CLINICAL PROFILE AND EARLY OUTCOMES OF ADULT PATIENTS WITH SUSPECTED CEREBROVASCULAR ACCIDENT PRESENTING TO THE EMERGENCY MEDICINE DEPARTMENT AT MUHIMBILI NATIONAL HOSPITAL IN DAR ES SALAAM, TANZANIA

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CLINICAL PROFILE AND EARLY OUTCOMES OF ADULT PATIENTS WITH SUSPECTED CEREBROVASCULAR ACCIDENT PRESENTING TO THE EMERGENCY MEDICINE DEPARTMENT AT MUHIMBILI NATIONAL HOSPITAL IN DAR ES SALAAM, TANZANIA

By

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A Dissertation Submitted in (Partial) Fulfillment of the Requirement for the Degree of Master of Medicine (Emergency Medicine) of Muhimbili University of Health and Allied Sciences

Muhimbili University of Health and Allied Sciences
October, 2016

CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled; ***Clinical Profile and Early Outcomes of Adult Patients with Suspected Cerebrovascular accident Presenting to the Emergency Medicine Department at Muhimbili National Hospital in Dar Es Salaam, Tanzania,*** in (partial) fulfillment of the requirements for the Degree of Master of Medicine (Emergency Medicine) of Muhimbili University of Health and Allied Sciences.

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Date

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Prof. Victor Mwafongo

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Date

DECLARATION AND COPYRIGHT

I, **Bhupinder S. Gojra**, declare that, this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for similar or any other degree award.

Signature……..... Date…….

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I am grateful to the Emergency Medicine Department at Muhimbili National Hospital for not only allowing me to conduct my research but also giving me their support and cooperation.

My appreciation and thanks also go to my colleagues who have willingly helped me out with their abilities.

DEDICATION

This thesis is dedicated to my parents who are indeed my angels in disguise

ABSTRACT

Background: Cerebrovascular accident (CVA) is among leading causes of death worldwide, and Low income countries (LIC) like Tanzania are disproportionately affected, accounting for approximately 85% of CVA deaths worldwide. Despite the largest burden of CVA in LIC, there is paucity of data on clinical-epidemiological profile and management of patients with CVA presenting to emergency departments or acute intake areas.

Objectives: To determine clinical profile and early outcomes of adult patients with suspected cerebrovascular accident presenting to the Emergency Medicine Department at Muhimbili National Hospital (EMD-MNH).

Methods: This was a descriptive cohort study of adult patients with a suspected or confirmed CVA presenting to the EMD-MNH between October 2015 to January 2016. CVA patients were identified using the ROSIER scale and structured data sheet recorded the variables of interest. Demographic information, clinical presentation, management plan, the final hospital diagnosis, and in-hospital mortality was obtained from patient chart. Simple descriptive statistics are presented while Confidence interval and Chi-Square is used to demonstrate the statistically significant difference as appropriate.

Results: We screened 9582 patients, and 181 [1.9% (95% CI 1.6-2.1%)] patients were enrolled having met the inclusion criteria. The male to female ratio was 1:1.2 and the median age was 61 years (IQR 51-71 years). Most patients (71.3%) had primary level education (59.7%) and the most common risk factors for CVA identified were lack of exercise 166 (91.7%) and hypertension 128 (70.7%). The top most frequent chief complaint was weakness of one side of the body (99.4%) and top physical finding was hemiplegia (100%), while aspiration pneumonia (12.7%) and seizures (11%) were the two top complications. Most patients 144 (79.6%) did not receive CT scan. Among those who received CT scan evaluation, the rate of hemorrhagic CVA 19 (10.5%) and ischemic CVA 18 (9.9%) was almost equal. The EMD, 24-hour and 30-days mortality rate was 2.2% (0.06-4.34%), 3.3% (0.7-5.9%) and 32.6% (25.71-39.49%) respectively. The mRS score at discharge between patients who

received CT Scan versus no CT Scan was either 2,4 or 5 versus 3 or 6 respectively (p=0.02). There was no difference of mRS score at 30 days (p=0.23).

Conclusions: The proportion of CVA among adult patients presenting to EMD-MNH is less than two percent, with no detectable difference in distribution among patients with hemorrhagic versus ischemic CVA. Most patients had risk factors associated with CVA, and presented with hypertension, respiratory compromise, fever and physical findings of neurological compromise. The 30-days mortality rate was 33%, and there was no clear relationship between availability of results of CT Brain Scan and overall clinical progression of patients.

