ASSESSMENT OF KNOWLEDGE REGARDING CARE OF PATIENTS WITH STROKE AMONG REGISTERED NURSES AT MUHIMBILI NATIONAL HOSPITALS, DAR ES SALAAM TANZANIA

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By

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A Dissertation submitted in (partial) Fulfilment of the Requirements for the Degree of Masters of Science (critical care and trauma)

Muhimbili University of Health and Allied Sciences

October, 2019

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili university of health and allied sciences a dissertation entitled "***Assessment of knowledge regarding care of patients with stroke among registered nurses at Muhimbili national hospitals, Dar es Salaam Tanzania"*** in (partial) fulfilment of the requirement for the degree of master of science in nursing - critical care and trauma of Muhimbili university of health and allied sciences

_____

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(Supervisor)

_____

Date

DECLARATION AND COPYRIGHT

I **JEREMIE MINANI** declare that this **dissertation** is my own work and that it has not been and will not be presented to any other university for a similar or any other degree award.

Signature_____ Date_____

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DEDICATION

This study is dedicated to my beloved parents NAHINKUYE Gédéon and MISIGARO Thélophine, and my brothers and sisters.

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OPERATIONAL DEFINITIONS

Stroke: is defined by the World Health Organization as 'a clinical syndrome consisting of rapidly developing clinical signs of focal (or global in case of coma) disturbance of cerebral function lasting more than 24 hours or longer leading to death with no apparent cause other than a vascular origin.'

A transient ischaemic attack (TIA) is defined as stroke symptoms and signs that resolve within 24 hours (Sacco et al., 2013).

Care: critical attention or consideration applied to provide properly what is necessary for the health, welfare, maintenance, and protection of someone or something.

ABSTRACT

Background

Stroke is a major public health problem causing both mortality and morbidity worldwide inclusive of Africa regions. Low and middle-income countries have a high mortality rate compare to high-income countries. World Health Organisation reports that 15 million people suffer stroke worldwide annually. In Tanzania, the burden of stroke on health services appears to have increased rapidly. Nurses as leading health care professional team members play a pivotal role in all phases of care of stroke patients. For optimal neurological outcomes, nurses have to develop measures to quickly, easily identify and assess stroke patients and implement appropriate interventions. However, there are few studies in Tanzania undertaken to assess the knowledge of health staff caring for patients with stroke.

Aims of the study: This study aimed to assess nurses' knowledge regarding care of stroke patients at Muhimbili National Hospitals (Upanga and Merge campus).

Method: The study was cross-section study design employed a quantitative approach, conducted at Muhimbili National Hospitals. A convenience sampling was used to select a sample size of 122 nurses working in medical wards and Intensive Care Units. Data was collected by using a self-administered questionnaire, analysed by using Statistical Package for the Social Sciences (SPSS) version 23, and represented into frequencies tables.

Results

A total of 122 nurses working in a medical ward and intensive care unit were recruited for the study. This study has shown that the majority of nurses 99(81.1%) successfully defined stroke. However, a considerable number of nurses 43(35.2%) incorrectly indicated that hemiplegia is one of the types of stroke. The majority of nurses 113(92.6%) identified high blood pressure as a risk factor for stroke. However, the majority of nurses were not able to identify family history of stroke 86(70.5%), previous intracranial haemorrhage 101(82.8%), lack of physical activity 83(68.0%), previous atrial fibrillation 71(58.2%), and previous Transient Ischemic Attack 87(71.3%) as risk factors for stroke. On the other hand, about 94% were knowledgeable about early warning signs of stroke which are sudden numbness or weakness of the face, arm, or leg, especially on one side of the body. The study also found that nurses had general knowledge on key nursing interventions for stroke patients. However, many were not knowledgeable on other important interventions that are recommended for stroke patients such as treatment of hyperglycaemia to keep blood glucose levels between 140-180 mg/dL and treatment of hypoglycaemia (blood glucose < 60 mg/dL) per hospital

protocol, and use of antiplatelet agent in the place of oral anticoagulation in a non-embolic stroke to reduce the risk of recurrent stroke.

Conclusion

The results of the present study showed that participants were knowledgeable about care of patient with stroke in general. However, with regard to specific areas that were assessed in the study, the majority of participants were not knowledgeable. It is recommended that the management organizes on-job training enhance nurses' knowledge about stroke care at Muhimbili national Hospitals

Keyword: Nurses, knowledge, stroke, care, Muhimbili

LIST OF ABBREVIATIONS

AIS	Acute Ischemic Stroke
ABCD2	Age, Blood Pressure, Duration, Diabetes
AHA	American Heart Association
ASA	American Stroke Association
CHD	Chronic Heart Diseases
CI	Confidence Interval
CT	Computerised Tomography
CVA	Cerebrovascular Accident
HT	Hypertension
MAMC	MUHAS Academic Medical Centre
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
t-PA	tissue Plasminogen Activator
UK	United Kingdom
WHO	World Health Organization
WSO	World Stroke Organization

CHAPTER ONE

1.0. INTRODUCTION

1.1 Background

The World Health Organization (WHO)' define of stroke as rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer leading to death, with no apparent cause other than of vascular origin (Sacco et al., 2013)

Stroke is a major public health problem causing both mortality and morbidity worldwide inclusive of Africa regions. Low and middle-income countries have a high stroke mortality rate compared to high-income countries. In 2013, Stroke was responsible for 6.5 million death globally; and was classified as the second leading cause of death worldwide after ischaemic heart diseases. About 87% of stroke deaths and disability-adjusted life years occur in low and middle-income countries (Tshikwela, et al., 2015).

Globally, the burden of stroke is expected to continue to rise. This is despite initiatives of the World Health Organization (WHO) and other associations like The World Stroke Organization (WSO) that fight stroke. In 2013, Cerebrovascular accident came in the second place in causing of deaths (11.8% of all deaths), after ischemic heart diseases which account for 14.8% of all deaths (Feigin et al, 2017). It is also the third leading cause of disability (4.5% of disability-adjusted life-years from all-cause) after ischemic heart diseases (6.1%) around the worldwide (Katan et al., 2018). Although advanced diagnosis, treatment, and rehabilitation are important for stoke prevention, Low- and middle-income countries continue to face challenges due to lack of resources and technical capacity (Yan et, 2016). Stroke causes also social and economic consequences such as premature death, long-term disability, restrictions in social functions, increased cost of care and loss of productivity (Lindsay et al., 2014).

Studies conducted in different countries in Africa regions indicate that the burden of stroke continues to increase. In 2015, stroke was the fourth leading cause of all deaths (Anderson et al., 2006; Lekoubou et al., 2016). Lack of availability of computerized tomography (CT) imaging is a serious problem that restricts access to information about the profile of different aspects of stroke in Africa regions (Anderson, et al., 2006; Lekoubou et al., 2016; Tshikwela

et al., 2015). A prospective, community-based study conducted in rural and urban Tanzania aimed to provide the incidence of stroke found that the incidence rate of stroke was high in urban compared to rural areas. However, little is known about nurses' knowledge regarding stroke care in Tanzania. A study conducted in Tanzania by Tesha in 2006 was focused on patients' knowledge about risk factors of stroke (Tesha J et al., 2006). Our study was focusing on the assessment of knowledge among nurses at Muhimbili National Hospitals (MNH Upanga and Merge).

Nurses' knowledge of adherence to protocols designed to take care of stroke patients is fundamental in the improvement of stroke patients' care, health promotion, education, and management process. A study conducted in the United Kingdom (UK) revealed that lack of knowledge and poor information among health care providers about diagnosis, rehabilitation, and prognosis causes serious problems for stroke patients in hospital (Mcdaniel et al,. 2016). It was found that nurses need to be trained on current best practices regarding stroke in order that they can appropriately respond to the need of stroke patients. Furthermore, it was recommended that nurses have to increase their knowledge and improve practice in regards to stroke so that they could provide evidence-based care to stroke patients and their families.

1.2 Problem statement

Stroke is a complex, challenging, and costly disease. It is a condition associated with a high incidence of mortality and often leaves a substantial proportion of survivors with significant physical, cognitive and psychological impairments. Stroke needs special attention as it leads to mortality and physical disability (Bushnell et al., 2014; Lindsay, Furie, Davis, Donnan, & Norrving, 2014; Madubuko, 2018)

World Health Organisation reports that 15 million people worldwide suffer a stroke annually. Of these, 5 million die while another 5 million are left permanently disabled, placing a burden on family and community (Katan, et al., 2018). In the African region including Tanzania, little is known about mortality and morbidity rate of stroke. However, a study comparing rural and urban of Tanzania reported that the overall crude yearly stroke incidence rates were 94·5 per 100 000 (95% CI 76·0–115·0) in Hai and 107·9 per 100 000 (88·1–129·8) in Dar-es-Salaam (Walker et al., 2010). In the African region, lack of knowledge in terms of the control for stroke risk factors has been identified by many searchers (Madubuko, et al., 2018; Roth et al., 2017; Tshikwela et al., 2015).

In Tanzania little is known about knowledge regarding care of patients with stroke among nurses. A study conducted in Tanga Region, Tanzania aimed to determine the knowledge of stroke among hypertensive patients in the Tanga region found that patients had poor knowledge about stroke (Tesha et al., 2006). Tesha et al. (2006) have recommended that healthcare be equipped with knowledge on stroke prevention. Other published studies on stroke in Tanzania have focused on prevalence, incidence, and post-stroke depression symptoms (Saadi et al., 2018). It has been highlighted that lack of awareness of the common symptoms of stroke remains a major educational challenge, and the urgency of stroke treatment is still poorly appreciated (Nicol, et al., 2005).

