the patient's limbs and on the surface of the chest which records the electrical activity of the heart from 12 different viewpoints or leads by attaching cables to the patient’s limbs and chest. The overall magnitude and direction of the heart's electrical depolarization are taken at each moment throughout the cardiac cycle. A 12-lead ECG must be recorded accurately because poor performance can lead to misinterpretation of the results, misdiagnosis, mismanagement of the patient, and inappropriate transfer to hospital (5).

Globally, data show a high level of practice of ECG interpretation among nurses who received ECG training and those with high experience. A study conducted to determine the nurses' knowledge and practice of ECG interpretation at university hospitals in North Cyprus found that nurses in the cardiology department had the highest knowledge and practice when compared with others. Further, the study revealed that working unit, previous ECG training,

and good working experience were significantly associated with good practice of ECG interpretation. The study concludes that working units and previous ECG training courses played an important role in ECG interpretation. These findings suggest further courses on ECG knowledge and practice be incorporated into the curriculum of nursing education(8).

Among the major causes of death in Tanzania for in-hospital patients apart from diseases such as ARDS and malaria are cardiovascular diseases. To prevent these deaths ECG can be used to detect numerous cardiac diseases (9). Although knowledge of ECG is important to nurses but previous studies have shown that ECG competency is not included in the curriculum of undergraduate nursing programs as a result there is a lack of competence among students and nurses in recognizing ECG rhythms. Nurses play important role in obtaining, interpreting, and communicating ECG. Nurses must have sufficient knowledge to perform these responsibilities in ways that increase care and patient outcomes (5).

Previous studies revealed that training could influence nurses' performances (5) . Therefore, assessment of nurses' knowledge and practice of ECG is important in improving their knowledge level and advance their initiation to become more professional in ECG interpretation.

1.2 Statement of the problem.

ECG monitoring has become the standard of care in the operating room and the intensive care unit (ICU). It is used to detect arrhythmias and ischemia and to assess the function and electrical activities of the heart. ECG monitoring in these patients can serve both a protective and diagnostic purpose. Early identification and intervention may reduce the risk of serious life-threatening arrhythmias and enhance quick recovery to patients. Although cardiac monitoring and ECG machines are available in many critical care settings, More than 50% of nurses do not know the correct ECG lead placement or basic interpretation of ECG(10) .

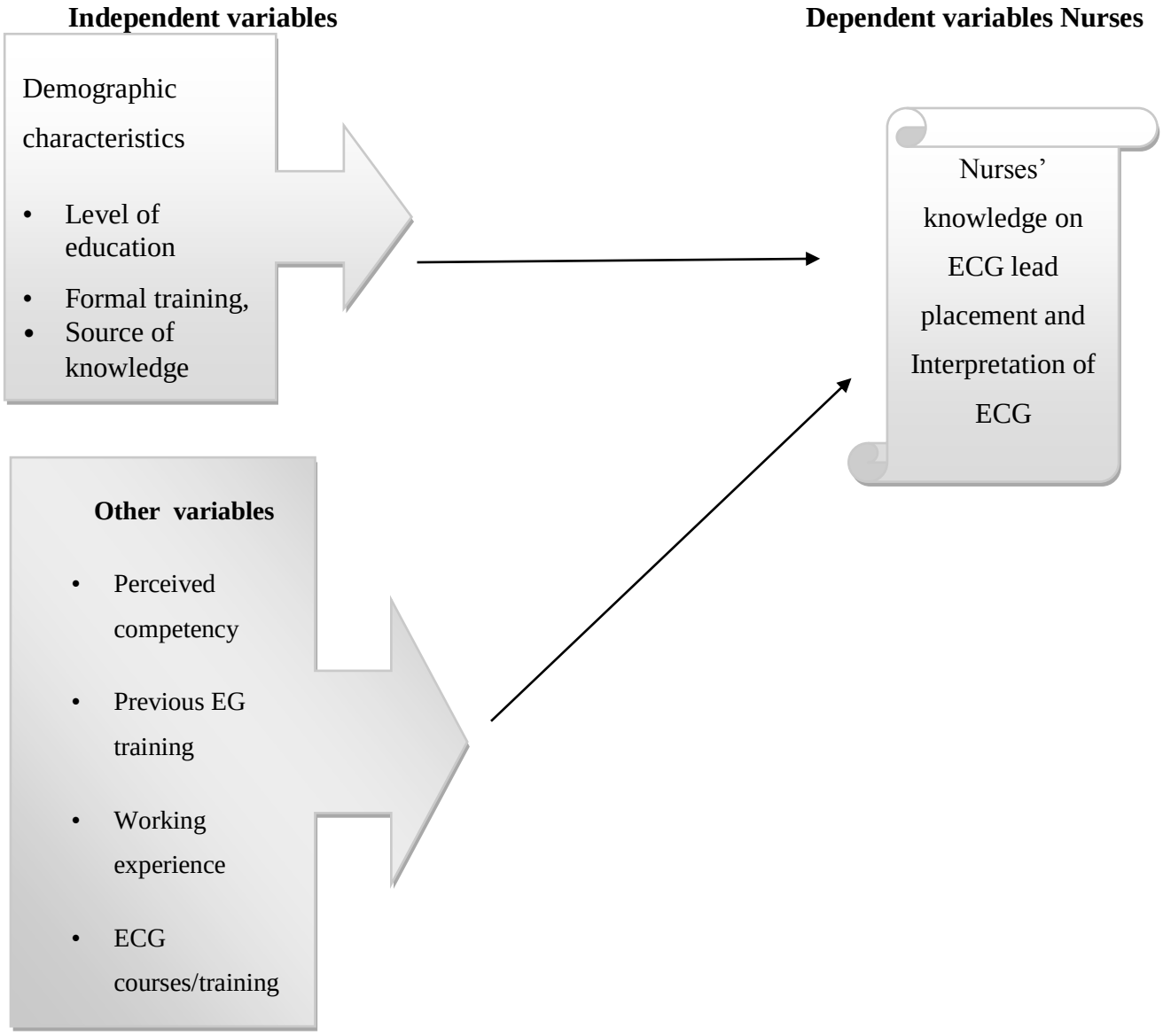
The accuracy of lead placement can significantly affect the reality of the ECG recording. Failures in making accurate ECG lead placement and interpretation can lead to a risk of possible harmful therapeutic measures, delay or inappropriate management of patients and in some cases may lead to deaths (4).

Little is known concerning knowledge and practice of ECG lead placement and interpretation in Tanzania. For example, at the national hospitals of MNH, JKCI and MOI, there is no clear protocol indicating who is responsible to perform an ECG within each institute and even within different departments. Some of Universities and colleges with undergraduate nursing programs don't have an ECG training curriculum making it difficult to assess the level of competence and skills within teams. Therefore, this study aims to assess nurse's knowledge and practice on ECG lead placement and interpretation at the JCKI, MOI and MNH.

1.2 Conceptual framework

These analytical tools that will conceptualize research variables diagrammatically to assess the knowledge and practice of electrocardiogram lead placement and interpretation among nurses working in critical care settings. The conceptual framework of this study was to guide the researcher to describe the relationship between the dependent variable (nurses' knowledge on lead placement and interpretation of ECG) and independent variable (level of education, working experience , on job training ,previous ECG training, perceived competency) and familiarized with different literatures to construct the framework (7,8,11,12). Therefore, the framework will enable the researcher in the formulation of objectives, development of study tools, discussing of result, analysis of data, literature review and presentation of study results.

Generally, knowledge of nurses on ECG practices and interpretation can be affected by working experience, previous training and ongoing training within the working unit as shown by the figure below.



Source: Adapted from the research done by(10)

Figure 1: Conceptual framework of nurse's knowledge and practices on electrocardiogram lead placement and interpretation among nurses working in critical care settings.

1.3 Operationalization of conceptual framework.

Nurses interpreting the electrocardiogram were taken into account for improving the quality of health care and minimize the risk in emergency situation. Nurses were **translating the** electrocardiographic knowledge into practice to obtain the accurate interpretation of ECG. However, a recently study observe that, inappropriate interpretations increase the cost of Health care and can delay the admission process which impose an unpleasant burden on both hospitals and patients (5). Therefore, in this study nurse's demographic factors (confounding variables) such as, working experience, ECG training/course, education level and working area can influence lead placement and ECG interpretation.

1.4 Rationale of the study

The findings of the present study will contribute to the understanding of the applied cognitive process when interpreting ECG/EKH, practice and lead placement among ICU and emergency nurses at MOI, JKCI and MNH. The findings will also provide baseline information that may be used in the education campaign and implementation of correct ECG/EKG interpretation and lead placement among nurses. This will lead to better outcomes of patient management and provide the basis for future studies by other researchers.

1.5 Broad Research Question

What is the knowledge and practice of electrocardiogram lead placement and interpretation among nurses working in critical care settings at MOI, JKCI, and MNH?

1.5.2 Research questions

1. What is the level of knowledge on ECG lead placement among nurses working in critical care settings?
2. What is the level of knowledge on ECG interpretation among nurses working in critical care settings?
3. What is the practice of nurses on ECG lead placement and interpretation in critical care settings?
4. What are the factors associated with practice on ECG interpretation among nurses working in critical care settings?

1.6 Broad objectives

To determine knowledge and practice of electrocardiogram lead placement and interpretation among nurses working in critical care settings at MOI, JKCI and MNH.

1.6.1 Specific objectives

1. To determine the level of knowledge on ECG lead placement among nurses working in critical care settings.
2. To determine the level of knowledge on ECG interpretation among nurses working in critical care settings.
3. To determine the practice of the ECG interpretation among nurses working in critical care settings
4. To determine factor associated with practice of ECG interpretation among nurses working in critical care settings

CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter will discuss literature pertinent to the study as documented from different sources. The discussion of related literature will revolve around subject themes based on the study objectives. The review will entail nurses' knowledge and practice of the ECG lead placement and interpretation as well as the association of nurses' demographic characteristics with knowledge and practice of ECG lead placement and interpretation. The main purpose of the literature review is to help a researcher build a logical framework for the study and set it within the traditional inquiry and the context of related studies.

2.1 Nurses' knowledge on ECG lead placement and interpretation

A prospective observational study conducted by Kelly McCann et al in adult patients undergoing an ECG as part of their routine ED care, showed that there was substantial inter-rather variation in the measurement of both vertical (mean 13.5 mm, range 0-105 mm) and horizontal (mean 16.5 mm, range 0-120 mm) displacement. The study concluded that there is wide variation in the identification of the correct location for electrode placement among nurses (13).

In study done at the university hospitals in Northern Cyprus, the study results showed a high level of ECG knowledge and practice among the nurses. Further, the study noted that the hospital unit and passage of previous ECG training courses played an important role in improving nurses' experiences of ECG lead placement. These findings connote that ECG training seemed to be effective at improving the nurses' knowledge of ECG lead placement (4).