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LIST OF ABBREVIATIONS

BP	Blood Pressure
CT scan	Computerized tomography scans
CVA	Cerebrovascular accident
DALYs	Disability Adjusted Life Years
DM	Diabetes Mellitus
ECG	Electrocardiogram
ECHO	Echocardiography
EMD	Emergency Medicine Department
HDL	High Density Lipoprotein
HIV	Human Immunodeficiency Virus
HTN	Hypertension
ICU	Intensive Care Unit
IQR	Inter-quartile Range
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
OR	Odds Ratio
RBG	Random Blood Glucose
SPSS	Statistical Package for Social Sciences
TIA	Transient Ischemic Attack
UK	United Kingdom
WHO	World Health Organization

DEFINITION OF KEY TERMS

ROSIER Scale is used to identify patients with CVA. It comprises a set of clinical features with different grading. A CVA patient will be defined as a patient who will score 1 point or higher in the ROSIER Scale. (Refer to section 2.8)

The MODIFIED RANKIN SCALE (mRS) is a commonly used scale for measuring the degree of disability or dependence in the daily activities of people who have suffered a CVA or other causes of neurological disability. The scale runs from 0-6, running from perfect health without symptoms to death. (Refer to section 2.12)

CEREBROVASCULAR ACCIDENT (CVA) is caused by interruption of the blood supply to the brain, usually because a blood vessel bursts or is blocked by a clot. This cuts of the supply of oxygen and nutrients, causing damage to the brain tissue.

ADULT PATIENTS – All individuals above the age of 18 years

EARLY OUTCOMES are morbidity and mortality including the degree of disability or dependence in the daily activities of people who have suffered CVA for a period of 30 days.

CHAPTER ONE

1.1 BACKGROUND

Cerebrovascular disease is the second leading cause of death globally with over 5.7 million deaths annually and remains in the top five causes of death in low-income and lower middle-income countries(1). According to the WHO, 15 million people suffer CVA worldwide each year. Out of these, approximately 4.7 million recover and about 5 million are permanently disabled(2). Sadly, approximately 85% of deaths occur in low-income and lower middle-income countries, making it one of the biggest burden of disease in terms of disability and mortality in these low income countries(3). Annually, there are an estimated 425,000 CVA deaths in Africa and 315.9 per 100,000 in Dar-es-Salaam(4–6).

Clinically, CVA is caused by the interruption of the blood supply to the brain cutting off the supply of oxygen and nutrients, causing damage to the brain tissue, usually because a blood vessel bursts or is blocked by a clot(7). According to WHO, CVA is defined as "A clinical syndrome characterized by rapidly developing clinical symptoms and / or signs of focal, and at times global, loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin" (8). CVA is broadly divided into two main types: ischemic and hemorrhagic. Hemorrhagic CVAs can further be distinguished into intracerebral and subarachnoid CVAs(9).

Early thrombolytic therapy (recombinant tissue plasminogen activator) for ischemic CVA is a potentially lifesaving and disability-limiting intervention if given within 3 hours after onset of CVA symptom(10). Clinical studies suggest that cerebral ischemia persisting >6 hours results in permanent neurological damage(11). According to a study, in **high-income countries** the median time from CVA onset to ED evaluation was 5.7 hours, with almost a third of patients presenting within 3 hours(12). On the contrary, there is not enough data on the time that patients take to arrive to the hospital in East Africa but some literature suggests that patients are more likely to have first sought care from traditional healers before going to hospital due to beliefs that CVA was associated with ancestral spirits and witchcraft(13). In a study in rural

South Africa, the mean time of presentation to a hospital was almost 2 days from onset of symptoms(14).

There are several risk factors associated with CVA. Some of the modifiable risk factors associated with CVA are Hypertension, Diabetes mellitus, Cardiac diseases, Hypercholesterolemia, tobacco use, excessive alcohol consumption, physical inactivity and oral contraceptives use(15,16). There is no adequate data on risk factors for CVA in East Africa but studies done in high-income countries show African Americans have double the rate of CVAs than Caucasians do (17). Identifying possible risk factors for CVA can guide healthcare providers and public health initiatives to provide appropriate treatment and secondary preventive plans, and public health campaigns(18,19).