Nurses must be aware of risk factors of stroke, recognition of causes, signs, and symptoms, management of stroke patients, and education of patients during and after hospitalization to provide appropriate care to stroke patients. There is a research gap in Tanzania about nurses' knowledge regarding the care of stroke patients. Therefore, this study focused on the assessment of nurses' knowledge regarding care of stroke patients at Muhimbili National Hospitals (Upanga and Merge campus).

1.3 Conceptual framework

This study used a conceptual model that helped to describe frequencies of variables of interest related to stroke patient care among nurses at Muhimbili National Hospitals.

Knowledge on different variables was assessed, it includes a description of the definition of stroke, types of stroke, causes, risk factors and warning signs and symptoms, prevention of complications and nursing interventions. Nurses' knowledge was assessed on each of the specific variable. Health care provider should be knowledgeable about definition of stroke, types of stroke, causes, risk factors and warning signs and symptoms, prevention of complications and nursing interventions patient with stroke. Guidelines and protocols must be a guide for nurses during provision of care to stroke patients. All of these components together will determine quality of care to be given to the patient as well as good outcome of patient.

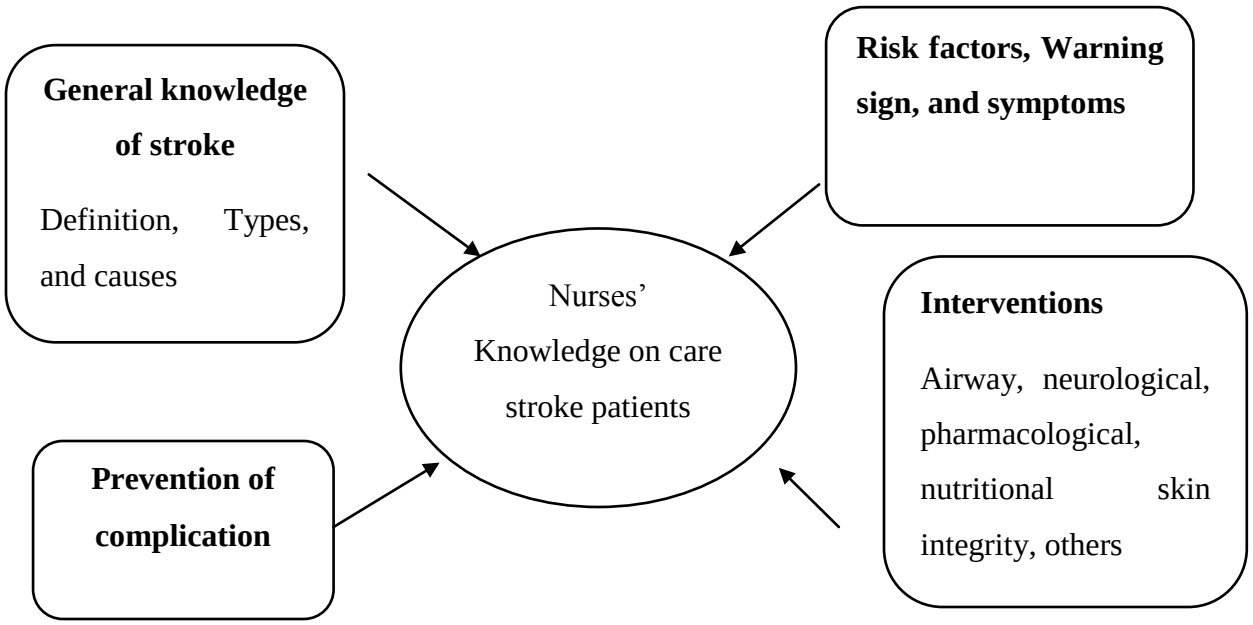


Figure 1: Researcher's conceptual framework

1.4 Rationale

This study aims to determine the knowledge regarding stroke patient' care among nurses who works at Muhimbili National Hospitals. Expectations are that the findings should be

disseminated and published to give current information about knowledge regarding care of stroke patients among nurses at MNH. The findings of the study could help to improve knowledge among nurses so that through the use of guidelines and protocols, they can appropriately respond to the needs of patients who are at high risk of getting stroke and those with stroke.

1.5 Broad objective

The aim of this study was to assess nurses' knowledge regarding care of stroke patients at Muhimbili National Hospitals (Upanga and Merge campus)

1.6 Research questions

1. What is the knowledge about the definition, causes, and types of stroke among registered nurses at Muhimbili National Hospitals?
2. what is nurses' knowledge regarding risk factors and warning signs of stroke among registered nurses at Muhimbili National Hospitals?
3. What is nurses' knowledge of nursing interventions for stroke patients among registered nurses at Muhimbili National Hospitals?
4. What is nurses' knowledge regarding the prevention of complications of a stroke among registered nurses at Muhimbili National Hospitals?

1.7 Specific objectives

This study was based on the following objectives:

1. To determine nurse' knowledge regarding definition, types and, causes of stroke;

2. To describe nurses' knowledge regarding risk factors and warning signs for stroke;

3. To determine nurses' knowledge of nursing interventions for stroke patients;

4. To determine nurses' knowledge regarding the prevention of complications of stroke

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Knowledge regarding prevention and management of stroke complications.

A stroke or cerebrovascular event occurs when there is a blockage in brain blood vessels (ischaemic stroke) or when a blood vessel ruptures in the brain (hemorrhagic stroke). It is a sudden death of brain cells due to insufficient blood flow and oxygen caused by a blood clot occluding an artery in the brain or a blood vessel rupturing(Lekoubou et al., 2016; Johnson, et al., 2016; Katan et al., 2018). The severity of a stroke depends on the area of the brain that is affected and the extent of the blockage. The patients have typical symptoms such as confusion, aphasia, headache, imbalance, and difficulty in walking, weakness, and numbness of the arm, face and leg (Davis et al., 2006). Stroke has a high risk of death and an even greater risk of disability. Survivors may have disability such as loss of vision, loss of speech, and paralysis. Certainly, about two-thirds of survivors are left with significant physical, psychological and/or behavioural problems and require assistance in their everyday activities, a task that usually falls upon voluntary family caregivers (Bell-Gam,et al., 2012; Johnson et al., 2016; Mendis et al., 2011). The care given by nurses to patients with stroke has a significant impact on the patient's outcome and prognosis (Summers et al., 2009a).

Patient assessment is key to identify the types of stroke and plan relevant care accordingly. There are two main types of stroke, ischemic stroke, and haemorrhagic stroke. Though clinical signs of these types of stroke share similarities, their differences guide intervention and hence patient's outcomes. Therefore, nurses must be knowledgeable of early signs and symptoms and their associated nature of stroke. History taking and initial assessment are therefore essential for timely diagnosis and intervention. (Suljic, et al., 2013). Many stroke patients receive unnecessary or harmful care due to lack of knowledge among caretakers concerning appropriate care intervention(Ackerson et al., 2018; Bakas et al., 2014; Miller et al., 2010).

To ensure a positive outcome, nurses have an important role in providing care, information about the disease, and education regarding healthy lifestyle. Furthermore, nurses should have enough knowledge of general medical checkups, nursing assessments, and neurological

examination. Lack of nurse's knowledge and patients' delay in getting care have an impact on the occurrence of complications(Saengsuwan et al., 2017). Nurses' encounter of patients at emergency care settings presents an opportunity for them to perform a comprehensive assessment for early diagnosis and intervention as well as for the prevention of complications that frequently occur within the first 24-48hours (Powers et al., 2018).

2.2 Nurses' knowledge regarding risk factors, and warning signs and symptoms for stroke.

Globally there is evidence of the growing burden of Non-Communicable Diseases (NCDs) especially in developing countries including Tanzania. Stroke is one of the non-communicable diseases that cause deaths and disability worldwide, and Tanzania is not an exception to this trend. Rapid urbanization of rural areas and rapid migration from rural to urban areas has also contributed to the increased burden of non-communicable diseases, as consequence, population are more exposed to sedentary lifestyles and uncontrolled diets, high blood pressure, overweight and obesity, tobacco use, alcohol consumption, high cholesterol levels, and lack of physical activity has been shown as the major risk factors in non-communicable diseases and they are prevalent in Tanzania (Madubuko et al., 2018; Mayige et al., 2011; Saadi et al., 2018; Tshikwela et al., 2015). Different risk factors are associated with stroke. Transient ischemic attack or prior stroke is an indicator that the patient is at risk of getting a stroke crisis. Kagan, Abraham, et al. found that among 1707 patients with TIA diagnosed in the emergency departments of a large Northern California health maintenance organization, at 90-day stroke risk was 10.5% after TIA. Hill et al found that the risk of stroke after TIA in Canada was 9.5% at 90 days, and 14.5% at 1 year (Kleindorfer et al., 2005) other risk factor has been categorized as modifiable and non-modifiable risk factors. Modifiable risk factors include hypertension, heart disease such as myocardial infarction atrial fibrillation and valvular defects, cigarette smoking, consumption of large amounts of alcohol, sedentary lifestyle, diabetes mellitus, obesity and viral infections and Non-modifiable risk factors for stroke include: Age, Genetics, Race/ Ethnicity (Nakibuuka et al., 2015; O'Donnell et al., 2010;Adebimpe et al., 2018; Mayige et al., 2011; Namale et al., 2018). Within the non-modifiable risk factors, age is the single most important and most powerful risk factor for

stroke. The risk of stroke increases with age, every 10 years after the age of 55 years, the stroke rate is more than doubled, both for men and women. a stroke occurs more often in men than in females (Choudhury et al., 2015; Ovbiagele et al., 2011).