In another study was conducted in London, UK to determine the reliability of ECG precordial electrode placement among doctors and nurses in the emergency care of patients with suspected cardiac diseases. The results revealed wide inter-individual and inter-group variations in the placement of electrodes. It further showed that nurses and doctors in

particular cardiologists didn’t know the correct positions of ECG electrodes thereof proposing training as a solution for proper precordial electrode placement(14).

A systematic review of 10 research papers in the UK conducted on accurate interpretation of the 12-lead ECG electrode placement in patients with suspected heart disease, the review findings evidenced the incorrect connection of the electrode cables to change the patterns of the ECG there of simulating or concealing abnormalities, such as myocardial infarction (MI). In addition, the findings noted limited adherence to correct anatomical precordial lead placement methodology especially for leads V1 and V2 at the fourth intercostal space (ICS) which can result in erroneous ECG diagnosis of septal MI.

These results concluded that wrong ECG diagnosis of MI emanating from improper lead placement potentially triggers inefficient use of healthcare resources and even causes harm to patients(11). About 40% of sudden death victims have cardiac arrest as the first manifestation of coronary artery disease. In patients with known coronary heart disease, sudden death is frequently caused by the sudden rupture of an unstable plaque, leading to occlusion of the coronary artery in a vessel previously having only a slight narrowing.

Emphasized that the nurses have significant diagnostic influence in the areas of cardiac rhythm monitoring and dysrhythmia identification. Nurses who care for patients at risk for cardiac dysrhythmia must have a thorough understanding of accurate electrode placement (15).

2.2 Nurses’ practice of ECG lead placement and interpretation

Globally, data show a high level of practice of ECG interpretation among nurses who received ECG training and those with high experience. A study conducted to determine the nurses' knowledge and practice of ECG interpretation at university hospitals in North Cyprus found that nurses in the cardiology department had the highest knowledge and practice when compared with others. Further, the study revealed that working unit, previous ECG training, and good working experience were significantly associated with good practice of ECG interpretation.

This was evident as study results showed lowest and highest knowledge and skills were observed among the nurses with less than one year and more than six years of work experience respectively. The study concluded that working units and previous ECG training courses played an important role in ECG interpretation. These findings suggest further courses on ECG knowledge and practice be incorporated into the curriculum of nursing education (8).

Also, a study by Davies shows that nurses found the task easier with the clinical history although this appears to have no impact on accuracy, tallying with earlier findings indicated that most of the participants rated themselves as fairly confident when interpreting electrocardiograms. It has also been noted that practitioners are often unaware of their lack of competence and that confidence was not a good indicator of performance. Practitioners find it easier to interpret electrocardiograms as they continue to gain experience but the process remains difficult. Barriers to successful interpretation include artifacts altering the waveform, lack of familiarity with the presenting condition, stress/panic at the prospect of making an inaccurate judgment, and overconfidence in one's interpretation abilities (10).

Results from a study on the ability of nurses to recognize electrocardiographic changes requiring immediate intervention and compare their performance in case of arrhythmias; concluded that nurses can identify changes in cardiorespiratory arrest rhythms and cardiac arrhythmias. However, they had difficulties in identifying electrocardiographic changes related to acute myocardial infarction. The study showed that nurses in critical care units evaluate the electrocardiogram of patients more frequently and self-report the ability to perform this activity in their routine (16).

Also, the study by (8) was important to increase the level of care outcome because most investigators have observed that the level of knowledge of nursing professionals is lower than desired. Also, the accuracy of the diagnosis derived from an ECG tracing is key to patient outcome In Africa most studies show more than 50% of participants have low knowledge of ECG and emphasizes the need for support systems for the educational development of nurses. Further training in specific skills and competencies may enhance the development of

knowledge among nurses in South Africa. The study done in (UK)state that nurses' skills regarding the interpretation of electrocardiogram procedures indicated that a minority of them performed heart rate monitoring, regularity, identify P wave, PR interval, QRS complex, and report interpretation(17).

In Tanzania, a study was conducted at MNH in Dar es Salaam to assess the knowledge and skills of nurses in identifying life-threatening arrhythmias. The study findings showed the majority (60%) of nurses had high knowledge concerning life-threatening arrhythmia identification. Though, the study observed a high level of skill regarding life-threatening arrhythmia in the majority of nurses (84.4%). In addition, the results showed that nurses (82.3%) were able to identify asystole on an electrocardiogram strip, and demonstrated a high level of knowledge (95%) in the nursing care of patients in asystole(18).

Even though nurses revealed poor skills in general, they were competent (97.9%) in electrode placement on the patient's chest before connecting the patient to the cardiac monitor. The study concludes that efforts are to be made to encourage nurses to engage in transforming their knowledge into practical skills through continuous professional programs emphasizing practical skills on life-threatening arrhythmias especially in critical care settings at MNH (19).

2.3 Factors Associated with ECG practice among nurses working in critical care settings.

According to(20), many independent factors affecting the ECG analysis relate to ECG measurement technique and physiological inter-individual variability. One of the main sources of mistakes is based on inaccurate ECG electrode placement in suggested anatomical landmarks like in proper intercostal spaces. On another hand, differences in inter-individual human anatomies, the exact heart position in the thorax is never precisely known. Both factors, dependent and independent on the medical staff can cause the change of the distance between the electrodes and source of the signal in the heart as well as the compact direction at which shape of ventricular mass is seen from the body surface(20). Another researcher reported about a method for the accurate placement of chest electrodes in taking serial electrocardiographic tracings reported that correct positions of the leads with an error less than 1 cm were achieved

by trained technicians only in case of 50% of studied men and 20 % of studied women(13). The findings established that error in placement of electrode was usually in the range of 2 to 3 cm, but rarely reached even 6 cm. These findings depict that fact the accuracy in electrode placement is a significant factor that affects the quality and precision of ECG recording and diagnosis of patients.

Similar to a study by (21) that investigated recommendations for the standardization and interpretation of the electrocardiogram reported that however, displacement of the ECG electrodes from determined standard positions can arise from mistakes of medical staff as well as by patients at home who participate in ECG monitoring programs (21).

A study conducted in Wuhan, China by (18) showed that before training nurses working in the cardiology department scored higher in basic ECG knowledge than those in the emergency department and ICU. Moreover, it was reported that the nurses' test scores for those who worked for 2-10 years were higher than else. These findings imply that the working unit and experience of nurses are significantly associated with their knowledge level and practice of ECG interpretation. Further, it was revealed that ECG training had significantly impacted knowledge domains of ECG as study results of the post-test total and domain scores at 2 weeks and 4 months after the lecture-based learning and 1 month after a self-learning ECG handbook was presented were higher than the pretest scores (22).

study conducted in Iran to compare competency in electrocardiogram (ECG) interpretation among emergency nurses and EMS personnel, the results indicated that hospital emergency nurses were more likely and qualified to interpret the ECG than the pre-hospital emergency medical personnel(4) . The study proposed that active involvement in ECG interpretation and continued standard education are needed to develop and improve the competency of the emergency nurses and EMS personnel on ECG interpretation.

Similar findings from a study by(11) aimed to improve the knowledge regarding ECG interpretation found that a significant difference in the level of knowledge, attitude, and practice regarding the interpretation of ECG before and after running a structured teaching

program for the staff nurses. The study concluded that a structured teaching program was effective on knowledge, ECG interpretation among critical care nurses at the selected wards of Sri Ramakrishna Hospital, Coimbatore(11).

Therefore, these findings put forward the need to associate nurses' demographic characteristics like level of education, working experience with knowledge and practice of ECG interpretation in the Tanzanian context. Generally, in Tanzania a little is known concerning Nurses’ knowledge and practice of ECG.

CHAPTER THREE: METHODOLOGY

3.1 Study design

The study was analytical cross-sectional design employing a quantitative approach to asses Nurses' knowledge and practice on electrocardiogram lead placement and electrocardiogram interpretation as well as practice. The reason for selecting cross-sectional design was due to limited time for data collection. The advantage of this design is not time consuming. Quantitative approach was used in order to determine the magnitude of the phenomena and to generalize the findings.

3. 2 study settings

The study was carried out in critical care settings at three referrals hospital. Muhimbili national consist of Pediatric Intensive Care Unit (PICU), Medical Intensive Care Unit (MICU), Surgical Intensive Care Unit (SICU), Maternal Intensive Care Unit and Emergency Medicine Department (EMD). Jakaya Kikwete cardiac institute consist of cardiothorathic Intensive Care unit (CT-ICU), Coronary Care unit (CCU) and Pediatric Intensive Care Unit. Muhimbili orthopedic Institute consist of Intensive Care Unit (ICU) and High dependent Unit (HDU). This hospitals are located within Dar es Salaam region, ilala district at upanga ward in Tanzania. These setting selected according to (5), who reported that, working unit affect the knowledge and practice of ECG.

The selection of the site was based on the fact these hospitals are the national referral hospital and it has a well-organized critical care unit, so they receive and admits all critically ill patients from different hospitals within and outside the region.

3. 3 Study Population

The study population was all registered nurses working in the selected critical care units of JKCI, MOI and MNH. The reason for selecting registered nurses was based on their responsibilities of providing direct care to critically ill patients admitted in ICUs, HDUs, and CCU. .

3.46 Sampling and Sample size

3.4.1 Sample size

Yamane's (1967) formula was used in this study to determining optimum sample size. The formula for sample size estimation for finite population are articulated as follows.

Where

Thus

$$n = \frac{N}{1+N(e^2)}$$

n = minimum required sample size.

N = the population size,

e =margin of error estimated at 5% (0.05)

n=162

$$n = \frac{\mathbf{272}}{1+272(0.05^2)}$$

Therefore, the minimum numbers of nurses to participate in the study will be 162. This adjusted for a 10% non-response rate:

n =161 x 100%/100%-10%

=161x1/0.90 =179.

Therefore, based on the above calculation the adjusted number of nurses to participate in study was **179** nurses.

Table 1: proportional of nurses per unit from the selected institute at MNH

S/N	Units	Proportion of nurses per units	Sample size per unit
1	CT-ICU	The sample will be (20/272)*179	13 nurses
2	CCU(JKCI)	The sample will be (13/272)*179	9 nurses
3	EMD	The sample will be (62/272)*179	40 nurses
4	HDU(MOI)	The sample will be (21/272)*179	14 nurses
5	ICU(MOI)	The sample will be(36/272)*179	24 nurses
6	MAICU(MNH)	The sample will be (19/272)*179	13 nurses
7	MICU(MNH)	The sample will be (26/272)*179	17 nurses
8	PICU(JKCI)	The sample will be (15/272)*179	10 nurses
9	PICU(MNH)	The sample will be (29/272)*179	19 nurses
10	SICU(MNH)	The sample will be (31/272)*179	20 nurses
TOTAL			**179Registerd Nurses**

3.5 Sampling method

Simple random sampling was applied to obtain study participant in the selected ward and unit of JKCI, MOI and MNH. Sample obtained by selecting number which were written one and two based in a numbered population in the day. Participants was selected based on characteristics of the objective, which was to assess knowledge and practice on ECG lead placement and interpretation among nurses at critical care settings. All nurses directly providing care to critically ill patients in the critical care units were selected to obtain the needed simple size. The selected participants were asked participate and signed a consent form if they agreed. This method was used since it gives each individual in the population an equal chance of being selected (23).