In high-income countries like the United States (US), someone has a CVA every 40 seconds and every 4 minutes someone dies of CVA killing nearly 130,000 each year(20). Of the total number of CVAs, ischemic CVA accounts for approximately 86.4%, while 10.4% are intracerebral hemorrhages and 3.4% are subarachnoid hemorrhages(21). The cost of health care services, medications, and lost productivity due to CVA costs the US a total of $38.6 billion annually (22). Similarly, there are approximately 152,000 CVAs in the UK each year i.e. more than one every five minutes. Out of these, approximately 85% are ischemic, 15% are due to intracerebral bleed and 5% are due to subarachnoid hemorrhage. CVA costs are between £3.7 billion and £8 billion annually in the US. These costs include health care costs and productivity loses due to morbidity and mortality(23).

The incidence and types of CVA are not fully understood in most of Africa due to lack of research (24). However, the limited data to date suggests that hemorrhagic CVA may be higher in Africa than is recorded in high-income countries (25). This difference may be due to environmental factors, but may also have a genetic component as several studies in the US, for example, suggest that African-Americans have an increased frequency of hemorrhagic CVA compared with Caucasians(26).

CVA is not limited to western or high-income countries; rather it is a global epidemic that disproportionally affects low-income and lower middle-income countries. These countries account for 87% of total losses due to CVA in terms of disability-adjusted life years, calculated worldwide in 72 million per year(3). According to WHO statistics, age adjusted CVA mortality rates and disability adjusted life-years loss rates are 3.5 fold and 3.84 fold higher in low income countries than in middle income and high income countries, respectively (27). A systematic review of worldwide CVA incidence showed a decline by 42% in high income countries over the four decades from 1970 -1979 to 2000 - 2008.During the same period, incidence in low to middle income countries rose more than 100%(28). The findings of this review suggest the burden of CVAs in Africa is high and still increasing.

In Tanzania, the establishment of the EMD-MNH in 2010 has provided an opportunity to improve and standardize care in the management of critically ill patients including CVA. However little is known about the clinical profile and early outcome of adult patients with suspected CVA presenting to the EMD.

This study will help us to provide the current statistics in terms of prevalence, types of CVAs, common risk factors and outcomes associated with CVA. With the demographic and epidemiologic shifts now occurring in many low-income and lower middle-income countries, increasing prevalence of risk factors for CVA are anticipated, including hypertension, tobacco use, obesity, unhealthy diet, physical inactivity and diabetes.

1.2 LITERATURE REVIEW

*Forouzanfar et al.*looked at global and regional burden of CVA during 1990-2010 involving 58 high-income countries and 61 low & middle-income countries showing that there is a decrease by 12% in high-income countries, and an increase by 12% in low-income and middle-income countries(29,30).

In another study by *Feiginet al*, CVA incidence in low-income and lower middle-income countries has doubled and exceed incidence in high-income countries by one-fifth (31). Compared with people in high income countries, people in low-income and lower middle-income countries also experience a higher CVA mortality rate(32).

In Africa, the incidence and prevalence of CVA is variable, in a meta-analysis of 1227 studies,(19 from 10 African countries), *Adeloye et al.*showed that 483 thousand new CVA cases among people aged 15 years or more were estimated in Africa in 2009, equivalent to 81.2/100000 population. Comparable figures for the year 2013 based on the same rates would amount to 535 thousand new CVA cases and 2.09 million CVA survivors, suggesting an increase of 10.8% and 9.6% of incident CVA cases and CVA survivors respectively, attributable to population growth and aging between 2009 and 2013(5).

In Tanzania, a prospective, community-based, case-control study by *Walker et al.* in 2006, looking at CVA risk factors in an incident population in urban and rural Tanzania found similar risk factors for CVA in Dar es salaam and Hai region, with previous cardiac event (odds ratio [OR] 7.39), a high ratio of total cholesterol to HDL cholesterol (OR 4.54), smoking (OR 2.72) and hypertension (OR 2.14) identified as significant independent risk factors. In Hai, additional risk factors of diabetes (OR 4.04) and low HDL cholesterol (OR 9.84) were also significant(33).