Nurses knowledge of risk factors is essential as it enables nurses to conduct a thorough assessment, identify the type of stroke, plan appropriate care and design effective preventive intervention to stroke patients and community in large. Studies indicate that initiation of effective preventive treatment and early assessment after minor stroke and TIA, have decreased substantially stroke recurrence rates (Ullberg, 2016). Other studies have shown that preventive intervention programs are very effective in terms of reducing the burden of stroke and nurses have an important role in the reduction of the burden of disease through the implementation of preventive measures (Niewada et al.,2016). Nurses are also responsible for providing health education on preventive measures to the patient with the recurrent transient ischemic attack. Many patients who are most at risk of stroke have little knowledge of stroke risk factors and warning signs (Saengsuwan et al., 2017). Knowledgeable nurses are therefore required to provide structured interventions to increase knowledge and awareness of stroke in these patients. However, a study done by Carroll and his colleagues indicates a significant lack of knowledge on risk factors for stroke among trained nurses working with stroke patients (Carroll et al., 2004). This could explain the low percentage of at-risk patients who acquire the stroke information from the medical profession.

2.3 Nurses' knowledge regarding nursing interventions for stroke patients.

The role of nurses in stroke care unit is to promote patients' quality of life. Close monitoring and immediate interventions are crucial for stroke patients as they help in the prevention of secondary brain injury and other complications through maintenance of a clear airway, maintenance of vital signs within safer limits, and maintenance of fluid and electrolyte balance. The use of advanced nursing care in clinical area should comprise routine practice of a wide range of specific nursing interventions such as continence of care, control of blood pressure, swallowing management, and early mobilization (Edwards et al., 2014; Theofanidis et al., 2016).

Nursing care in acute stroke, general medical check-up, nursing assessment, and neurological examination include ABCD2 of the patients, help the early diagnosis of stroke and differentiation of stroke. The most common patient's symptoms in the emergency ward include acute onset of weakness or other neurological problems. Airway support and ventilatory assistance are essential for the management of patients with decreased consciousness or who have unexplained impairment that compromise maintenance of a clear airway. Supplemental oxygen should be given to maintain oxygen saturation above 94% (Powers et al., 2018).

Stroke patients receive several drugs depending on the type of stroke and related complications. Nurses are required to administer such drugs, closely monitor their therapeutic effects, and ensure that patients tolerate any of their side effects (Basheti et al., 2019). Basic nursing care plans during the administration of these drugs involve assessment of the level of consciousness, body temperature, blood pressure, pulse, respiration, heart rhythm, blood glucose, oxygen saturation, and hydration. Intracranial pressure should be closely monitored controlled for the patient with stroke. It is preferable to use hyperosmolar agents such as mannitol and hypertonic saline which form a relatively hypertonic intravascular space, promoting osmotic flow outward from the brain parenchyma (Powers et al., 2018; Theofanidis & Gibbon, 2016).

To optimize the neurological outcome, nursing staff should be competent in the assessment and implementation of time-sensitive interventions (Charlotte d.et al., 2016). However, nurses working in a stroke unit are not comfortable to assess stroke patients leading to delayed identification of stroke complications and treatment provision(Johnson et al, 2011). Study shows that nursing interventions involving assessment, continence management, pressure area care, swallowing management, and early mobilization facilitate early patient recovery (Andrew et al., 2019, Theofanidis et al., 2016). Other important nursing interventions include the prevention of pulmonary thromboembolism and early antiplatelet therapy (Andrew et al., 2019; Powers et al., 2018).

Patient education is among the very important nursing interventions for stroke patients after hospitalization. It consists of an organized activity prepared for both the patient, and also their family members to support and encourage healthy behavior for active participation in all aspects of self-care for better outcomes. After a stroke, both patients and families should be prepared physically and psychologically so they are aware of rehabilitation opportunities in the community and in the home following physical or cognitive. Nurses, in particular, and other hospital workers have a pivotal role to play in educating the public about stroke; through personal interactions, electronic media or printed materials (Marissa M et al., 2015).

CHAPTER THREE
3.0 STUDY METHODOLOGY
3.1 Study design

The study was a descriptive cross-sectional design employing quantitative approach intended to assess nurses' knowledge on definition of stroke, types causes, risk factors, warning signs, nursing interventions and prevention of complications of stroke. A cross-sectional study involves collecting data from a study population of interest at a single point of time (Polit & Beck, 2008).

3.2 Study setting

This study was conducted at Muhimbili National Hospital Upanga and Muhimbili National Hospital-Merge.

Muhimbili National Hospital-Merge

Muhimbili National Hospital-Merge is a National specialized and super-specialized Hospital built to serve as a premier Centre to support health professionals' education, service provision and research in Tanzania. MNH-Merge is a Government-owned hospital that serves patients from across all regions of the United Republic of Tanzania. The hospital works in collaboratively with MNH Upanga. It is a major provider of medical, nursing, midwifery and allied health professional education at pre and post-graduate levels. MNH-Merge is located 25 kilometers from Dar-es-Salaam. It has a bed capacity of 571.

Muhimbili National Hospital

Muhimbili National Hospital-Upanga is National Referral Hospital and University Teaching Hospital located in Ilala district Dar-es-salaam, Tanzania. MNH is organized into seven directorates which are Clinical Services, Nursing Services & Quality, Clinical Support Services, Human Resources, Finance and Planning, Technical Services, and Information & Communications Technology; it has 25 departments and 106 units. Muhimbili National Referral Hospital and University Teaching Hospital was considered an ideal setting for the study because it large with 1,500 bed facility, admitting 1,000 to 1,200 inpatients per week. Forty percent (40%) of the patients are admitted in the medical ward while 5%, many of

whom having a history of stroke, are admitted in ICU. MNH has 2700 employees of whom 300 are doctors and specialists, while 900 are registered & enrolled nurses.

3.3 Study population.

The study population was composed of all registered nurses who work at Muhimbili National Hospital- Upanga and Muhimbili National Hospital-Merge. The target population was all nurses who work in the medical ward and ICU.

3.4 Sample size

Yamane (1967:886) provides a simplified formula for calculating the sample size (Ajay et al., 2014). Yamane's formula will be used to calculate the sample size in this study as follows:

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

n is the sample size required in the study,

N is the population size being studied, and

e: is the level of precision (5%)

The total number of nurses works in medical ward and medical ICU that admit stroke patients at MNH Upanga (w1, w4, w6, w7, w8) and Merge (icu, w6, w8, w9) is 148

Therefore, $n = \frac{148}{1 + 148(0.05)^2} = 109$

This sample size has been adjusted for non-response rate. Assume 10% for none response.

$n' = \frac{109 \times 100}{100 - 10} = 122$

The number of nurses included in this study was 122.

From this sample size, we allocate the number of participants from the two hospitals according to the sample size after adjustment and the number of nurses works in each area of the study. Therefore, the formula become:

$$n = \frac{\text{number of nurses in selected setting} \times \text{estimated sample size}}{\text{Total number of nurses in all settings}}$$

n = Number of nurses to be included as a sample in each selected setting

After adjustment of none response rate, a total number of 122 participants is needed to be recruited in the study, from MNH Upanga and MNH Merge

148 Total number of registered nurses work at MNH and in the MNH Merge medical ward and medical ICU where

73 Total number of registered nurses at MNH upanga from medical ICU, medical ward

75 Total number of Registered nurses at MNH merge from medical ICU, and medical ward

$$n = \frac{\text{number of nurses in selected setting} \times \text{estimated sample size}}{\text{Total number of nurses in all settings}}$$

Participants recruited from MNH upanga become:

$$n = \frac{73 \times 122}{148} = 60$$

Participants recruited from MNH Merge will be:

$$n = \frac{75 \times 122}{148} = 62$$

Therefore, the researcher was select 122 participants in this study from MNH and MNH Merge

3.5 Inclusion criteria

Nurses registered by Tanzania Nursing and Midwives council who were working in the medical ward and ICU at Muhimbili National Hospitals during period of greater than 3 months volunteered to participate in this study and accepted to provide their consent for participation.

3.6 Exclusion criteria

Nurses who were available during the period of data collection and meet criteria to be included but fail to participate for different reasons such illness, unwilling to participate, maternity leave, annual leave etc.

3.7 Sampling procedures

A convenience sampling method was used at the level of selecting participants needed in the study. A convenience sampling method is a subset of a statistical population in which the researcher choose participant available during the period of data collection (Polit et al., 2004). Nurses who work in eligible units have been explained the purpose of the study and conveniently asked to participate in the study after reading and sign a consent form.

3.8 Variables

3.8.1 Independent variables

Definition of stroke, types of stroke, causes, risk factors, and warning signs and symptoms, prevention of complications and nursing interventions.

3.8.2 Dependent Variables

Knowledge of stroke care.

3.8.3 Research Measurement of Variables.

In the measurement of variables related types of stroke, causes, risk factors, complications of stroke and nursing interventions a list of questions required to assess knowledge of nurses on specific items has been established by researcher and supervisors from the American Heart Association/American Stroke Association (AHA/ASA) guideline 2018. Questions have been grouped into five categories: questions related to knowledge about definition, causes, and types of stroke, knowledge of stroke risk factors and warning signs, knowledge related to nursing interventions, and knowledge on prevention of stroke complications. Each participant was assessed on a specific item of each category and their responses were classified as

knowledgeable if participants tick a good answer and not know if the participant ticks the wrong answer. The proportion of each answer provided on a specific item has been calculated.