3.5.1 Inclusion criteria

The inclusion criterion for this study was:

Registered nurses who are working in the critical care units at least for three months and provide direct care to critically ill patients at MOI, JKCI and MNH.

3.5.2 Exclusion criteria

The exclusion criterion for this study was:

Nurses who are involved with administration issues and not providing direct care to the patients.

3.6Study variables

3.6.1 Dependent variables

The dependent variable of this study was ECG interpretation.

3.6.2 Independent variables

The independent variable of this study was social demographic characteristics, working area, on job training, equipment's, competency level, and correct lead placement, proper ECG interpretation, working experience, nurse's knowledge and practice

3.6.3 Dependent Variables

ECG lead placement and ECG interpretation

3.7 Data collection tool

A self-administered questionnaire was used for data collection. Part one of the questionnaire contained information on the nurse's demographic characteristics, part two contained information on the nurse's knowledge on ECG lead placement, part three contained information on ECG interpretation and part four had information about ECG interpretation practice among registered nurse. There were questions with multiple answered to assess the nurse's knowledge and practice related to ECG lead placement as well as the interpretation of ECG was assessed with the question illustrated with picture to represent clear concept to be answered by the respondent. Furthermore the questions in the questionnaire had been adapted and some modified after reading extensively various literatures relate to knowledge and practice on ECG interpretant among nurses in critical setting(7,8,12). Therefore, to maximize the responsive rate and avoid bias questionnaire was written in English because registered nurses are familiar with English language.

3.8 Data collection procedure

After the permission have been granted for data collection, the researcher and nurses in charge will visit the respondents in their respective unit of service the patient handover according duty rooster. The nurse in charge was introduced the researcher to the respondent; researcher was taking that opportunity to describe the risk, benefit, and aim of the study including the inclusion and exclusion criteria for the respondent to participate to the study. During data collection, researcher was recruit study participant from the sampling frame by selecting the even number listed with names. Those who met the inclusion criteria provided a written consent to participate in the study. A self-administered questionnaire was distributed by researcher and research assistants upon voluntary consent of respondent to participate in the data collection. Once they completed the questionnaire, they asked to put them in the box provided under the supervision of the research to ensure all questionnaires are well submitted.

3.9 Recruitment and training of research assistants

Researcher and one research assistant were involved in the process of data collection in different critical care unit at JCKI, MOI and MNH. Orientation was conducted in two (2) days to train a research assistant on the study purpose and research protocols such as how to safeguards respondents' confidentiality, how to use the research tools including checking the tool for completeness during data collection. The research assistant was not be obtained from the same setting to avoid the conflict of interest and enhance data collection process with a maximum responsive rate from different critical care setting of JKCI, MOI and MNH.

3.10 Pre-testing of the tools

Pre-testing of the data collection tool was conducted at critical care unit of Agha Khan Hospital consisting of eighteen (18) registered nurses. These nurses were not included in the actual study. The Agha khan hospital was selected because it is accredited internationally for patient care, equipment and training. The feedback obtained enabled the researcher to rephrase the questions and make them understood by participants.

3.11 Validity and reliability

3.11.1 Validity

Validity is a determination of how well the instrument reflects the abstract concept being examined (12). The content validity of the data collection tool of the study was assessed by specialist nurse who is experts and have an experience on interpreting the electrocardiogram lead placement critical care setting from MUHAS in a School of Nursing and one cardiologist from the JKCI respectively. Views and opinion from the experts were taking into consideration to adjust and modify tool for clarity, relevance and comprehensiveness**.**

3.11.2 Reliability

Reliability is the consistency of the instrument measures the same way each time, it is used under the same conditions with the same subjects(12). In this study, the sample of eighteen (18) registered nurses which are ten (10%) of the sample size was recruited from Agha

Khan hospital for pretesting the tool before the actual study but they are not included in a sample. This was enabling the researcher to ensure the instrument will bring accurate and reliable results to the study. However, the findings from the pre-test were used to make necessary adjustments for the improvement of the tool. Hence the same tool was administered to all participants after adjustment from pre-testing have been conducted. Therefore, researcher and researcher assistant participated in the data collection to ensure reliability of the data collected.

3.12. Data Analysis

The Statistical Package for Social Sciences (SPSS) version 23 was used for data entry and analysis. The computer that used for storing data is protected with the password that is owned. Descriptive statistics was used to summarize Nurse demographic characteristics, Practice and knowledge related to ECG and presented using frequency and percentage. Inferential statistics was done using Pearson chi square to determine association of nurses knowledge and practice on ECG leads placement and ECG interpretation value in Pearson chi square of less or equal to 0.05 was considered significant. Those variables which were significant in Pearson chi square were subjected to bivariate analysis then to multivariate logistic regressions' value of less than 0.25 was considered significant in bivariate analysis while in multivariate analysis p value of less or equal to 0.05 was considered statistically significant .Findings of bivariate analysis were reported by using Crude Odds Ratio (COR), P value and 95% Confidence Interval (CI). The findings of Multivariate logistic regressions were reported by using adjusted Odds Ratio(AOR), P value and 95% Confidence Interval (CI).

This study went further to and make a scoring of questions in section which include 13 questions. Those who scored more than 9 of the total number of questions were taken as knowledgeable and below 9 score were taken as less knowledgeable and on ECG interpretation had a total of 10 questions, those who scored more than 7 were taken as knowledgeable and below 7, were taken as less knowledgeable

Odds ratio and their 95%CI was used to predict the strength of association and a P value of less than 0.05 used as a cut off point for statistical significance. Crude and adjusted Odds ratio was used for comparison of univariate and multivariate logistic regression. Only independent variables that associated with knowledge and practice related to ECG at a P value of 0.05 was included in the final model of logistic regression whereby at a change of 10% was considered as confounded variables.

3.13 Ethical considerations

Ethical approval was obtained from Muhimbili University of health and allied sciences Institutional Review Board (IRB). Permission to conduct study at MNH, JKCI and MOI was obtained from Executive Directors (ED) of respective Hospital. Participants were given informed consent which was written in simple language to make them understand but also in case of clarification researcher explained to the participants. No respondent was forced or coerced to join the study and the respondents were free to withdraw from the study whenever they felt uncomfortable. Privacy and disclosure were preserved to the maximum. The respondents were anonymously identified as they were instructed not write their names in the questionnaires. The code numbers were used instead of names.

CHAPTER FOUR: RESULTS

This chapter includes a description of results, starting with an analysis of participants' demographic data, followed by analysis of data regarding the proportion of nurses working in critical care unit, basically on ECG interpretation,

4.1 Descriptive characteristics of the nurses (N=179)

A total of 179 questionnaires were administered for this study and the mean ages of the participants were 33 years. 59.9% of the participants were female, most of the nurses 52.5% had work experience of 1-5 years and 46.4% of the nurses had diploma level of education. Majority of participants ((74.4%) were able to perform ECG to patients and participants who were able to interprets ECG for patients were (62.0%) as shown in the (Table 2)

Table 2: Demographic information's

Descriptive characteristics	N	%Percent
Age mean (33.27)		
22-31	93	52
32-41	64	35.8
42-51	20	11.2
Above 51	2	1.1
Gender		
Male	72	40.2
Female	107	59.8
Years of working experience		
Below 12 months	38	21.2
12-60 months	94	52.5
Above 60 months	47	26.3
Currently working unit in hospital		
PICU	19	10.6
CT-ICU	18	10.1
MICU	24	13.4
SICU	16	8.9
CCU	12	6.7
HDU	21	11.7
EMD	42	23.5
MOI-ICU	20	11.2
Maternity-ICU	7	3.9
Education level		
Diploma	83	46.4
Advance Diploma	9	5.0
Bachelor's Degree	77	43.0
Master's Degree	10	5.6
Do you take ECG for patient		
Yes	133	74.4
No	46	25.7
Do you interpret ECG for patient		
Yes	111	62.0
No	68	38.0

4.2 Characteristics of the Nurses on ECG education (N=179)

Regarding nurses Characteristics on ECG education, the results showed (55.9%).of participants didn't have previous ECG training course. Nurses who received ECG training reported in five categories of resource. 21.2% of participants received ECG information from university ,26.8%,from courses,13.4% from internet, 38.0% from self-learning books and 6%).from congress/conferences. Most of participants (55.9%) had no previous ECG training course. Regarding ECG competency level, 64% of participants answered that their ECG competency level as beginner. 96.6% of participants said that they had desire to learn about ECG (Table 3).

Table 3: Characteristics of nurses on ECG

Descriptive characteristics	N	%
Previous ECG training course		
Yes	79	44.1
No	100	55.9
ECG information resource		
University	38	21.2
Courses	48	26.8
Internet	24	13.4
Self-learning books	68	38.0
Congress/conference	1	6
Years since taking the last ECG courses		
I don't take	86	48.0
Less than 2 years	56	31.3
Between 2 to 5 years	22	12.3
More than 5 years	15	8.4
ECG competency level		
Beginner	116	64
Intermediate	55	30.7
Advance	8	4.5
Desire to learn about ECG		
Yes	173	96.6
No	6	3.4

4.3 Nurses Knowledge on ECG lead placement (N=179)

Based on the data collected from 179 nurses at MNH, assessing the level on knowledge on ECG lead placement, this aspect was assessed via different variables classified as knowledgeable and less knowledgeable based on the score established during analysis of which a total of 13 question enrolled in assessing knowledge on ECG lead placement the result presented here is for the proportional and frequency of respondents included on my study.

Most of the respondent appeared to have different knowledge based on variable used starting with first variable which is when performing ECG to patients. Most participants 110 (61.5%) were knowledgeable since the correct answer was to place the patient's arms down by their side to relax their shoulders while the rest 69 respondents were less knowledgeable which had a P- value of 0.00 of which is statistically significant. Another variable was when placing lead to patient most nurses of about 120 (67%) were knowledgeable since the correct answer Electrodes should not be placed over bones and over areas where there is a lot of muscle movementt. while the rest 49 respondents were less knowledgeable which had a P- value of 0.15 as presented on the table 4.