Another study done by *Walker et al.* in 2010, looked at CVA incidence in rural and urban Tanzania. This study showed an overall crude yearly CVA incidence rate of 94.5 per 100,000 in Hai and 107.9 per 100,000 in Dar-es-salaam. Thus, showing age-standardized CVA incidence rates in Hai were similar to those in high-income countries. However, age-

standardized incidence in Dar-es-salaam were higher than seen in most studies in high-income countries; this could be because of a difference in the prevalence of risk factors and emphasizes the importance of health screening at a community level. Health policy makers should be informed of the incidence of cerebrovascular accident in sub-Saharan Africa and should base future decisions on such data(33).

A study by *Ghandehari*, on barriers of thrombolysis therapy in low-income and lower middle-income countries, showed that the number of CVA patients receiving r-tPA in these countries is extremely low. Pre-hospital delay, financial constraints, and lack of infrastructure are main barriers of thrombolysis therapy in low-income countries. Until a cheaper thrombolytic agent and the proper infrastructure for utilization of thrombolytic therapy is available, countries may be best served by focusing on primary and secondary CVA prevention strategies(34).

A Multicenter study by *Langhorne et al* looking at medical complications after CVA in West Scotland showed 85% of the CVA patients suffer from complications such as recurrent CVA (9% of patients), seizures (3%); infections—urinary tract infection (24%), chest infection (22%), others (19%); mobility related—falls (25%), falls with serious injury (5%), pressure sores (21%); thromboembolism-deep venous thrombosis (2%), pulmonary embolism (1%); pain—shoulder pain (9%), other pain (34%); and psychological—depression (16%), anxiety (14%), emotionalism (12%), and confusion (56%). There is no adequate data for complications among CVA patients in Tanzania.

A study by *Nedeltchev et al* in Switzerland, looking at predictors of outcomes and recurrence in CVA involving 199 consecutive patients with ischemic CVA showed that thirteen non-fatal CVA, two fatal CVAs, and six transient ischemic attacks (TIA) occurred during a mean (SD) follow up of 26 (17) months. Total anterior circulation CVA, and diabetes mellitus were independent predictors of unfavorable outcome or death ($p=0.011$, and $p=0.023$). History of TIA predicted CVA recurrence ($p=0.02$). Severe neurological deficits at presentation, total anterior circulation CVA, and diabetes mellitus predict unfavorable outcome. Previous TIAs are associated with increased risk of recurrence (35).