3.9 Data collection tool

3.9.1 Questionnaire

The questionnaire included five section: socio-demographic characteristics (gender, education level, working experience, age group, place of working), general knowledge of stroke(definition of stroke, types of stroke, and causes of stroke), knowledge of stroke risk factors and warning signs (risk factor of stroke, and warning signs and symptoms), knowledge related to nursing interventions (airway interventions, neurological intervention, nutritional interventions, intervention of skin integrity and others important intervention), and knowledge on prevention of stroke complications.

3.9.2 Validity and Reliability of the study instrument

3.9.2.1 Validity

According to Polit and Beck validity is the extent to which an instrument measures what it is supposed to measure (Polit, and Beck, 2004). Content validity of the research questionnaire was reviewed by the researcher's supervisors, Health care providers with clinical experience and researcher, especially who has experience in quantitative research method. Suggestions for changes was amended by the researcher and supervisor were necessary before data collection. In addition to that pre-testing of the tool has been done to 15 nurses to check the clarity and accuracy of questions.

3.9.2.2 Reliability

Reliability refers to the consistency, stability, and repeatability of results. Pre testing of the tool was conducted at JKCI two weeks before data collection. The Cronbach's alpha was also used to calculate and evaluate internal consistency of the instrument with cut-off point of 0.71.

3.9.3 Pre – Testing of tool

The pre-testing of the data collection tool was conducted by Jakaya Kikwete Cardiac Institute. The researcher has taken 15 nurses from ICU and coronary cardiac unit to participate in pre-testing of the tool. This has been done 3 weeks before starting data collection. The questions were amended after the suggestions from participants included in pre-testing. The data collected and participants involved in the pre-test didn't include in the main study.

3.9.4 Data collection procedure

A self-administered questionnaire was given to the participants to complete questions and the researcher has collected them after they finish. The participants were asked to complete the questionnaire during their shift once they are free. Anonymity was used to keep confidentiality of responses given by each participant to prove this participant was asked to write "YES" and sign a consent form.

3.10 Data measurement and analysis

3.10.1 Data analysis

In this study, collected and coded data were entered into SPSS version 23. This software also was used to clean the data to clear all illogical entries and detecting out layers. Data were summarized and presented in the form of frequency tables and pie charts. Knowledge on stroke care was assessed using different domain of stoke care including definition of stroke, types, and causes, prevention of complication, risk factors, warning sign, and symptoms, airway, neurological, pharmacological and nutritional skin integrity.

3.10.2 Data measurement

The response of each item under each domain categorized into two categorizes namely knowledgeable and not knowledgeable. A code of 0 and 1 were given for incorrect and correct answer. At the end, the scores of each domain were aggregated to give an overall score. A minimum and maximum of 0 and 102 scores accumulated from all domains were expected from each participant.

3.11 Ethical consideration

This study was conducted after the approval of MUHAS Research, Ethical and Publication Committee. Later the permission to conduct the study has been required from MNH Upanga and Merge administrative authority. The purpose of this study was explained to the potential study participants. Consent of participants has been sought and their right to participate or not to participate have been respected. All participants have informed that they had the right to stop or continue to participate during the study if they wish to. The study has recruited only nurses who meet inclusion criteria and accepted to sign the written consent form. Participants

have assured that the confidentiality and anonymity of their names and their answers have been kept. Participants have been informed that all information obtained during data collection will be kept under strict conditions whereby only the researcher will be had access.

CHAPTER FOUR

4.0 Result

4.1. Introduction

The chapter includes a description of results starting with the analysis of socio-demographic characteristics of the participants. Analysis of data regarding nurses' general knowledge about stroke, knowledge regarding risk factors and warning signs, knowledge regarding nursing interventions for stroke management and, knowledge regarding the prevention of complications are also described. The last part of this chapter presents the analysis of the association between sociodemographic characteristics and nurses' knowledge for stroke care.

4.2 Socio-demographic characteristics of the participants (n=122)

A total of 122 nurses working in a medical ward and ICU at Muhimbili National Hospitals (Upanga and Merge campus) were recruited in this study. To analyze the data, the subjects were categorized by their nursing education; years of working experiences; age; gender and specific unit/ward (medical ward and ICU). The 122 respondents consisted of 51(41.8%) male and 71(58.2%) female with a mean age (SD) of 31.9(±6.8). About 73(59.8%) respondents had a bachelor's degree, 46(37.7%) had diploma levels, a master's degree was 2(1.6%) and only one nurse had a certificate level. With regards to working experience, 73(59.8%) had less than five years, 26(21.3%) had between 6 to 10 years, an 9(7.4%) had 16-20 years. More than half of nurses 62(50.8) were working in ICU and 60(49.2%) in the medical ward (Table 1).

Table 1: Socio-demographic characteristics of the Participants (n=122)

Characteristics	Number	Percentage
Gender		
Male	51	41.8
Female	71	58.2
Education		
Certificate	1	0.8
Diploma	46	37.7
Bachelor Degree	73	59.8
Master Degree	2	1.6
Working experience (years)		
<5	73	59.8
6 to 10	26	21.3
11 to 15	9	7.4
16-20	4	3.3
21-30	7	5.7
> 30	3	2.5
Age group		
<30	52	42.6
30-60	70	57.4
Mean		
Mean (SD)	31.9(6.8)	
Place of work/unit		
ICU	62	50.8
Medical ward	60	49.2

4.3 knowledge about definition, types and causes of stroke

Table show results for general knowledge of stroke among registered nurses at MNH (Upanga and Merge). The results show that 99 (81.1) nurses knew the definition of stroke. More than half nurses 72(59%) did not know that a transient ischemic attack is one type of stoke. Furthermore, about 43 (35.2%) of nurses wrongly indicated that hemiplegia was a type of stroke. On the other hand, many nurses were knowledgeable that ischemic stroke 119(97.5%) and hemorrhagic stroke 120 (98.4%) were types of stroke. With regards to causes of stroke, 117 (95.9%) and 85(69.7%) indicated high that blood pressure and uncontrolled thrombus or embolus were causes of stroke, respectively. Forty-eight (60.7%) respondents denied that overtreatment with anticoagulants and weak spots in blood vessel walls were causes of stroke.

Table 2: knowledge about definition, types and causes of stroke

Knowledge on:	**Knowledgeable n (%)**	**Not Knowledgeable n (%)**
What do you think a stroke is?	99(81.1)	23(18.9)
Types of stroke		
Transient ischemic attack	50(41.1)	72(59.0)
Hemiplegia	79(64.8)	43(35.2)
Ischemic stroke	119(97.5)	3(2.5)
Hemorrhagic stroke	120(98.4)	2(1.6)
Cause of stroke		
Thrombus embolus	85(69.7)	37(30.3)
Uncontrolled high blood pressure	117(95.9)	5(4.1)
Overtreatment with anticoagulants	48(39.3)	4(60.7)
Weak spots in your blood vessel walls	48(39.3)	74(60.7)

4.4 Nurses' knowledge regarding risk factors and warning signs for stroke

The knowledge of respondents on risk factors, cause and warning signs of a stroke are indicated in table3. The majority of nurses were knowledgeable of several risk factors for stroke. Results show that most nurses had adequate knowledge that overweight obesity (97.5%), tobacco use (76%,) high blood pressure (92.6%), high cholesterol level (88.5%) were risk factors for stroke. On the other hand, the majority of nurses were not knowledgeable that family history of stroke (70.5%), previous intracranial haemorrhage (82.8%), lack of physical activity (68%), previous atrial fibrillation (58.2%) and previous TIA (71.3%) are also risk factors for stroke. The majority of participants knew that age (84.4%) and genetics (67.2%) are also a risk for stroke.

Respondents were also assessed on their knowledge regarding warning signs indicative of stoke. Generally, results show that nurses were knowledgeable about several warning signs of a stroke. Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body, were the most known signs of stroke (94.3%). Despite being the most common standard signs that every nurse should know, few nurses (14.8%) knew that FAS (Face drooping, arm drifting, speech slurred) are signs of stroke.

Table 3: Nurses' knowledge of risk factors and a warning sign of stroke

Type of Risk	Knowledgeable, n (%)	Not Knowledgeable, n (%)
High blood pressure	113(92.6)	9(7.4)
Overweight and obesity	119(97.5)	3(2.5)
Tobacco use	93(76.2)	29(23.8)
Excessive consumption of alcohol	88(72.1)	34(27.9)
Diabetes	79(64.8)	43(35.2)
High cholesterol levels	108(88.5)	14(11.5)
Family history of stroke	36(29.5)	86(70.5)
Previous intracranial haemorrhage	21(17.2)	101(82.8)
Lack of physical activity	39(32.0)	83(68.0)
Previous atrial fibrillation	51(41.8)	71(58.2)
Previous TIA	35(28.7)	87(71.3)
Age	103(84.4)	19(15.6)
Genetics	82(67.2)	40(32.8)
Warning Sign/symptoms		
Face drooping, arm drifting, speech slurred	104(85.2)	18(14.8)
Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body	115(94.3)	7(5.7)
Sudden confusion, trouble speaking or understanding speech	98(80.3)	24(19.7)
Sudden trouble seeing in one or both eyes	94(77.0)	28(23.0)
Sudden trouble walking, dizziness, loss of balance or coordination	107(87.7)	15(12.3)
Sudden severe headache with no known cause	104(85.2)	18(14.8)

4.5. Nurses' knowledge regarding nursing interventions for stroke patients

Knowledge of nurses concerning various nursing interventions needed during care of patients with stroke are indicated in table 4 below. Nurses were assessed of knowledge of different interventions for stroke patients such as airway interventions, neurological nursing assessment and interventions, pharmacological intervention, nutritional support, maintenance of skin integrity and other related interventions. The majority of nurses had knowledge of interventions regarding stroke care and management.