Other variable used under this aspect were based on the position of the V1, V2, V3, V4, V5, V6, RA, RL, LL, and LA, and presented as knowledgeable for the respondents who score more than a half of the variable used, and vice versa is true as presented by the table 4

Table 4: Nurses Knowledge on ECG lead placement

	Level	Variable response		df	p- value
Knowledge on ECG lead placement		Place the patient's arms down by their side to relax their shoulders.		1	0.00
		Yes	No		
	Knowledgeable	105	5		
	Less Knowledgeable	20	49		
Total		125	54		

	Level	Variable response		df	p-value
Knowledge on ECG lead placement		Electrodes should not be placed over bones and over areas where there is a lot of muscle movement.		1	0.15
		Yes	No		
	Knowledgeable	61	49		
	Less Knowledgeable	32	37		

Knowledge	Level	Variable response		df	p-value
on ECG lead placement		4th Intercostal space to the right of the sternum		1	0.02
		Yes	No		
	Knowledgeable	30	80		
	Less Knowledgeable	26	43		

Knowledge	Level	Variable	df	p-value

	Level	Variable response		df	p- value
on ECG lead placement		response 4th Intercostal space to the left of the sternum.		1	0.04
		Yes	No		
	Knowledgeable	79	31		
	Less Knowledgeable	40	29		
Knowledge on ECG lead placement	Level	Variable response Midway between V2 and V4		df 1	p-value 0.51
		Yes	No		
	Knowledgeable	68	42		
	Less Knowledgeable	47	27		
Knowledge on ECG lead placement	Level	Variable response 5th Intercostal space at the midclavicular line.		df 1	p-value 0.36
		Yes	No		
	Knowledgeable	61	49		
	Less Knowledgeable	41	28		
Knowledge on ECG lead placement	Level	Variable response Anterior axillary line at the same level as V4.		df 1	p-value 0.03
		Yes	No		
	Knowledgeable	54	56		

	Level	Variable response		df	p- value
	Less Knowledgeable	23	46		
Knowledge on ECG lead placement	Level	Variable response		df	p-value
		Midaxillary line at the same level as V4 and V5		1	0.37
		Yes	No		
	Knowledgeable	71	39		
	Less Knowledgeable	42	27		
Knowledge on ECG lead placement	Level	Variable response		df	p-value
		Right arm.		1	0.09
		Yes	No		
	Knowledgeable	90	20		
	Less Knowledgeable	50	19		
Knowledge on ECG lead placement	Level	Variable response		df	p-value
		Left leg		1	0.26
		Yes	No		
	Knowledgeable	17	97		
	Less Knowledgeable	14	55		
Knowledge on ECG lead placement	Level	Variable response		df	p-value
		Left leg		1	0.24
		Yes	No		

	Level	Variable response		df	p- value
	Knowledgeable	89	21		
	Less Knowledgeable	52	17		
Knowledge on ECG lead placement	Level	Variable response		df	p-value
		Left arm		1	0.35
		Yes	No		
	Knowledgeable	93	17		
	Less Knowledgeable	56	13		

4.4 Nurses Knowledge on ECG interpretation (n=179)

A total of 179 nurses recruited for the study on determination of ECG interpretation which was assessed by ten questions of which both the correct answer and wrong answer were sorted and assembled together to obtain the proportional and possible association of the variable with ECG interpretation.

Starting with the knowledge of basic hint of ECG that the P wave represents right and left atrial repolarization most nurse replied the correct answer (f=104) 58.1% of the study sample while the rest 74 nurses (41.9%) were unable to provide the correct answer, of which on association of knowledge on ECG interpretation had a p-value of 0.00 as presented by the table 5.

Based on the aspect of the QRS representation figure in relation to the heart functions that QRS complex represent right and left ventricular depolarization. 103 respondents answered correctly while 76 participants didn't understand what QRS wave represent with p- value of 0.00. To more than a half of the study sample showed to have knowledge on the interpretation of normal PR intervall, what V1 and VR leads represent, pathological Q waves, ST wave elevation and other parameter which are important to nurses working in critical care unit at JKCI, MOI and MNH in Dar es Salaam as shown in the table 5.

Table 5: Nurses Knowledge on ECG interpretation

Statement on ECG	A	Correct Answer		Wrong answer		Df	p-value
		frequency	Percent	frequency	Percent		
The P wave represents right and left atrial repolarization	Correct answer	104	58.1	75	41.9	1	0.00
QRS complex represent right and left ventricular depolarization	Correct answer	103	57.5	76	42.5	1	0.00
T wave represents ventricular repolarization	Correct answer	112	62.5	67	37.5	1	0.04
Normal PR interval is between 0.12 and 0.20	Correct answer	73	40.8	106	59.2	1	0.00
In a normal ECG, V1 and a VR leads are negative waves	Correct answer	52	29.0	127	71.0	1	0.12
Pathological Q waves are sign of previous myocardial infarction	Correct answer	67	37.4	112	62.6	1	0.00
ST elevation in lateral myocardial infarction appears in leads I,aVL, V5, V6.	Correct answer	94	52.5	85	47.5	1	0.12
ST elevation in anterior myocardial infarction appears in leads II,III, and aVF	Correct answer	72	40.2	107	59.8	1	0.21
ST depression in ECG indicate myocardial ischemia	Correct answer	116	64.8	63	35.2	1	0.52

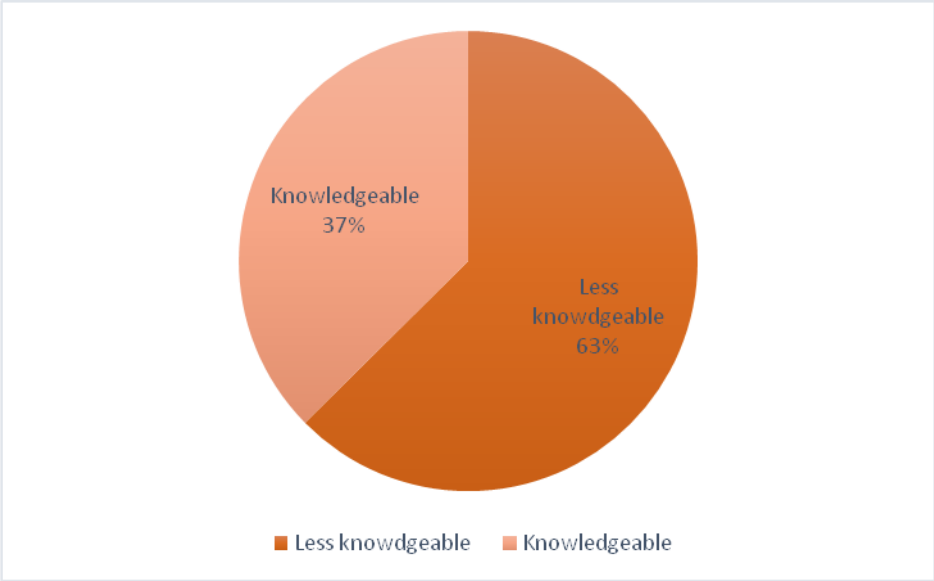


Figure 2: Nurse Knowledge on ECG interpretation

Knowledge of nurses on electrocardiogram was shown in figure 2 and in table 5 above. The total frequency of correct answer was 37% and the total frequency of wrong answer was 63% (figure 1). It shows that majority of the nurses did not have correct answers on most of items. (Table 5)

4.5 Factors associated with ECG interpretation among nurses working experience with practice in critical care unit(n=179)

Practice level of nurse on ECG interpretation versus working experience.

Based on working experience of the nurses studied, 94 participants had work experiences of 12-60 months, 47participants had work experiences of above 5 years while 38 nurses had work experiences below 1 year. Regarding level of practice only 30 nurses had shown to have good practice and the remaining 149 participants practiced poorly, with the p value of 0.02 which is statistically significant, as shown in the table 6.

Table 6: Practice level of nurse on ECG interpretation versus working experience

Practice level	Working experience			Df	p- value
	Below 12	12 - 60	Above 60	2	0.02
Good practice	3	13	14		
Poor practice	35	81	33		
Total	38	94	47		

4.6 Practice level of nurse on ECG interpretation vs formal ECG training.

A total of 179 respondents recruited in my study based on the aspect of formal training on ECG. Most participants 100(55.9%), had not received any formal training of ECG while 79(,,,,%) had formal training on ECG.Regarding ECG practice only 30(…%) participants appeared to had good practice on ECG interpretation while the rest of the population study had poor practice with the p- value of 0.09 as shown on the table 7.

Table 7: Practice level of nurse on ECG interpretation vs formal ECG training

Practice level of nurse on ECG interpretation	Level	Formal training on ECG		df	p- value
		Yes	No	1	0.09
	Good practice	17	13		
	Poor practice	62	87		
Total		79	100		

4.7 Practice level of nurse on ECG interpretation versus ECG perceived competency level.

Regarding participants level of competency on ECG interpretation, the results showed that out of 179 participants ,169(64.8%)participants were the beginners followed by 55(30.7%), participants who were at intermediate level and 8(4%) participants had at advanced competency level .On practice level 30(….%) participants had a good practice and the rest ()had poor practice with the P- value of 0.01 (table8)

Table 8: Practice level of nurse on ECG interpretation versus ECG perceived competency level

Practice level of nurse on ECG interpretation	Level	ECG perceived competency level			df	P- value
		Beginner	Intermediate	Advanced	1	0.01
	Good practice	14	12	4		
	Poor practice	102	43	4		
Total		116	55	8		

Practice level of nurse on ECG interpretation versus level of education

A total of 179 respondents recruited in my study, based on the aspect of level of education on ECG interpretation, the results showed all nurses regardless level of education interpret ECG. Regarding practice on ECG whether good practice or bad practice, the results showed out of 10 participants with master degree, 6 (60%) had good practice on ECG interpretation. Out of 9 participants with advanced diploma level 5(55.6) had good practice on ECG interpretation. Out of 83 participants with diploma level 76 (91.6%) had poor ECG interpretation. Out of 77 participants with bachelor degree 65(84%) had poor ECG interpretation (Table 9) .

Table 9: Practice level of nurse on ECG interpretation vs level of education

Practice level of nurse on ECG interpretation	Level	Level of educations				df	P- value
		Diploma	Advanced diploma	Bachelor degree	Master degree	3	0.00
	Good practice	7	5	12	6		
	Poor practice	76	4	65	4		
Total		83	9	77	10		

4.8 Bivariate analysis of factors associated with practice on ECG interpretation

A bivariate logistic regression was performed on factors that had a p-value below 0.25 as presented in table below. These variables were; level of education, perceived competency level, working experience and previous ECG training. Study represented statistically significant differences in years of working experience as registered nurse of ECG interpretations" ($p< 0.05$) 3.08 times higher odds , also currently working unit in hospital, perceived competency level and previous ECG training course represented the comparison with practice of nurses on ECG interpretations were not statistically significant with practice on ECG interpretation.