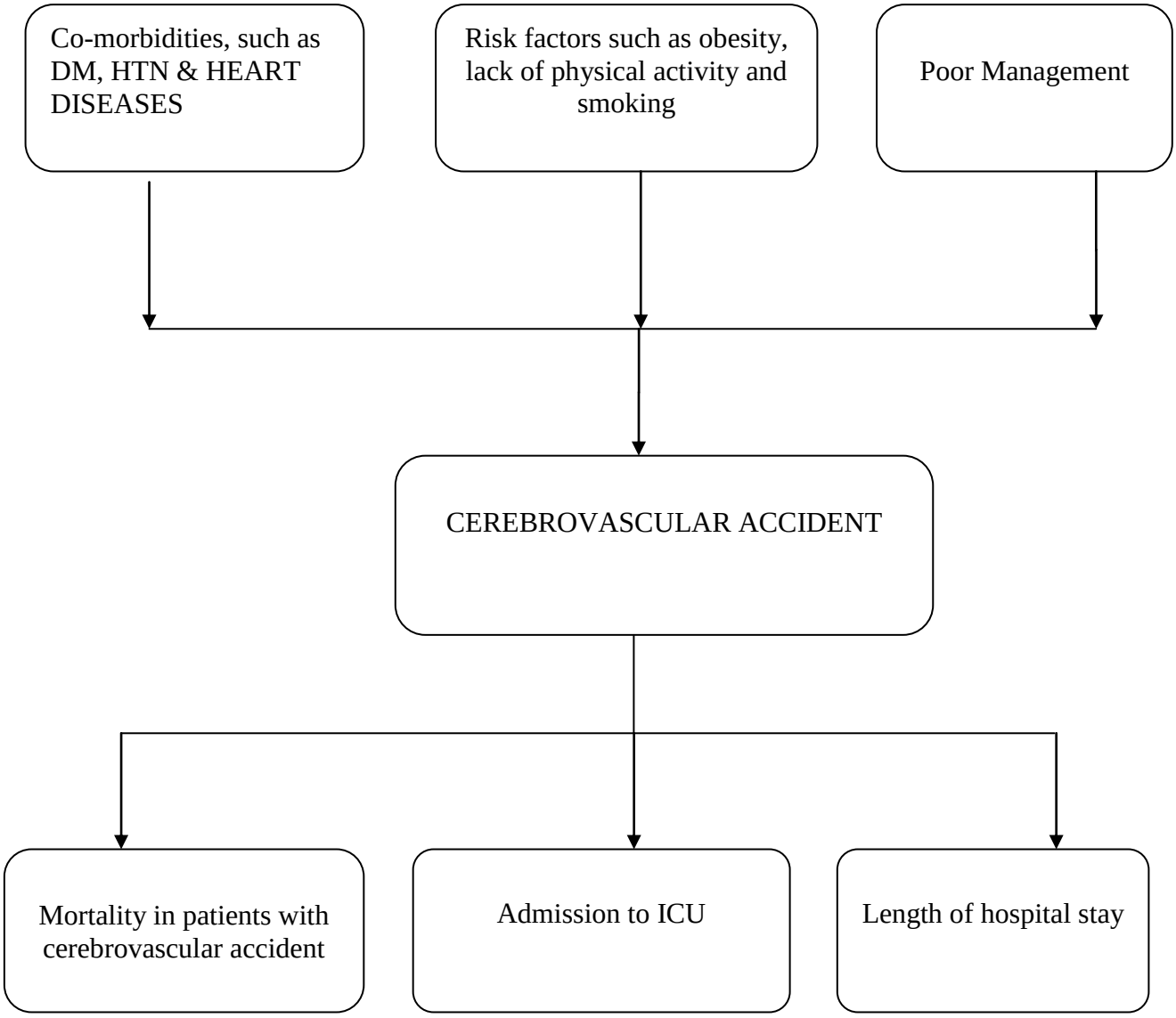
1.3 STATEMENT OF THE PROBLEM

CVA is a major contributor to morbidity and mortality throughout the world(36). In the high-income and upper middle-income economics, deaths due to CVA have decreased over the past 15 years(31). This is due to the advances made in the medical fields whereby CVA patients can be diagnosed with cerebrovascular accident within few hours and can be commenced on treatment early. Furthermore, patients have early health seeking behavior and have regular health checkups. This helps in reducing morbidity and mortality from CVA.

On the other hand, in low-income and lower middle-income countries, cerebrovascular accident is a prevalent and increasing cause of morbidity and mortality that accounts for approximately 85% of deaths occurring worldwide annually due to CVA(3). This is mainly due to delayed presentation and poor health seeking behavior by individuals(37).

In Tanzania, little is known about clinical presentation, risk factors and outcomes of patients presenting with suspected or confirmed CVA, furthermore, no studies have been done in Tanzania to look at the early outcome and risk factors associated with CVA.

1.4 CONCEPTUAL FRAMEWORK



CVA is caused by multiple risk factors, some of which are obesity, lack of physical activity, smoking, hypertension, and diabetes mellitus. Poor management of hypertension and diabetes mellitus also leads to CVA. It is one of the major contributors to increased morbidity and mortality in low income countries. It is therefore important to address the risk factors for CVA as early as possible and to intervene so as to minimize mortality.

1.5 RATIONALE

According to the WHO, of the total deaths due to CVA, approximately 85% occur in low-income and lower middle-income countries making it one of the biggest burden of disease in terms of disability and mortality in these countries(3). There are an estimated 359,000 CVA deaths (3% of all deaths) in Africa and 315.9 per 100,000 in Dar-es-Salaam(4,5). Yet, there is limited data available on the risk factors and outcome associated with cerebrovascular accident in Tanzania.

As we know, there are a number of risk factors associated with CVA and these risk factors might be different in low-income and lower middle-income countries compared to the high-income and upper middle income countries. This study will help us to determine prevalence of CVA; its patterns, associated risk factors and outcomes among patients. With the outcome, healthcare providers can do a better job identifying patients with risk factors and reinforcing the importance of managing blood pressure and regular health checks.