The role of nurses in stroke care unit is to promote patients' quality of life. Close monitoring and immediate interventions are crucial for stroke patients as they help in the prevention of secondary brain injury and other complications through maintenance of a clear airway, maintenance of vital signs within safer limits, and maintenance of fluid and electrolyte balance. The use of advanced nursing care in clinical setting should comprise of a wide range of specific nursing interventions such as continence of care, control of blood pressure, swallowing test assessment before feeding, and early mobilization (Edwards et al., 2014; Theofanidis et al., 2016).

were knowledgeable on the importance of providing supplemental oxygen to maintain oxygen saturation > 94% in hypoxic patients 109(89.3%) and advise for ventilator support for respiratory depression, fatigue, decreased consciousness or a compromised airway 103(84.4%). The majority of nurses also were knowledgeable for assessing signs of brain stem herniation which are increased intracranial pressure, decreased strength in extremities, focal or global seizure activity, or asymmetrical pupils 112(91.8%). Again, results show that the majority of nurses 95(77.9%) know the use of intermittent pneumatic compression (IPC) in addition to routine care (aspirin and hydration) to reduce the risk of DVT in immobile stroke patients as the pharmacological intervention. On nursing intervention for nutritional support, majority 111(91.0%) respond that gastrostomy tube may be needed if unable to swallow safely for longer than 2-3 weeks although there is a large number of nurses 91(74.6%) who were not knowledgeable that in non-embolic stroke, antiplatelet agent should be used in place of oral anticoagulation to reduce risk of recurrent stroke.

Table 4. Nurses' knowledge regarding nursing interventions for stroke patients

Interventions	Knowledgeable, n (%)	Not Knowledgeable, n (%)
Airway interventions		
Provide supplemental oxygen to maintain oxygen saturation > 94% in hypoxic patients.	109(89.3)	13(10.7)
Advice for ventilator support for respiratory depression, fatigue decreased consciousness or a compromised airway.	103(84.4)	19(15.6)
Neurological nursing interventions		
Monitor vital signs at least every 15 minutes.	104(85.2)	18(14.8)
Neurologic assessments should be performed hourly or as needed.	20(16.4)	102(83.6)
Monitor for signs of brain stem herniation (increased intracranial pressure, decreased strength in extremities, focal or global seizure activity, or asymmetrical pupils.)	112(91.8)	10(8.2)
Monitor for neurologic changes (decreased LOC, visual changes, new-onset weakness)	104(85.2)	18(14.8)
Monitor for seizure activity and implement seizure precautions.	104(85.2)	18(14.8)
Pharmacological intervention		
Do not administer anti-seizure medication prophylactically.	68(55.7)	54(44.3)
Treat hyperthermia with antipyretics medications.	90(73.8)	32(26.2)
Treat hyperglycemia to keep blood glucose levels between 140-180 mg/dL and treat hypoglycemia (blood glucose < 60 mg/dL) per hospital protocol.	38(31.1)	84(68.9)
Use intermittent pneumatic compression (IPC) in addition to routine care (aspirin and hydration) to reduce the risk of DVT in immobile stroke patients.	95(77.9)	27(22.1)
In a non-embolic stroke, use the antiplatelet agent in place of oral anticoagulation to reduce the risk of recurrent stroke.	31(25.4)	91(74.6)
For most patients with atrial fibrillation and stroke, begin oral anticoagulation within 4-14 days after onset of neurological symptoms.	91(74.6)	31(25.4)

Nursing intervention for nutritional support		
Start the enteral diet within 7 days of admission after an acute stroke.	36(29.5)	86(70.5)
Screen for dysphagia before the patient begins eating, drinking or receiving oral medications to identify risk for aspiration.	107(87.7)	15(12.3)
For patients with dysphagia, use nasogastric tubes for feeding in the early phase of stroke (first 7 days);	111(91.0)	11(9.0)
Consider nutritional supplements for patients who are or at risk for malnourishment.	109(89.3)	13(10.7)
Implement oral hygiene protocols to reduce the risk of pneumonia.	109(89.3)	13(10.7)
Maintain nutrition and hydration	8(6.6)	114(93.4)
Skin integrity		
Minimize skin friction and pressure and avoid excessive moisture	111(91.0)	11(9.0)
Regular turning, good skin hygiene, special mattresses, wheelchair cushions, and seating should be used until mobility returns.	108(88.5)	14(11.5)
Others interventions		
Do not use elastic compression stockings in ischemic stroke patients	83(68.0)	39(32.0)
Screen for post-stroke depression and administer antidepressants if not contraindicated.	31(25.4)	91(74.6)
Avoid routine use of indwelling bladder catheters to prevent catheter-associated urinary tract infections.	84(68.9)	38(31.1)

4.6. Nurses' knowledge regarding the prevention of complications of a stroke

Table 4 presents nurses' knowledge of the prevention of post-stroke complications. The results indicate that more than 80% of nurses were knowledgeable about intervention for prevention of post-stroke complications such as putting patient in suitable position and elevate bed at 45 degrees 106(86.9%), checking if patient is choking while eating, or prolonged coughing after eating 113(92.6%), insert urinary catheter as soon as possible105 (86.1%), monitoring of platelet counts if patient is on heparin to watch for heparin-induced thrombocytopenia105 (86.1%). However, there was a large number of nurses103(84.4%) who were not knowledgeable that to starting or restarting antihypertensive therapy during hospitalization in neurologically stable patients with BP > 140/90 mmHg to improve long-term BP control, unless contraindicated, is one of the prevention approaches of stroke complications.

Table 5: Knowledge regarding the prevention of complications

Prevention of stroke complications	**Knowledgeable, n (%)**	**Not Knowledgeable, n (%)**
Putting the patient in a suitable position and elevate bed at 45 degree	106(86.9)	16(13.1)
Check if the patient is choking while eating, or prolonged coughing after eating	113(92.6)	9(7.4)
Check for Presence of wet hoarseness	95(77.9)	27(22.1)
Check if the trunk support is poor and cannot maintain a sitting position for long	101(82.8)	21(17.2)
Ensure the patient remains NPO (nil per os) to prevent aspiration or is using NGT for feeding	93(76.2)	29(23.8)
Ensure a bedside swallowing assessment should be performed before allowing the patient to eat, drink or consume medications.	105(86.1)	17(13.9)
Correct hypotension and hypovolemia to maintain perfusion and organ function.	103(84.4)	19(15.6)
Avoid rapidly lowering BP which can lead to worsening ischemia.	94(77.0)	28(23.0)
Do not lower the BP during the initial 24 hours of acute ischemic stroke unless BP > 220/120 mmHg.	81(66.4)	41(33.6)
Start or restart antihypertensive therapy during hospitalization	19(15.6)	103(84.4)

in neurologically stable patients with BP > 140/90 mmHg to improve long-term BP control, unless contraindicated.		
Take insert urinary catheter as soon as possible.	105(86.1)	17(13.9)
Monitor platelet counts if on heparin to watch for heparin-induced thrombocytopenia.	105(86.1)	17(13.9)

CHAPTER FIVE

5. 0 DISCUSSION, LIMITATION, CONCLUSION AND RECOMMENDATIONS

5.1 DISCUSSION

This study intends to assess nurses' knowledge of the care of the patient with stroke found in tertiary hospital, Muhimbili National Hospital. Nurses are obliged to assume a significant role in the provision of care for stroke patients in order to reduce the time for hospitalization and prevent recurrent stroke as well as further complications that can affect the life of patients and their daily activities. This affects also socio-economic status in the community. More than half of the respondents in this study were female (58.2%), with the predominance of bachelor degree 73(59.8%). This unequal distribution regarding level of education is probably due to employment criteria.

Knowledge about definition, types and causes of stroke

This study has shown that the majority of nurses 99(81.1%) successfully defined stroke. The findings are in agreement with a study conducted by Karzekwa which involved nurses from neurology and stroke ward whereby the majority of participants successfully defined stroke (Korzekwa et al., 2017). However, finding from a study conducted in Egypt at the Cairo hospital which showed that only 48% of respondents had successfully define stroke(Shehata et,.al 2016). Respondents also were asked to identify types of stroke. About 119 (97.5%) nurses mentioned ischemic stroke and 120(98.4%) mentioned haemorrhagic stroke as types of stroke. However, considerable number of nurses 43(35.2%) indicated that hemiplegia is one of the types of stroke which is not true. This implies that, not all nurses are knowledgeable of types of stroke which is mainly three, haemorrhagic, ischemic and transient ischemic stroke. In this study, the majority of nurses knew that uncontrolled blood pressure and thrombus or embolus are causes of stroke. While few number nurses (39.3%) indicated that overtreatment with anticoagulants and weak spots in blood vessel walls can causes stroke. This finding

demonstrates the need for more training focusing provision of basic knowledge about stroke particularly on what is stroke, types of stroke and causes of stroke.