Table 10: Bivariate analysis of factors associated with practice on ECG interpretation

Variable	Good practice (%)	Poor practice (%)	COR(CI)	AOR(CI)	P value
Education					
Below bachelor degree(ref)	12(13)	80(87)	1.00	1.00	
Bachelor degree and above	189(20)	69(79.5)	0.58(0.26,1.28)	0.59(0.25,1.39)	0.23
Competency level					
Beginner(ref)	14(12.1)	102(87.9)	1.00	1.00	
Intermediate	16(25.4)	47(74.6)	0.40(0.18,0.89)	0.51(0.21,1.22)	0.13
Working experience					
Below 60 months(ref)	14(29.8)	33(70.2)	1.00	1.00	
Above 60 months	16(12.1)	116(87.9)	3.08(1.36,6.95)	3.081.29,7.00)	0.01
ECG training					
No (ref)	13(13)	87(87)	1.00	1.00	
Yes	17(21.5)	62(78.5)	0.55(0.25,1.20)	1.3(0.55,3.01)	0.55

COR: Crude odds ratio, AOR: Adjusted odds ratio, ECG: electrocardiogram

CHAPTER FIVE: DISCUSION

5.1 General characteristics

A total of 179 questionnaires were administered for this study and the mean ages of the participants were 33 years. 59.9% of the participants were female. 61% of the nurses had experience of one to five years as registered nurses (52.5%), the questionnaires were administered for this study in goal to target nurses which work in critical care settings. 46.4%of the nurses had diploma qualification

More than half of participants don't have previous ECG training course. Nurses who received ECG training reported in five categories of resource. Most of participants had not take ECG course and large number of nurses answer that their ECG competency level as beginner. High percentage of nurses reported a desire to learn about ECG. The findings of this study on nurse ECG education has the same findings with the study done by (7,12) .

Based on the data collected from 179 nurses at MNH, assessing the level on knowledge on ECG lead placement, this aspect was assessed via different variable, classified as knowledgeable and less knowledgeable based on the score established during analysis of which a total of 13 question enrolled in assessing knowledge on ECG lead placement, the result presented here is for the proportional and frequency of respondents included on my study.

More than half of the respondent appeared to have different knowledge based on variable used, these section was based on how and where the ECG leads are placed on the patient based on leads placement normal and abnormal findings on ECG, this result is similar to the study done by (4,11) which was assessing knowledge on ECG, who said that Knowledge of nurses on electrocardiogram which described that the most frequently known and correct items with high percentage which was assessed on different aspect.

Under this study, working experience of the nurses studied, large number of nurses have working experience of less than five years, but on practice level of ECG interpretation, only few nurses have shown to have good practice with which is statistically significant, this is

similar with the study done by (5) which also reported that nurses' work experience as well as their clinical and ECG training courses had a positive impact on their knowledge. The study findings showed that the nurses with less than one year of job tenure had the lowest average of correct answers, while those with six or more years of working experience had the highest average of correct answers. Which means as the time of experience increase the like hood of a nurse to have basic knowledge on ECG.

The level of nurses on ECG interpretation in this study which included 179, based on the ECG competence level which was categorized as beginner, intermediate and advanced competency, most of nurses in critical care unit were the beginner which takes about more than fifty percent of respondent. But based on practice level few nurses had a good practice level , and the majority shows to have poor practice. This is similar with the study done by (5) which showed that the nurses' competence in ECG interpretation affect practice of the nurses on ECG interpretation. Accordingly, majority of the nurses passed the questionnaire, which is higher compared to other studies. The lowest percentage of correct answers was related to identifying the case scenario of atrial tachycardia. Similarly, in the study conducted by(24), nurses were more familiar with ventricular tachycardia and atrial flutter arrhythmias (16). In the present study, the diagnosis rate of acute myocardial infarction on ECG was higher among the nurses. This finding is similar to the results of the study performed by (12).

From the aspect of formal training on ECG, few respondents have received formal training on ECG, based on the aspect of practice less than forty percent nurses appeared to have good practice on ECG interpretation, means that previous ECG training increase the like hood percentage of the nurse to have a good practice on ECG, this result is similar with the study done by (5) which showed that a significant relationship between the nurses' knowledge of ECG and previous ECG training. Accordingly, the nurses who had previously received ECG training provided more correct answers to the questions with significant association. These results were in agreement with those obtained by (12), which demonstrated that the nurses who had received training within the previous five years scored significantly higher in comparison to those who had not which also similar to study done by (7).

CHAPTER SIX: STRENGTH AND LIMITATION OF THE STUDY

6.1 limitation

- Participants sharing of information and response in the questionnaire, this was happened where the participants who had already field the questionnaire is around while other participants were receiving a questionnaire for filling this was observed during data entry specifically from the questionnaire from the same locality

- Another limitation was that the findings of this study are derived from a small sample size only within the Dar salaam region (National hospital and its Institution). Therefore, a generalization is hard to made. However, participants were selected randomly from MNH, JKCI and MOI within the critical care settings within hospital units.

6.2 Strength

- Good cooperation between researcher nurses in charge and subordinate of the specific unity.
- Sample size met by 100% with good quality of data.
- Managed to collect data , data entry, analysis and presentation.
- Managed the time frame given for research period

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CHAPTER SEVEN RECOMMENDATIONS AND CONCLUSION

7.1Conclusion

The results of this study showed a low level of ECG interpretation. At the same time, it was revealed that low practice of ECG among the nurses. nurse's practice on ECG interpretation relay on working experience with statistical significant association.

This study provides some initial information that serves to stimulate further inquiry into this important field that has not been developed in this country, but is very important.

7.2 Recommendations

1. Hospital directors should organize refresher training on ECG courses to nurses who are working at critical care settings.
2. Cardiologist and nurse's specialist should conduct mentorship to nurses on ECG interpretation.
3. TNMC in collaboration with nursing training institution should include basic ECG knowledge competence in undergraduate curriculum.

REFERENCES

1. Randazzo BA 2016. Guide To 12 lead ECG.
2. Khan E. Clinical skills: the physiological basis and interpretation of the ECG. Br J Nurs. 2004;13(8):440–6.
3. Ebtsam Aly Abou Hashish, Shatha Hashim Mari HZA. Knowledge, Attitude and Practice of Undergraduate and Intern Saudi Nursing Students Regarding Biomedical Waste Management and Influencing Factors. :7. Available from: http://ijnnet.com/vol-7-no-1-june-2020-abstract-7-ijn
4. Yaser O, Tahboub H, Yılmaz ÜD. Nurses ' Knowledge and Practices of Electrocardiogram Interpretation Nurses ' Knowledge and Practices of Electrocardiogram Interpretation. 2019;(September).
5. Tahboub OYH, Dal Yılmaz Ü. Nurses' knowledge and practices of electrocardiogram interpretation. Int Cardiovasc Res J. 2019;13(3):80–4.
6. Ajam T, Mehdirad AA. Electrocardiography. Hear OGMEDSCAPE. 2019;
7. Yaser T, Obaydah. Knowledge and Practices of Electrocardiogram Interpretation of Nurses Knowledge and Practices of Electrocardiogram Interpretation of Nurses. 2018;
8. Yaser O, Tahboub H, Yılmaz ÜD. Nurses ' Knowledge and Practices of Electrocardiogram Interpretation. 2019;13(9):80–4.
9. Bakari M, Chillo P, Lwakatare J. Factors associated with, and echocardiographic findings of heart failure among HIV infected patients at a tertiary health care facility in Dar es Salaam, Tanzania. Tanzan J Health Res. 2013;15(2):1–9.
10. Davies A, Mueller J, Horseman L, Splendiani B, Hill E, Vigo M, et al. How do healthcare practitioners read electrocardiograms? A dual-process model of electrocardiogram interpretation. Br J Card Nurs. 2019;14(10):1–19.
11. Drew BJ, Califf RM, Funk M, Kaufman ES, Krucoff MW, Laks MM, et al. Practice standards for electrocardiographic monitoring in hospital settings: An American Heart Association scientific statement from the councils on cardiovascular nursing, clinical cardiology, and cardiovascular disease in the young. Circulation. 2004;110(17):2721–46.

12. Rn MC, Mb MFJRN, Rn ML. E MERGENCY N URSE C OMPETENCE IN E LECTROCARDIOGRAPHIC I NTERPRETATION S PAIN : A C ROSS -S ECTIONAL S TUDY. J Emerg Nurs [Internet]. 2012;1–11. Available from: http://dx.doi.org/10.1016/j.jen.2017.06.001
13. McCann K, Holdgate A, Mahammad R, Waddington A. Accuracy of ECG electrode placement by emergency department clinicians. EMA - Emerg Med Australas. 2007;19(5):442–8.
14. Rajaganeshan R, Ludlam CL, Francis DP, Parasramka S V., Sutton R. Accuracy in ECG lead placement among technicians, nurses, general physicians and cardiologists. Int J Clin Pract. 2008;62(1):65–70.
15. Hassan SMS, Hassan HS. Effectiveness of nursing education program on nurses knowledge toward Arrhythmia in Kirkuk ' s teaching hospitals . Salah M S . Hassan , PhD / Adult Health Nursing Department , College of Nursing , University of Kirkuk Hakima S . Hassan , PhD / Professor . 2012;1–13.
16. Kimbonguila A, Matos L, Petit J, Scher J, Nzikou J-M. Effect of Physical Treatment on the Physicochemical, Rheological and Functional Properties of Yam Meal of the Cultivar "Ngumvu" From Dioscorea Alata L. of Congo. Int J Recent Sci Res. 2019;10:33688–91.
17. Shehab MS, Ibrahim NM, Abd-Elkader H. Impact of an Educational Program on Nurses' Knowledge and Practice Regarding Care of Traumatic Brain Ýnjury Patients at Intensive Care Unit at Suez Canal University Hospital. Int J Caring Sci. 2018;11(2):1104–16.
18. Zhang H, Hsu L. The effectiveness of an education program on nurses' knowledge of electrocardiogram interpretation. Int Emerg Nurs. 2013;21 4:247–51.
19. Ruhwanya, Dinna. assessement of knowledge and skills in caring for life threatening arrythmias among nurses working in critical care setting at Muhimbili National Hospital. 2016;

20. Kania M, Rix H, Fereniec M, Zavala-Fernandez H, Janusek D, Mroczka T, et al. The effect of precordial lead displacement on ECG morphology. Med Biol Eng Comput. 2014;52(2):109–19.
21. Marie Patrice Halle, Mogo Franklin Kom, Felicite Kamdem, Sidick Mouliom, Hermine Fouda, Anasthase Dzudie, Folefack Francois Kaze EGA. : Cardiovascular Disease Burden in Patients with Non-Dialysis Dependent Chronic Kidney Disease in Cameroon: Case of the Douala General Hospital. Open J Nephrol. Vol.10 No.
22. Wu H. EliScholar – A Digital Platform for Scholarly Publishing at Yale Retention Of Knowledge By Nurses After An Online Ecg Monitoring Course. 2012;(January).
23. Horton M. simple random sampling advantage and disadvantages [Internet]. Investopedia. 2021. Available from: https://www.investopedia.com/ask/answers/042815/what-are-disadvantages-using-simple-random-sample-approximate-larger-population.asp
24. Chou R, Totten AM, Carney N, Dandy S, Fu R, Grusing S, et al. Predictive Utility of the Total Glasgow Coma Scale Versus the Motor Component of the Glasgow Coma Scale for Identi fi cation of Patients With Serious Traumatic Injuries. Ann Emerg Med. 2017;70(2):143-157.e6.