In Tanzania, the EMD-MNH was established in the year 2010. Many patients with CVA are brought to the emergency department. Understanding the pattern and the common risk factors associated with CVA will help in the development of setting-specific clinical protocols and in the resource allocations so as to ensure optimal use of resources and appropriate management of the patients. By the available data, health centers can easily initiate individuals on prophylactic treatments. Furthermore, health education and public health efforts will be required so people have more health seeking behavior so as to have regular health checks.

1.6 RESEARCH QUESTIONS

What are the clinical profiles and early outcomes of adult patients with suspected cerebrovascular accident presenting to the EMD-MNH in Dar es salaam, Tanzania?

1.7 OBJECTIVES

1.7.1 AIM

To determine clinical profile and early outcomes of adult patients with suspected cerebrovascular accident presenting to the EMD-MNH in Dar es salaam, Tanzania.

1.7.2 SPECIFIC OBJECTIVES

1. To describe the proportion of cerebrovascular accident (CVA) among all adult patients presenting to EMD.
2. To characterize the rate of abnormal physical findings, risk factors and abnormal vital signs among patients with suspected or confirmed CVA presenting to EMD.
3. To characterize different patterns of CVA and clinical complications associated with CVA among patients with CVA brought to EMD.
4. To describe in-hospital mortality rate of patients and the relationship between availability of results of CT Brain Scan and clinical progress of the patients with suspected or confirmed CVA brought to EMD.

CHAPTER TWO

2.1 MATERIALS AND METHODS

2.2 STUDY DESIGN

This was a prospective descriptive cohort study of adults above 18 years presenting to EMD-MNH and meeting criteria for CVA, between October 2015 and January 2016.

2.3 STUDY AREA

This study was done at the EMD-MNH. Muhimbili National Hospital (MNH) is located in Dar es salaam, Tanzania and serves as a tertiary hospital with bed capacity of 1,500. EMD is part of the MNH and it is the first entry to the hospital for most of the patients(38).

The department is staffed by nurses, interns (fresh graduates from medical school), Registrars (registered medical practitioners who are 1 to 3 years post internship) and Emergency medicine residents (all had already worked as registrars before joining the 3-year residency program). All the doctors are supervised and trained by the locally trained emergency physicians with support and consultation from a group of board-certified emergency physicians from the USA, Canada, and South Africa.

The department receives referral patients from throughout the country and serves a high-acuity patient population from within Dar es Salaam as well. According to a study done in 2012, approximately 40,000 patients are seen each year and only 20% are discharged home from the EMD. The top five categories of complaints seen in the department are trauma, infectious, mental health, neoplasm and pregnancy related issues(39,40).

2.4 TARGET POPULATION

All adult patients above 18 years with suspected CVA presenting to acute intake areas/EMDs at tertiary hospitals in Tanzania

2.5 ACCESSIBLE POPULATION

All adult patients above 18 years presenting to EMD with suspected CVA usingROSIER scale at MNH

2.6 STUDY POPULATION

All adult patients above 18 years with suspected CVA presenting to EMD-MNH during October 2015 to January 2016

2.7 STUDY DURATION

The study was conducted in a period of four months, from October 2015 to January 2016.

2.8 INCLUSION CRITERIA

Using ROSIERS SCALE:

All adults above the age of 18 years presenting with:

- ☐ History of syncope or loss of consciousness
- ☐ History of seizure activity

  New onset of:
- ☐ Asymmetric facial weakness
- ☐ Asymmetric arm/leg weakness
- ☐ Speech disturbance
- ☐ Visual field defect
  - Patients brought with referral diagnosis of CVA
  - Patients brought with CT scan or MRI suggestive of CVA

2.9 EXCLUSION CRITERIA

- Patient presenting more than one time during the study period with old CVA

2.10 STUDY VARIABLES

INDEPENDENT VARIABLES

- Demographic data (age, sex and marital status)
- Clinical presentation
- Co-morbidities (DM, HTN, HIV and Obesity)
- CT Scan results (Type of CVA)

DEPENDENT VARIABLES

- ICU admissions
- 24- hour mortality

2.11 SAMPLE SIZE

A study done by *Mlay et al* at MNH showed that CVA accounts for 6.8% of medical admissions. We have used 6.8% as expected proportion in our sample size calculation (41).The formula used to calculate the sample size is as follows:-

$$N = \frac{z^2 p (1-p)}{\varepsilon^2}$$

Where;