Nurses' knowledge regarding risk factors and warning signs for stroke

Nurses in this study were also assessed on their knowledge with regard to risk factors and warning signs for stroke. Majority of nurses 113(92.6%) have identified high blood pressure as risk factors of stroke findings which are similar to other studies(Akinyemi et al., 2009; Shehata et,.al 2016) . Results from this study have also shown that overweight and obesity 119(97.5%) and high level of cholesterol 108(88.5%) and age 103(84.4%) were the commonest risk factors of stroke identified by the majority of nurses in addition to high blood pressure. Surprisingly in this study, a largest number of nurses haven't identified family history of stroke 86(70.5%), previous intracranial haemorrhage 101(82.8%), lack of physical activity 83(68.0%), previous atrial fibrillation 71(58.2%), and previous TIA 87(71.3%) as risk factors of stroke. Nurses have a pivotal role in assessing and identifying early signs that indicate stroke and provide an initial supportive intervention to minimize severity. Finding from this study indicate knowledge gap among nurses regarding risk factors of stroke. Knowing types of stroke is important for nurses in order make a good nursing care plan according to the type of intervention to be given especially at the initial stage of the stroke occurrence. Each type of stroke has its own ways of management especially at the initial stage and appropriate interventions that is given initially determine the good patients' outcome. The identified knowledge gap among nurses on types of stroke need to be providing the nurses with up to date information of types of stroke and its evidence-based interventions. There was also a large number of nurses79 (64.8%) identified diabetic Mellitus as risk factors of stroke. Findings from a study conducted in Nigerian indicate that only 33.3 % of hospital workers mentioned diabetes mellitus as a risk factor for stroke (Akinyemi ~~R~~ et, 2009).

Knowledge of warning signs and symptoms is an important for nurses, particularly when nurses provide health educations to patients who at risk for stroke. In this study, the warning signs and symptom indicated by many nurses were sudden numbness or weakness of the face, arm, or leg, especially on one side of the body 115(94.3%), face drooping, arm drifting, and

speech slurred 104(85.2%), Sudden confusion, trouble speaking or understanding speech98(80.3%). Other study conducted in Cairo also indicate a good knowledge of early warning sings among nurses working in neurology and stroke ward (Korzekwa et al 2016). This finding implies that the nurses in this study are knowledgeable on how to recognize the very early signs of stroke and hence help the patient to receive appropriate interventions early. Recognition of stroke early and correctly determine how quickly someone will receive a help and treatment. Getting correct initial hospital management rapidly would more likely lead to a better recovery from stroke (Suljic et al., 2013).

Nurses' knowledge regarding nursing interventions for stroke patients

In this study participants were also assessed on a different component of nursing interventions for stroke include neurological interventions, pharmacological interventions nursing intervention on nutritional support, interventions on skin integrity and other important interventions for stoke patients' care. With regard airway interventions, majority of nurses indicated that it is crucial to provide supplemental oxygen to maintain oxygen saturation of more than 94% in hypoxic patients. This findings concurs with recommendation of from American Heart Association/ American Stroke Association (AHA/ASA) guidelines (Ackerson et al., 2018). However, others have shown that this recommendation is now of no benefit to stroke patient. The study conducted by Ferdinand and his colleagues. found no beneficial functional outcome at 90 days of oxygen by nasal cannula at 2 L/min (baseline O2 saturation >93%) or 3 L/min (baseline O2 saturation ≤93%) continuously for 72 hours or nocturnally for 3 nights (Ferdinand, et al., 2017).

Nurses are also responsible in recognizing neurological symptoms, analyse and intervene accordingly. In this study, monitor for signs of brain stem herniation (increased intracranial pressure, decreased strength in extremities, focal or global seizure activity, or asymmetrical pupils.) was identified by the majority of nurses 112(91%) as main symptoms indicate neurological deterioration in stroke patients. Monitoring of vital signs every 15 minutes was identified by a large number of nurses 104(85.2%) as an important component of neurological intervention for stroke patients. This is congruent with the recommendation of American heart association in their Schedule of Neurological Assessment and Vital Signs where they

emphasize neurological assessment and vital signs (except temperature) every 15 min for the first 2 h at the beginning of recombinant tissue plasminogen activator (rtPA) infusion, then every 30 min for 6 h, then every 60 min for 16 h (total of 24 h) (Summers et al., 2009b). Again, monitoring of neurologic changes (decreased level of consciousness, visual changes, new-onset weakness) and monitoring for seizure activity and implementing seizure precautions was indicated by almost 85% of nurses as crucial nursing interventions for stroke patients. Least number of nurses 20(16.4%) identified that neurologic assessments should be performed hourly or as needed. On component of pharmacological interventions majority of nurses were generally knowledgeable of some items being assessed including knowledge on use intermittent pneumatic compression (IPC) in addition to routine care (aspirin and hydration) to reduce the risk of deep vein thrombosis (DVT) in immobile stroke patients and initiation of oral anticoagulation within 4-14 days after onset of neurological symptoms for patients with atrial fibrillation and stroke. This finding demonstrates that nurses in this study had general knowledge on key nursing interventions for stroke patients.

However, still large number of nurses in this study were not knowledgeable on other important interventions that are recommended for stroke patients such as use of treatment of hyperglycaemia to keep blood glucose levels between 140-180 mg/dL and treat hypoglycaemia (blood glucose < 60 mg/dL) per hospital protocol, use the antiplatelet agent in place of oral anticoagulation in a non-embolic stroke to reduce the risk of recurrent stroke. The raised blood glucose level in the acute stroke phase harms the neuronal function of the body (Elizabeth et al., 2017). It is now recommended that nurses should perform regular monitoring of blood glucose. The American Stroke Association guidelines for the early management of patients with acute ischemic stroke recommends that serum glucose concentrations of a range between 140–180 mg/dL (7.8–10 mmol/L) should be achieved during the first 24 hours after acute ischemic stroke in all hospitalized patients.

One study recommend that hyperglycaemia and hypoglycaemia should be avoided for stroke patient and insulin should be given to the patient when blood glucose is above 10mmol/l (Ackerson et al., 2018). For European Stroke Initiative guidelines also recommend the use of

immediate insulin therapy once stroke patient has a blood glucose of 180 mg/dL (10 mmol/L) or higher (Chen et al., 2017; Karger, 2003).

Additionally, the use of antipyretics medications for a patient with hyperthermia was indicated by many nurses in this study (73%), concurring with American Heart Association/American Stroke Association 2018 (AHA/ASA) recommendation.

Nutritional support is an important key issue for stroke patients. Lack of nutritional support has been associated with several complications and poorer outcomes (Bouziana et al., 2011; Schmidt, et al., 2019). In most stroke cases, nurses are the first health care personnel encounter the patients, therefore, early identification of dysphagia and start of nutritional intervention are nurses' responsibility which can help to sustain nutrition intake and reduce further complications for stroke patients (Rhoda et al., 2010). In this study, majority of nurses manage to recognize most of items for nutrition that need to be assessed such as screen for dysphagia before the patient begins eating, drinking or receiving oral medications to identify risk for aspiration 107(87.7%) and use nasogastric tubes for feeding in the early phase of stroke (first 7 days) for patients with dysphagia111 (91.0%). Also were knowledgeable on the importance of providing nutritional supplements for patients who are at risk for malnourishment 109(89.3%) and the implementation of oral hygiene protocols to reduce the risk of pneumonia 109(89.3%).

This finding is contrary to the study conducted in Namibia where nurses' knowledge on dysphagia screening and other aspects of nutrition for stroke patients was generally moderate (Rhoda et al, 2010). With regard to skin integrity nurses were knowledgeable on important interventions for preventing altered skin integrity such as minimizing skin friction and pressure and avoidance of excessive moisture, regular turning, good skin hygiene, special mattresses, wheelchair cushions, and seating up the stroke patient until mobility returns (91.0%), 88.5%. This response demonstrated that nurses in this study had generally knowledge on the best evidence interventions that improve skin integrity for stroke patients as recommended by the American Heart Association/American Stroke Association guideline 2018 (AHA/ASA).

Knowledge regarding the prevention of complications.

Health care providers including nursing should focus on preventing the potential complications of a stroke that most commonly occur in the first four days after the acute event. Use of standardized evidence-based practice and care paths results in prevention of complication as well as the better outcome of patients. In this study, more that 67% nurses were knowledgeable about items regarding the prevention of complications for stroke patients. These items include positioning of patients, screen for depression and use of antidepressants, prevention of aspiration, and maintenance of perfusion of key organ function, control of blood pressure, infection prevention, and monitor for platelets count. However, the largest number of respondents 103(84.4%) did were not knowledgeable that antihypertensive therapy for neurologically stable patients with BP > 140/90 mmHg should be initiated to improve long-term BP control, unless contraindicated. This show that participant did not know about the importance of initiation of ant hypertensive for a patient with BP > 140/90 mmHg as it is recommended by AHA/ASA guideline 2018. This finding indicates that, new updated need to be provided to nurses to update their knowledge and hence improve their care on patients with stroke

5.2 STUDY LIMITATIONS

Findings from this study was limited due to small sample size being recruited. A generalization that nurses works in medical ward and ICU at Muhimbili National Hospital cannot be made due to this small sample size. However, participants were recruited using convenience sampling from different medical ward.

5.3 CONCLUSION

The results of the present study showed that participants were knowledgeable about stroke care in general. However, strengthening of nurse's knowledge on current guidelines is still needed. Findings on specific knowledge area assessed in this study showed that the majority of participants were not knowledgeable of some of the items especially on types of stroke, risk factors, and causes. However, the majority. Nurses seemed to be unaware of current information about stroke. This is a gap that needs to be filled through planning and implementation of on-the-job training for nurses so as to prevent reduce the cost of care, and improve patient outcome.

5.4 RECOMMENDATIONS

This study has revealed some important issues with regarding nurses' knowledge regarding care of stroke patients and prevention of complications at Muhimbili National Hospitals (Muhimbili and MLOGANZILA campus

1. Hospital management has to organize continuing education programs that enhance nurses' knowledge about stroke.
2. Nurses should keep on reading update research and protocols as well as morning teaching and discussion about case of stroke.
3. Hospital administration needs to develop protocols that will guide nurses in taking care of patients with stroke.
4. Hospital administration, in collaboration with the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDEC) (Tanzania), has to come up with specialized stroke units that are appropriately and adequately staffed.
5. Further researchers need to explore awareness, challenges, and practice that nurses have in caring for patients with stroke. This will facilitate bridging of the gaps identified in the study.
6. Future studies need to involve a wider geographical area, use larger samples with diversity of cadres, and employ mixed-methods designs so as to provide a clearer picture of nurses' knowledge in stroke care.