Name of the study: Nurse's knowledge and practice on electrocardiogram lead placement and interpretation in critical care setting at MNH, JKCI and MOI

INSTRUCTIONS:

- Thank you for your willingness to respond to my questions.
- Please answer all questions to the best of your knowledge.
- Any information you give will be used for the purpose of this study only and will be treated as confidential.
- Your full participation will greatly contribute to this study.
- Thank you.

Serial No…… Date ……

DEMOGRAPHIC INFORMATION (Circle the appropriate answer).

1. What is your gender

a) Male

b) Female

2. What is your age?..... yrs

3. What is your level of education?

a) Certificate

b) Diploma

c) Advanced Diploma

d) Bachelor's degree

e) Master's degree.

f) PhD

g) Other specify……

4. Which critical care unit are you currently working?

a) Pediatric Intensive Care Unit (PICU)

b) Cardiothoracic Intensive care unit(CT ICU)

c) Medical Intensive Care Unit (MICU)

d) Surgical Intensive Care Unit (SICU)

e) Coronary care unit (CCU)

f) High dependent unit (HDU)

g) Emergency Medicine Department (EMD)

h) Maternity ICU

i) MOI ICU

5. How many years/months of working experience do you have at the units?

…….year or ……months

6. Have you received any formal training of electrocardiogram?

a) Yes

b) No

7. ECG education resource

a) University

b) Courses

c) Internet

d) Self learning books

e) Congress / conferences

8. Is there an ECG machine at your working unity?

A. Yes

B. No

9. How often do you perform an ECG to patient/client?

a) Daily

b) per week

c) per month

d) Not performing

10. How often do you interpret an ECG to patient/client?

a) Daily

b) .per week

c) per month

d) Not

11. Years since taking the last ECG course

a) I don't take

b) Less than 2 years

c) Between 2 to 5 years

d) More than 5 years

12. ECG competency level

a) Beginner

b) Intermediate

c) Advanced

13. Desire to learn about ECG

a. Yes

b. No

14. Who is responsible to perform an ECG at your unity?

a) Nurses

b) Doctors

c) Technicians

d) Health attendants

NURSES KNOWLEDGE ON ECG LEAD PLACEMENT

15. When performing ECG to patient;-
    a) Place the patient's arms up by their side to relax their shoulders.
    b) Place the patient's arms down by their side to relax their shoulders.
    c) Place the patient's arms down by one side to relax their shoulders.
16. When placing ECG lead to patient
    a) Electrodes should be placed over bones and over areas where there is a lot of muscle movement.
    b) Electrodes should not be placed over bones and over areas where there is a lot of muscle movement
    c) Electrodes should be placed over large bone.
17. When assessing patient skin before placing ECG lead
    a) Shave any hair that can interfere with electrode placement.
    b) No need to shave any hair that can interfere with electrode placement.
    c) Treat patient according to their culture and believes.

18. V1 should be placed at
    a) 4th Intercostal space to the left of the sternum
    b) 4th Intercostal space to the right of the sternum
    c) Anywhere between the left shoulder and the wrist
19. V2 should placed at
    a) 4th Intercostal space to the right of the sternum
    b) 4th Intercostal space to the left of the sternum
    c) Anywhere between the left shoulder and the wrist
20. V3 should placed at
    a) Anterior axillary line at the same level as V4
    b) Midway between V2 and V4
    c) Midaxillary line at the same level as V4 and V5
21. V4 should placed at

a) 5th Intercostal space at the midclavicular line

b) Anterior axillary line at the same level as V4

c) Midway between V2 and V4

22. V5 should placed at

a) Anterior axillary line at the same level as V4

b) Midaxillary line at the same level as V4 and V5

c) 5th Intercostal space at the midclavicular line

23. V6 should placed at

a) Anterior axillary line at the same level as V4

b) Midaxillary line at the same level as V4 and V5

c) Midway between V2 and V4

24. RA should be placed at

a) Right arm

b) Left arm

c) Right leg

25. RL should be placed at

a) Left leg

b) Right leg

c) Right arm

26. LL should be placed at

a) Left leg

b) Left arm

c) Right leg

27. LA should be placed at

a) left arm

b) Left leg

c) Right arm

NURSE KNOWLEDGE ON ECG INTERPRETATION

In ECG interpretation;-

28. The P wave represents right and left
    a) atrial depolarization
    b) atrial repolarization
    c) ventricular depolarization
29. QRS complex represents right and left
    a) ventricular depolarization
    a) atrial depolarization
    b) ventricular repolarization
30. T wave represents
    a) atrial depolarization
    b) ventricular repolarization
    c) ventricular depolarization
31. Normal PR interval is between
    a) 0.12 and 0.20
    b) 1.2 and 1.5
    c) 0.5 and 0.1
32. In a normal ECG, V1 and aVR leads are
    a) positive waves
    b) Negative waves
    c) positive and negative wave
33. Pathological Q waves are sign of
    a) previous myocardial infarction
    b) existing myocardial infarction
    c) atrial repolarization
34. ST elevation in lateral myocardial infarction appears in
    a) leads V1-V6

b) leads I,aVL, V5, V6

c) II, III and aVF

35. ST elevation in anterior myocardial infarction appears in

a) leads II,III, and aVF

b) leads V2-V3

c) leads V1-V6

36. ST depression in ECG indicate

a) myocardial ischemia

b) decreases cardiac enzymes

c) increased troponin level

37. T long wave and QRS wide wave seen in

a) Hyperkalemia

b) Hypokalemia

c) hyponatremia

NURSES PRACTICE ON ECG INTERPRETATION

38. You perform an ECG and observe the following what do you think it might be?

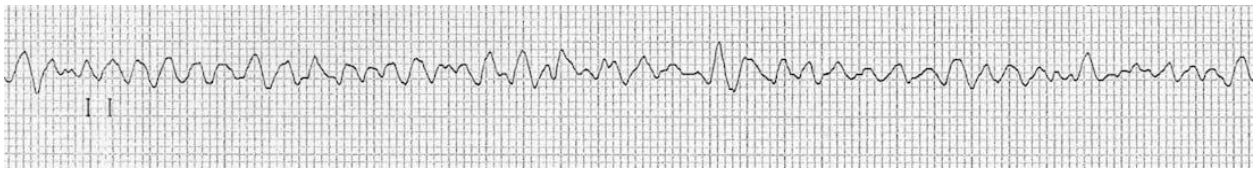


a) atrial flutter

b) atrial fibrillation

c) ventricular fibrillation

39. You perform an ECG and observe this rhythm. What does it represent?



a) ventricular fibrillation

b) atrial fibrillation

c) atrial flutter

40. A patient come at EMD due to respiratory distress. He has 140beats per minute, you perform an ECG and observe the following. What type of rhythm is that?

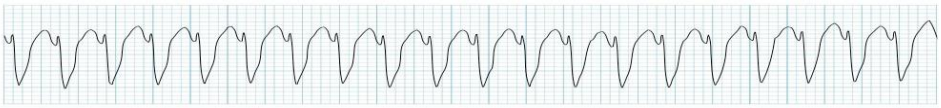


a) atrial fibrillation

b) atrial flutter

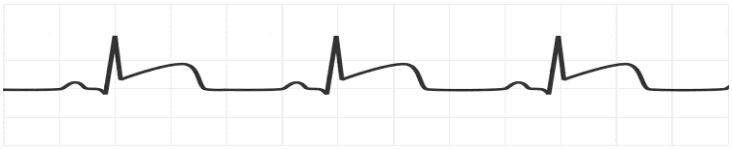
c) ventricular fibrillation

41. A hospitalize patient had surgery due to acute myocardial infarction, his vital sing are stable. You perform an ECG and observe the following, what is patient presenting?



a) ventricular tarchycardial
b) ventricular bradychadia
c) ventricular fibrillation

42. You perform an ECG to patient who had chest pain appeared after leaving an important meeting two hours ago. He is 53 years old and hypertensive and he is diagnosed with type two diabetes mellitus a few month ago the ECG is as follows, what will be the diagnosis?



a) acute myocardial infarction
b) dilated cardiomyopathy
c) heart failure

43. A 20 years old male comes at the emergence department. He is athletics and slim. He reports feeling a pricking sensation in the left area of his chest since he finished doing exercise three hour early. You perform an ECG and observe the following what does it represent



a) normal ECG
b) ventricular tachycardia
c) mitral prolapse

44. A 30-year-old woman comes to the EMD and reporting palpitation, chest tightness and dyspnea. You perform ECG and observe the following how will you interprete this?



a) atrial tachycardia

b) ventricular tachycardia

c) heart block

APPENDIX

Appendix 1: Consent Form.

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

Greeting,

My name is Lucia D Kabeya, a student from Muhimbili University of Health and Allied Sciences; I would like to welcome you to participate in this study.

Study goal

Nurses' knowledge and practice on electrocardiogram lead placement and interpretation from selected critical care setting.

Type of data and procedure

If you agree to join the study, you will be asked to answer a series of questions in the questionnaire prepared.

Participant selection

You have been selected to be part of this study, and that is why we would like to interview you. This study is conducted by Lucia D Kabeya in collaboration with the Muhimbili University of Health and Allied Sciences, School of Nursing and this study is currently taking place at Muhimbili Orthopedic Institute and Jakaya Kikwete cardiac Institute and Muhimbili National Hospital in Dar es Salaam.

Potential Risk

I do not expect that any harm will happen to you because of joining this study however if any physical injury resulting from participation in this research happen, I will guide you to obtain medical treatment according to the current standard of care in Tanzania. There will be no additional compensations for you.

Potential benefits

If you agree to take part in this study, your contribution will help us to explore the nurse's competency in ECG lead placement and will help the government and community on their plan in health sectors; also, it will be an opportunity for you to volunteer in this study for the benefit of others and the country. It helps the individual on early identification and management for patient with abnormal ECG that can help in improving patient outcome and decrease the cost.

The results of this study will be used to assist the Ministry of Health, Muhimbili Orthopedic Institute and Jakaya Kikwete Cardiac Institute and Muhimbili National Hospital in developing public health programs that target efforts to improve patients' outcome and decrease the mortality rate of the patients with abnormal ECG.