Z = level of confidence (1.96 value obtained from the table for 95% confidence interval)

p = expected proportion= 6.8% =0.068

ε = margin of error = 0.05

$$N = \frac{1.96^2 \times 0.068 (1 - 0.068)}{(0.05)^2}$$

$$= \frac{0.2435}{0.0025}$$

$= 97.4 \sim 98$

2.12 PATIENT RECRUITMENT AND DATA COLLECTION TECHNIQUE

All patients meeting the inclusion criteria were assigned a code number. Each participant's demographic data such as age, sex and residence were collected on a case record form. The ROSIER scale was used to identify patients with CVA.

The ROSIER scale comprises a set of clinical features with different grading. A CVA patient was defined as a patient who scored 1 point or higher in the ROSIER Scale. In this study, a total of 15 weekend days (Saturday, Sunday) and 43 week days (Monday-Friday) between October 2015 and January 2016 were used for consecutive screening of patients over 24hours time, when the research assistant was available to recruit patients. Face-to-face interviews were conducted using structured, pre-tested questionnaires to determine the risk factors such as smoking, alcohol intake and other co-morbidities.

Patients were followed up in the in-patient department and by phone call up for a period of 30 days. Outcomes of patients were assessed using the Modified Rankin Scale.

The MODIFIED RANKIN SCALE (mRS) is a commonly used scale for measuring the degree of disability or dependence in the daily activities of people who have suffered a CVA or other causes of neurological disability. The scale runs from 0-6, running from perfect health without symptoms to death.

- 0 - No symptoms
- 1 - No significant disability. Able to carry out all usual activities, despite some symptoms
- 2 - Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities
- 3 - Moderate disability. Requires some help, but able to walk unassisted
- 4 - Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted
- 5 - Severe disability. Requires constant nursing care and attention, bedridden, incontinent
- 6 – Dead

2.13 ELECTRONIC DATA

Data from questionnaires was entered into Microsoft® Excel® 2013 sheet and later on transferred to IBM Statistical Package for Social Sciences® (SPSS) statistics version 20, 2014.

2.14 DATA ANALYSIS

Patient descriptive characteristics were reported, including means, medians, inter-quartile ranges and standard deviation. The proportion of patients with CVA in EMD was calculated from the enrolled CVA patients divided by the total number of patients who visited the EMD during the study period. Patients' clinical presentation, EMD diagnostic testing, physical examination findings and radiology test results were recorded on questionnaires. In hospital 24-hour mortality for CVA was estimated from the number of patients who died during the course of hospital stay divided by the total number of patients admitted in 24 hours. Chi square analysis was also used to examine the relationship between outcomes of CVA patients using Modified Rankin Scale or those who managed to get CT-scan done versus those who could not get the CT-scan done.