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APPENDICES

APPENDIX A: INFORMED CONSENT (ENGLISH VERSION)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS CONSENT FORM

ID NO: HD/MUH/B.303/2017

Consent to participate in a study: "**ASSESSMENT OF KNOWLEDGE AND PRACTICE REGARDING CARE FOR PATIENTS WITH STROKE AMONG REGISTERED NURSES AT MAMC AND MNH DAR ES SALAAM TANZANIA"**

Good morning everyone! I'm MINANI JEREMIE, a second-year student from Muhimbili University of Health and Allied Sciences, studying the Master of Sciences of critical care and trauma nursing.

I would like to invite you to participate in this study that will help to get current knowledge and practice about stroke in this setting so that we can improve quality of care and respond to the need of the patient and their family. This study sponsored by me and my family.

Purpose of the Study: is to assess nurses' knowledge and practice regarding care of stroke patients and prevention of its risk factors at Muhimbili National Hospital and MHAS Academic Medical Centre Hospital.

Participation in this study.

This study will involve registered nurses working at Muhimbili National Hospital and MAMC in the medical ward and ICU.

Procedure:

If you agree to join the study, you are not allowed to write your name and will be required to answer questions provided in the questionnaire form and observation will be done while care of the patient with stroke.

Confidentiality: The information provided will not be disclosed to anyone, anonymity will be used. It will be kept in the area where only the researcher and supervisor will access it. You may be contacted by the research team only if it is necessary to complete the information missing.

The right to anonymity: The information provided will be strictly confidential; no name will appear on the questionnaire during this study, the researcher will only use code numbers to designate participants.

Risks: I do not expect that any harm will happen during this study. However, if it happens during this period of research, we will assist you to solve the issue immediately according to the way that is supposed to be solved.

Rights to withdraw: Your participation is voluntary and you have the right to withdraw from the study any time after having agreed to participate. If you have any questions about this study you may ask me name MINANI JEREMIE mobile number +255692782201.

Potential benefits: There will be no direct benefits for your participation. Your contribution will help to identify where we are about care of stroke patients and what is needed to be done. It will help the Hospital and Ministry of Health, Community Development, Gender, and Elderly in the health sectors. Also, it will be an opportunity for you to volunteer in this study for the benefit of others and the country.

Compensation: There will be no compensation to you for your participation in the study.

Who to contact: If you ever have questions about this study, you should contact the study PI name MINANI JEREMIE, Muhimbili University of Health and Allied Sciences, School of Nursing P.O. Box 65001; or Director of Research and Publication MUHAS, Dr. Bruno Sungunya telephone number: Tel + 255 222150302 -6/ 2152489?

I _____ have read and understood the contents of this form, my questions have been answered, and I consent to participate in this study.

Signature of participant_____

Signature of researcher_____

Date of signature _____/_____/_____

APPENDIX B: Fomu ya ridhaa (Kwa lugha ya kiswahili)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI



KURUGENZI YA TAFITI NA UCHAPISHAJI.

FOMU YA RIDHAA.

Nambari ya usajili: HD/MUH/B.303/2017

Naitwa MINANI JEREMIE, mimi ni mwanafunzi wa mwaka wa pili katika shahada ya uzamili ya huduma kwa wagonjwa mahututi na majeruhi katika chuo kikuu cha afya na sayansi shirikishi Muhimbili. Ninafanya utafiti kuhusu **UCHUNGUZI WA ELIMU NA UJUNZI WA KUHUDUMIA WAGONJWA WA KIHARUSI KWA WAUGUZI WASAJIRIWA WA MNH NA MAMC.**

Napenda kuwakaribisha kushiriki katika utafiti huu ambao utasaidia kupata ujuzi na mazoezi ya sasa juu ya kiharusi katika mazingira haya ili tuweze kuboresha ubora wa huduma na kujibu haja ya mgonjwa na familia zao. Utafiti huu unasaidiwa na mimi na familia yangu.

Umuhimu wa utafiti huu: ni kuchunguza maarifa na mazoezi ya wauguzi kuhusu huduma ya wagonjwa wa kiharusi na kuzuia sababu zake za hatari katika Hospitali ya Taifa ya Muhimbili na MNH- Mlogazila

Kushiriki katika utafiti huu.

Utafiti huu utahusisha wauguzi wasajiliwa wanaofanya kazi katika Hospitali ya Taifa ya Muhimbili na MAMC katika kitengo cha …… na…….

Utaratibu:

Ikiwa unakubali kujiunga na utafiti huo, huruhusiwi kuandika jina lako na utahitajika kujibu maswali yaliyotolewa katika fomu ya maswali na uchunguzi utafanyika wakati uangalizi wa mgonjwa akiwa na kiharusi.

Usiri: Majibu yote yatakusanywa kutoka katika eneo la utafiti na yatahifadhiwa sehemu maalum ambapo wahusika tuu ndio wataruhusiwa kuzipata taarifa hizo. Pia majina hayatatumika badala yake tutatumia nambari ya utambulisho tu. Hakuna jina la mshiriki litakalochapishwa.

Hatari: Sitarajii kuwa madhara yoyote yatatokea wakati wa utafiti huu. Hata hivyo, ikiwa hutokea wakati wa utafiti huu, tutakusaidia kutatua suala mara moja kulingana na njia ambayo inatakiwa kutatuliwa.

Haki za kujiondoa: Ushiriki wako ni wa hiari na una haki ya kujiondoa kwenye utafiti wakati wowote baada ya kukubali kushiriki. Ikiwa una maswali yoyote kuhusu utafiti huu unaweza kuniuliza numbari yangu ya simu ni +255692782201

Faida za uwezekano: Hakutakuwa na manufaa ya moja kwa moja kwa ushiriki wako. Mchango wako utasaidia kutambua wapi sisi kuhusu huduma za vibali vya kiharusi ambazo zinahitajika kufanywa. Itasaidia Hospitali na Wizara ya Afya katika mpango wao katika sekta za afya. Pia, itakuwa fursa kwako kujitolea katika utafiti huu kwa faida ya wengine na nchi.

Fidia: Hakutakuwa na fidia kwa ushiriki wako katika utafiti.

Mawasiliano:

Kama utakuwa na swali lolote kuhusu utafiti huu unaweza kuwasiliana na mkuu wa utafiti huu Jeremia Minani, Shule ya Uuguzi ya Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, S.L.P. 65004, Dar es Salaam, namba ya simu

Na ukiwa na swali lolote kuhusu haki zako kama mshiriki, unaweza kuwasiliana na Mkurugenzi wa Utafiti wa Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, Dr Bruno Sunguya S.L.P. BOX 65001, Dar es Salaam. Tel + 255 222150302 -6/ 2152489.

Je unakubali?

Mshiriki kakubali……Mshiriki hajakubali…….

Mimi _____ nimesoma na kuelewa yaliyomo ya fomu hii, maswali yangu yamejibu, nami nimekubali kushiriki katika utafiti huu.

Saini ya mshiriki _____

Saini ya mtafiti_____

Tarehe ya saini _____ / _____ / _____

APPENDIX C: ABCD2 ASSESSMENT WHEN TIA SUSPECTED

An Age: > 60 years (1 point)

B Blood pressure: >140/90 mmHg (1 point)

C Clinical features: Unilateral weakness (2 points), speech impairment without weakness (1 point)

D Duration: More than >60 min (2 points), more than 10-59 min (1 point)

D Diabetes (1 point)

Tool interpretation

>4 HIGH risks; <4 LOW risk

The maximum score of 7 points.

Warning signs

F.A.S.T: Face-Arm-Speech-Time is a very simple method to determine the signs of a stroke. When a person can see the signs then immediate help from an emergency is needed right away.

- **Face Drooping**: Ask a person to smile. The face may be dropped on one side; the person may not be able to smile.
- **Arm Weakness**: Ask a person to raise his/her both arms. The person may not be able to lift one or both arm(s) due to weakness or numbness.
- **Speech Difficulty**: Ask a person to repeat a very simple sentence, e.g. The Ocean is blue. Is the sentence repeated correctly or is the speech slurred?
- **Time to call**: If any of the above symptoms is shown then it is time to call the emergency number immediately and get help. Notice the time when the first symptom started.