Confidentiality

The information you provide is confidential and will not be disclosed to anyone. It will only be used for research purposes. Your personal information will not be disclosed. You may be contacted by the survey team again only if it is necessary to complete the information on the survey. Refusal to participate or withdraw from the study will not involve penalty or loss of any benefit which you are otherwise entitled.

Voluntary participation

Your participation is voluntary, and you can withdraw from the survey after having agreed to participate. You are free to refuse to answer any question that is asked and the questionnaire.

Contact information

If you have any questions about this survey, you may ask me or contact to Lucia D Kabeya telephone0688-636165. If you have questions about your rights as a participant and need further clarification, you may call Director of Research and Publication Dr. Bruno Sungunya, Muhimbili University of Health and Allied Science (MUHAS), P. O. Box 65001, Dar es Salaam, Tel. no

+255222152467. Fill free to ask the question.

Consent to participate

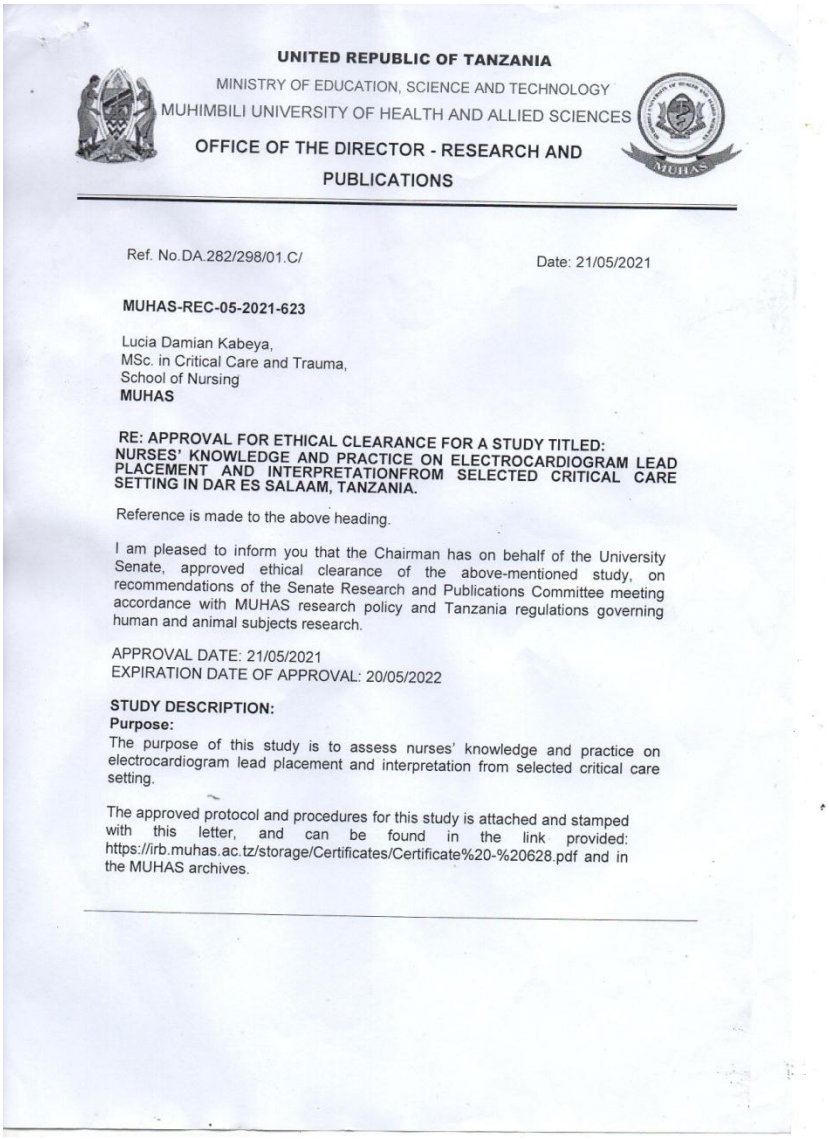
Signing this consent indicates that you understand what will be expected of you and are the willingness to participate.

Name of participant ……..…….

Signature of participant …….Date…….

Name of researcher……...……

Appendix I1: Ethical Clearance



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: 21/05/2021

MUHAS-REC-05-2021-623

Lucia Damian Kabeya,
MSc. in Critical Care and Trauma,
School of Nursing
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: NURSES' KNOWLEDGE AND PRACTICE ON ELECTROCARDIOGRAM LEAD PLACEMENT AND INTERPRETATIONFROM SELECTED CRITICAL CARE SETTING IN DAR ES SALAAM, 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: 21/05/2021
EXPIRATION DATE OF APPROVAL: 20/05/2022

STUDY DESCRIPTION:
Purpose:
The purpose of this study is to assess nurses' knowledge and practice on electrocardiogram lead placement and interpretation from selected critical care setting.

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-%20628.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

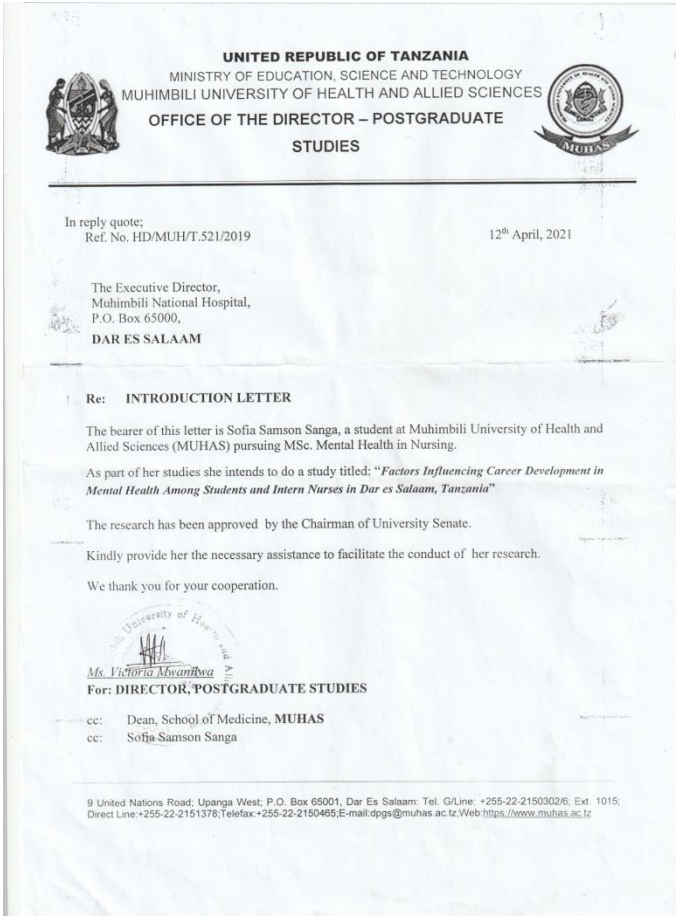
Dr. Bruno Sunguya
Chairman, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research & Publications
Box 65001

Cc: Director of Postgraduate Studies

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 III: Introduction Letter



UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.521/2019

12th April, 2021

The Executive Director,
Muhimbili National Hospital,
P.O. Box 65000,
DAR ES SALAAM

Re: INTRODUCTION LETTER

The bearer of this letter is Sofia Samson Sanga, a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MSc. Mental Health in Nursing.

As part of her studies she intends to do a study titled: "***Factors Influencing Career Development in Mental Health Among Students and Intern Nurses in Dar es Salaam, Tanzania***"

The research has been approved by the Chairman of University Senate.

Kindly provide her the necessary assistance to facilitate the conduct of her research.

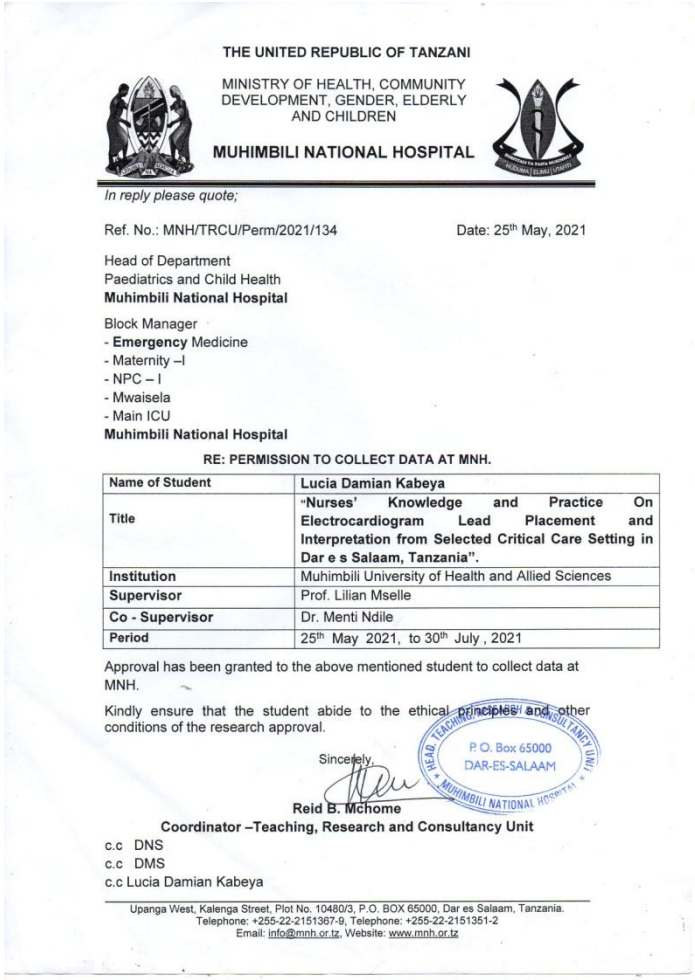
We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Dean, School of Medicine, **MUHAS**
cc: Sofia Samson Sanga

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix IV: Permission to collect data at MNH



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/2021/134 Date: 25th May, 2021

Head of Department
Paediatrics and Child Health
Muhimbili National Hospital

Block Manager
- **Emergency** Medicine
- Maternity –I
- NPC – I
- Mwaisela
- Main ICU

Muhimbili National Hospital

RE: PERMISSION TO COLLECT DATA AT MNH.