APPENDIX C: QUESTIONNAIRE

I. Demographic characteristics of the Participants: (Circle One)

1. Gender
a. Male
b. Female

2. Age
……

3. **Education level**

a. certificate

b. Diploma

d. Bachelor Degree

d. Master Degree

e. Other (Please explain)
_____

4. Years of Nursing Experience

a. 0-5

b. 6-10

c. 11-15

d. 16-20

e. 21-30

f. > 30

5. Place of work/unit……

II. Knowledge regarding definition, causes and types of stroke

What do you think a stroke is?
……
……

Types of stroke

	Yes	**No**
a. Transient ischemic attack	☐	☐
b. Ischemic stroke	☐	☐
c. Hemiplegia	☐	☐
d. Hemorrhagic stroke	☐	☐

Causes of stroke	Yes	No
Thrombus embolus	☐	☐
Uncontrolled high blood pressure	☐	☐
Overtreatment with anticoagulants	☐	☐
Weak spots in your blood vessel walls	☐	☐

III. KNOWLEDGE REGARDING RISK FACTORS AND WARNING SIGNS FOR STROKE.

The below list includes risk factors of stroke, some of them can be modified others cannot be modified Risk factors of stroke Complete with yes or no for each question if you think it fits in the correct group**.**

NO	**suggested risk factors modifiable risk factors**	yes	no	Don't know
1.	High blood pressure			
2.	Overweight and obesity			
3	Tobacco use			
4.	Excessive consumption of alcohol			
5.	Diabetes			
6.	High cholesterol levels			
7.	Family history of stroke			
8.	Previous intracranial hemorrhage			
9.	Cardiac artery disease			
	Non-modifiable risk factors			
10.	Age			
11.	Lack of physical activity is all risk factor of stroke			
12.	Race/ Ethnicity			
13.	Genetics			
14.	Previous atrial fibrillation			
15.	Previous TIA			

Warning signs and symptoms of stroke

	Yes	No
a. F.A.S.T (face drooping, arm drifting, speech slurred, time to consults).	☐	☐
b. Sudden NUMBNESS or weakness of the face, arm, or leg, especially on one side of the body	☐	☐
c. Sudden CONFUSION, trouble speaking or understanding speech	☐	☐
d. Sudden TROUBLE SEEING in one or both eyes	☐	☐
e. Sudden TROUBLE WALKING, dizziness, loss of balance or coordination	☐	☐
f. Sudden SEVERE HEADACHE with no known cause	☐	☐

IV. KNOWLEDGE REGARDING NURSING INTERVENTIONS FOR STROKE MANAGEMENT

1. Indicate which nursing interventions for stroke patient that you think are correct

No	Variables	Yes	No	Don't know
	Airway interventions			
1	Provide supplemental oxygen to maintain oxygen saturation > 94% in hypoxic patients.			
2	Advise for ventilator support for respiratory depression, fatigue decreased consciousness or a compromised airway.			
	knowledge related to neurological nursing interventions			
3	Monitor vital signs at least every 15 minutes.			
4	Neurologic assessments should be performed hourly or as needed.			
5	Monitor for signs of brain stem herniation (increased intracranial pressure, decreased strength in extremities, focal or global seizure activity, or asymmetrical pupils.)			
6	Monitor for neurologic changes (decreased LOC, visual changes, new-onset weakness), which may indicate extension of the stroke area, cerebral vasospasm, or cerebral brainstem herniation.			

7	Monitor for seizure activity, implement seizure precautions.			
	Pharmacological intervention			
8	Do not administer anti-seizure medication prophylactically.			
9	Treat hyperthermia with antipyretics medications.			
10	Treat hyperglycemia to keep blood glucose levels between 140-180 mg/dL and treat hypoglycemia (blood glucose < 60 mg/dL) per hospital protocol.			
11	Use intermittent pneumatic compression (IPC) in addition to routine care (aspirin and hydration) to reduce the risk of DVT in immobile stroke patients.			
12	In a non-embolic stroke, use an antiplatelet agent in place of oral anticoagulation to reduce the risk of recurrent stroke.			
13	For most patients with atrial fibrillation and stroke, it is reasonable to begin oral anticoagulation within 4-14 days after onset of neurological symptoms.			
	Nursing intervention for nutritional support			
14	Start the enteral diet within 7 days of admission after an acute stroke.			
15	Screen for dysphagia before the patient begins eating, drinking or receiving oral medications to identify risk for aspiration.			
16	For patients with dysphagia, use nasogastric tubes for feeding in the early phase of stroke (first 7 days); percutaneous gastrostomy tube may be needed if unable to swallow safely for longer than 2-3 weeks.			
17	Consider nutritional supplements for patients who are or at risk for malnourishment.			
18	Implement oral hygiene protocols to reduce the risk of pneumonia.			
19	Maintain nutrition and hydration			
	Skin integrity			

20	Minimize skin friction and pressure, provides support surfaces, and avoid excessive moisture			
21	Regular turning, good skin hygiene, special mattresses, wheelchair cushions, and seating should be used until mobility returns.			
22	For patients with extracranial carotid or vertebral artery dissection, it is reasonable to treat with antiplatelet or anticoagulant therapy for 3 to 6 months			
23	Statins: Continue statin therapy for patients taking statins or initiate in-hospital statin therapy for patients who qualify.			
24	Perform regular skin assessments during hospitalization and inpatient rehabilitation			
	Others interventions			
25	Do NOT use elastic compression stockings in ischemic stroke patients			
26	Screen for post-stroke depression and administer antidepressants if not contraindicated.			
27	Avoid routine use of indwelling bladder catheters to prevent catheter-associated urinary tract infections.			

V. KNOWLEDGE REGARDING THE PREVENTION OF COMPLICATIONS

To prevent complications for stroke patients nurse should consider the following:

No	Variables	Yes	No	Don't know
1	Putting the patient in a suitable position and elevate bed at 45 degree			
2	Check if the patient is choking while eating, or prolonged coughing after eating			
3	Check for Presence of wet hoarseness			
4	Check if the trunk support is poor and cannot maintain a sitting position for long			
5	Check patient has chronic respiratory disease			
6	Check if the patient is taking psychotropic or other drugs that may affect swallowing			
7	Ensure the patient remains NPO (nil per os) to prevent aspiration or is using NGT for feeding			
8	Ensure a bedside swallowing assessment should be performed before allowing the patient to eat, drink or consume medications.			
9	Avoid hypotension in patients with ischemic stroke to prevent further cerebral ischemia; correct hypotension and hypovolemia to maintain perfusion and organ function.			
10	Avoid hypertension in patients with hemorrhagic stroke to prevent the expansion of intracranial bleeding.			
11	Avoid rapidly lowering BP which can lead to worsening ischemia.			
12	Do not lower the BP during the initial 24 hours of acute ischemic stroke unless BP > 220/120 mmHg.			
13	Start or restart antihypertensive therapy during hospitalization in neurologically stable patients with BP > 140/90 mmHg to			

	improve long-term BP control, unless contraindicated.			
14	Gastrointestinal ulcer prophylaxis.			
15	Take insert urinary catheter as soon as possible.			
16	Monitor platelet counts if on heparin to watch for heparin-induced thrombocytopenia.			

APPENDIX D ETHICAL CLEARANCE

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES

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Ref. No. DA.287/298/01A/

13th May, 2019

Mr. Minani Jeremie
MSc. Critical Care and Trauma
MUHAS.

RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED: "ASSESSMENT OF KNOWLEDGE AND PRACTICE REGARDING CARE FOR PATIENTS WITH STROKE AMONG REGISTERED NURSES AT MAMC AND MNH, 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 Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from **7th May, 2019 to 6th May, 2020.** In case you do not complete data analysis and dissertation report writing by 6th **May, 2020,** you will have to apply for renewal of ethical clearance prior to the expiry date.

Dr. Emmanuel Balandya
ACTING: DIRECTOR OF POSTGRADUATE STUDIES

cc: Director of Research and Publications
cc: Dean, School of Nursing, MUHAS

APPENDIX E PERMISSION TO COLLECT DATA AT MNH

MUHIMBILI NATIONAL HOSPITAL

Cables: "MUHIMBILI"
Telephones: +255-22-2151367-9
FAX: +255-22-2150534
Web: www.mnh.or.tz

Postal Address:
P.O. Box 65000
DAR ES SALAAM
Tanzania

In reply please quote:

MNH/TRC/Permission/2019/069 **16th May, April, 2019**

Block Manager,
Mwaisela
Muhimbili National Hospital

RE: PERMISSION TO COLLECT DATA AT MNH.

Name of Student	**Mr. Minani Jeremie**
Title	**" ASSESSMENT OF KNOWLEDGE AND PRACTICE REGARDING CARE FOR PATIENTS WITH STROKE AMONG REGISTERED NURSES AT MAMC AND MNH, DAR ES SALAAM, TANZANIA ".".**
Institution	Muhimbili University of health and Allied Sciences
Main Supervisor	**DICKSON A. MKOKA**
Period	3/4/2019 to 30/09/2019 (6 months)

The above named student has been permitted to collect data for the above study.
Please ensure that the researcher abide to the ethical principle and other conditions.

Sincerely,

Dr. Faraja Chiwanga
Head of Teaching, Research and Consultancy Unit

c.c DNS
c.c. **Mr. Minani Jeremie**

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

APPENDIX F PERMISSION TO COLLECT DATA AT MLOGANZILA

MUHIMBILI NATIONAL HOSPITAL

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Postal Address:
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DAR ES SALAAM
Tanzania

MLOGANZILA

In reply please quote:
MNH- MLG /TRCU/Permission/2019/007 **24/05/ 2019**

Head,
Internal Medicine Department
MNH-Mloganzila

RE: PERMISSION TO COLLECT DATA AT MNH - MLOGANZILA

Name of Student	Mr. MINANI JEREMIE
Title	"ASSESSMENT OF KNOWLEDGE AND PRACTICE REGARDING CARE FOR PATIENTS WITH STROKE AMONG REGISTERED NURSES AT MAMC AND MNH DAR ES SALAAM."
Institution	Muhimbili University of Health and Allied Sciences
Supervisors	Dr. Dickson A Mkoka
Period	27/05/2019 to 27/11/2019 **(24 Weeks)**

Permission has been granted to **Mr. Minani Jeremie** to collect data for the above study.

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

Sincerely,

Dr. Faraja S. Chiwanga
Head of Teaching, Research and Consultancy Unit

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

c.c. DMS
c.c. Mr. Minani Jeremie

All Correspondence to be Addressed to the Executive Director