Name of Student	**Lucia Damian Kabeya**
Title	**"Nurses' Knowledge and Practice On Electrocardiogram Lead Placement and Interpretation from Selected Critical Care Setting in Dar e s Salaam, Tanzania".**
Institution	Muhimbili University of Health and Allied Sciences
Supervisor	Prof. Lilian Mselle
Co - Supervisor	Dr. Menti Ndile
Period	25th May 2021, to 30th July , 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,

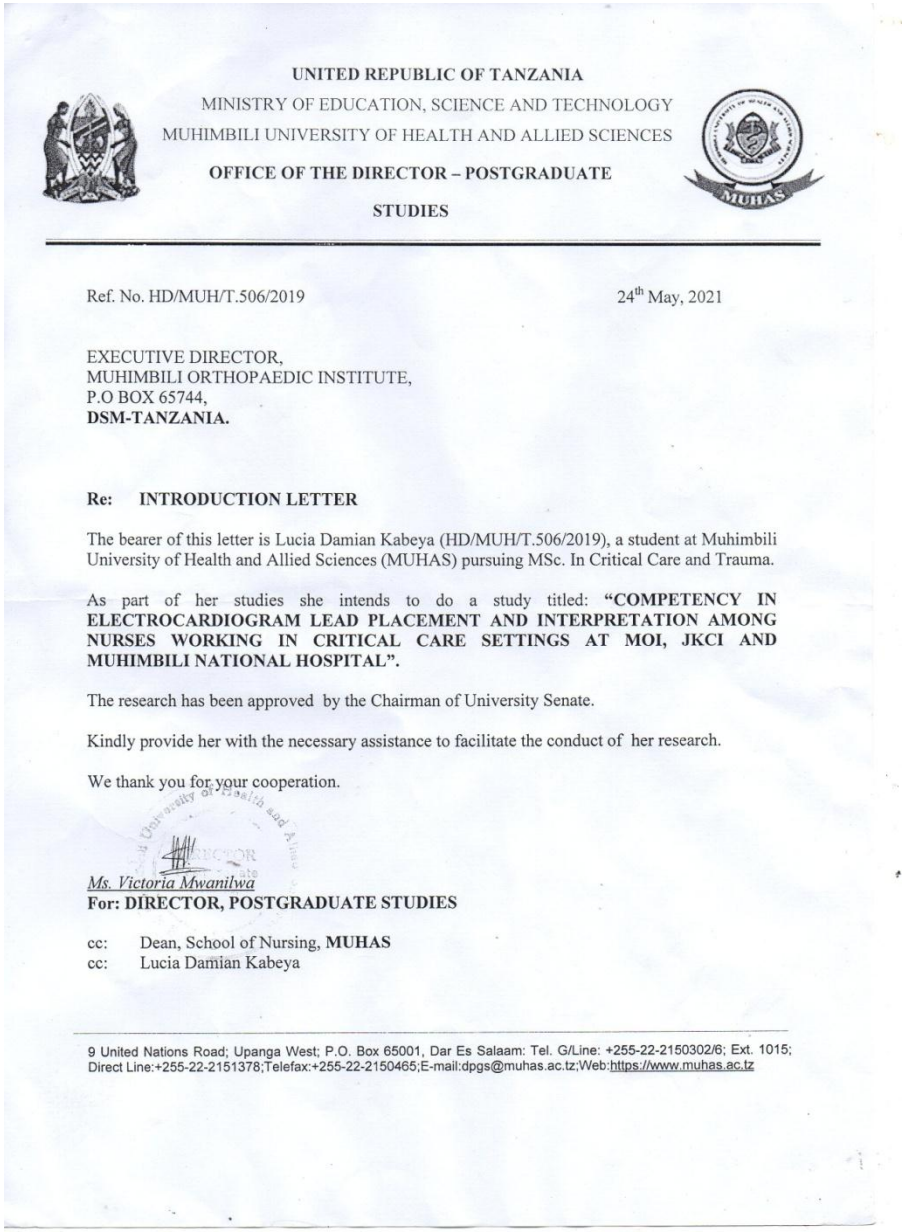
P. O. Box 65000
DAR-ES-SALAAM

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

c.c DNS
c.c DMS
c.c Lucia Damian Kabeya

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 V: Introduction Letter MOI



UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

Ref. No. HD/MUH/T.506/2019 24th May, 2021

EXECUTIVE DIRECTOR,
MUHIMBILI ORTHOPAEDIC INSTITUTE,
P.O BOX 65744,
DSM-TANZANIA.

Re: INTRODUCTION LETTER

The bearer of this letter is Lucia Damian Kabeya (HD/MUH/T.506/2019), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MSc. In Critical Care and Trauma.

As part of her studies she intends to do a study titled: **"COMPETENCY IN ELECTROCARDIOGRAM LEAD PLACEMENT AND INTERPRETATION AMONG NURSES WORKING IN CRITICAL CARE SETTINGS AT MOI, JKCI AND MUHIMBILI NATIONAL HOSPITAL".**

The research has been approved by the Chairman of University Senate.

Kindly provide her with the necessary assistance to facilitate the conduct of her research.

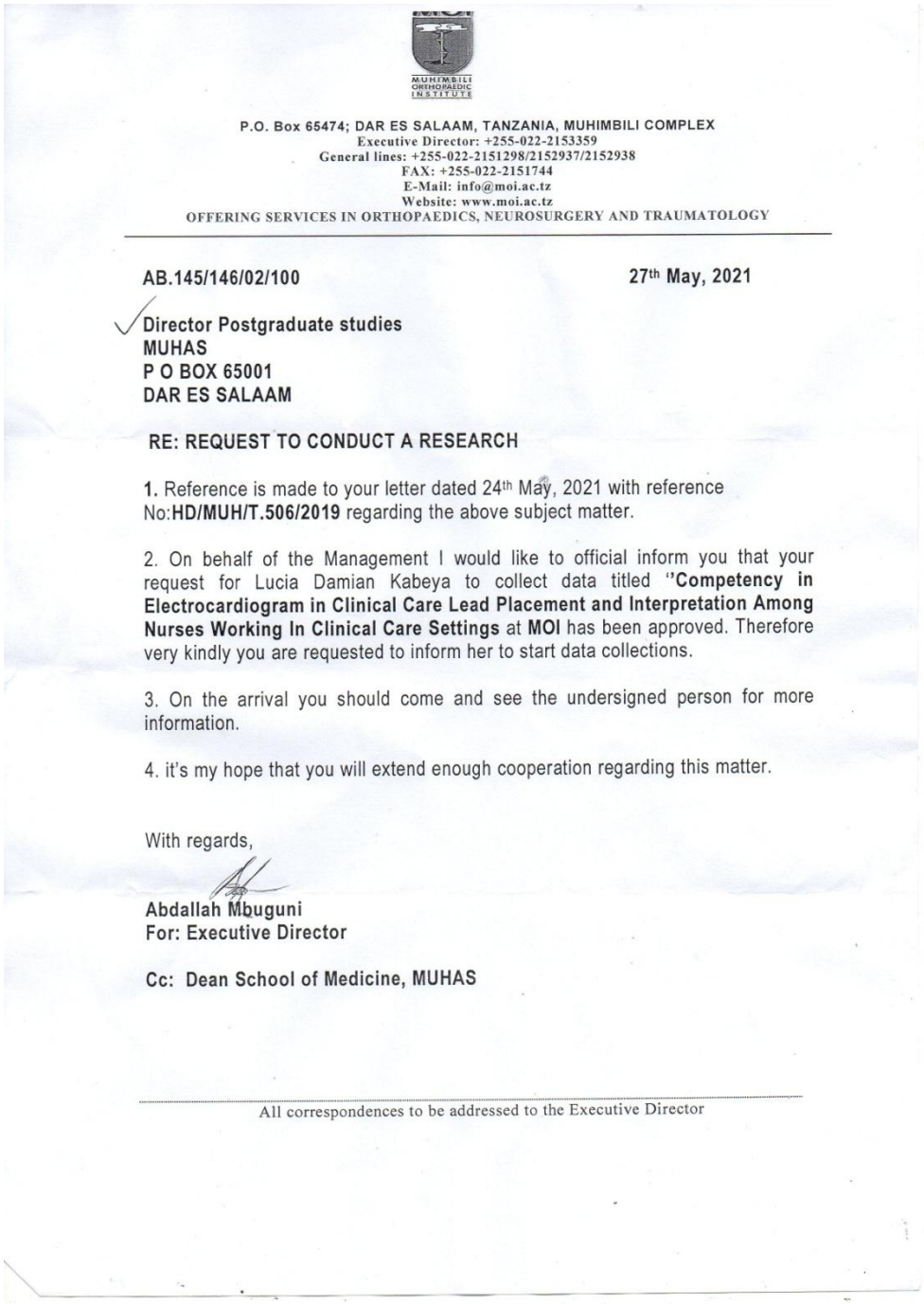
We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Dean, School of Nursing, **MUHAS**
cc: Lucia Damian Kabeya

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix VI: Permission to collect data at 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.145/146/02/100 27th May, 2021

Director Postgraduate studies
MUHAS
P O BOX 65001
DAR ES SALAAM

RE: REQUEST TO CONDUCT A RESEARCH

1. Reference is made to your letter dated 24th May, 2021 with reference No:**HD/MUH/T.506/2019** regarding the above subject matter.

2. On behalf of the Management I would like to official inform you that your request for Lucia Damian Kabeya to collect data titled **''Competency in Electrocardiogram in Clinical Care Lead Placement and Interpretation Among Nurses Working In Clinical Care Settings** at **MOI** has been approved. Therefore very kindly you are requested to inform her to start data collections.

3. On the arrival you should come and see the undersigned person for more information.

4. it's my hope that you will extend enough cooperation regarding this matter.

With regards,

Abdallah Mbuguni
For: Executive Director

Cc: Dean School of Medicine, MUHAS

All correspondences to be addressed to the Executive Director

Appendix VII :Introduction Letter JKCI

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

Ref. No. HD/MUH/T.506/2019 24th May, 2021

EXECUTIVE DIRECTOR,
JAKAYA KIKWETE CARDIAC INSTITUTE,
P.O BOX 65141,
DSM-TANZANIA.

Re: INTRODUCTION LETTER

The bearer of this letter is Lucia Damian Kabeya (HD/MUH/T.506/2019), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MSc. In Critical Care and Trauma.

As part of her studies she intends to do a study titled: **"COMPETENCY IN ELECTROCARDIOGRAM LEAD PLACEMENT AND INTERPRETATION AMONG NURSES WORKING IN CRITICAL CARE SETTINGS AT MOI, JKCI AND MUHIMBILI NATIONAL HOSPITAL".**

The research has been approved by the Chairman of University Senate.

Kindly provide her with the necessary assistance to facilitate the conduct of her research.

We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

cc: Dean, School of Nursing, **MUHAS**
cc: Lucia Damian Kabeya

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix VIII: Permission to 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/65 Date: 27/05/2021

Lucia Damian
Msc. in Critical Care and Trauma
School of Nursing
MUHAS

RE: PERMISSION TO CONDUCT RESEARCH

Reference is made to your letter. Your request to conduct a study titled, **"COMPETENCY IN ELECTROCARDIOGRAM LEAD PLACEMENT AND INTERPRETATION AMONG NURSES WORKING IN CRITICAL CARE SETTINGS AT MOI, JKCI AND MUHIMBILI NATIONAL HOSPITAL".** Has been 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,

K.n.y. MTENDAJI YA KIKWETE

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.