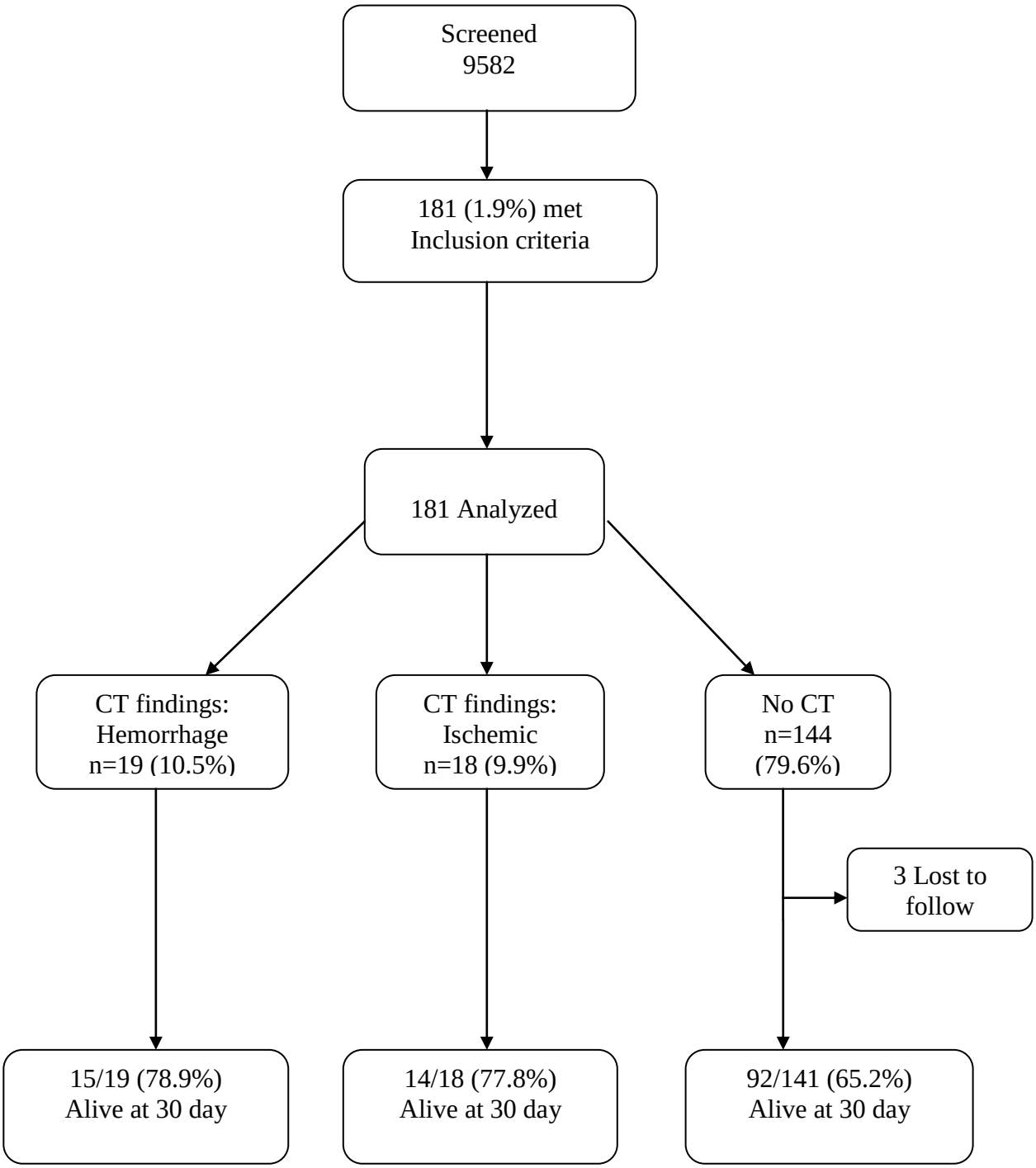
2.15 ETHICAL CONSIDERATIONS

Ethical clearance and permission to conduct this study was obtained from MUHAS ethical committee and MNH administration respectively. Caretakers of participants were requested to sign informed consent forms prior to recruitment; this was done after receiving information regarding this study particularly; benefits, risks involved and the importance of doing this study.

The information provided and the test results were kept strictly confidential. The study information was stored in protected computer files and in paper records stored in locked filing cabinets. Only study staff had access to the information. The information will be maintained indefinitely.

CHAPTER THREE

3.1 RESULTS



Of the total patients screened, 181 (1.9%) patients met the proportion of patients with suspected CVA and were enrolled into the study. One-fifth of the total participants were able to afford CT-scan brain of which, almost half had hemorrhagic CVA and other half had Ischemic CVA. A total of 3 patients were lost to follow up among the group that could not afford CT-scan brain.

Demographic and baseline characteristics of study population

The majority (n=100, 55.2%) of the participants were females and the median age of the study population was 61 years with an inter-quartile range of 51-71 years. Three-fifths of the patients had primary level of education, as compared to one-tenth with university level of education. More than two-third of the participants were married and one-third were unemployed. Among the participant, majority were non-smokers and almost half (47.5%) of the total participants were taking alcohol. Nearly three quarters (70.7%) of the population had a prior history of hypertension and one-fifth had prior history of diabetes. History of previous CVA was found in a quarter of the population (Table 1).

Table 1: Demographic and baseline characteristics of study population

BASELINE CHARACTERISTICS	ALL (N=181)
Gender	
Female	100 (55.2%)
Male	81 (44.8%)
Age in years (Median)	61
Inter-quartile range (years)	51-71
Education level	
University	18 (9.9%)
A-level Secondary	1 (0.6%)
O-level Secondary	34 (18.8%)
Primary	108 (59.7%)
None	20 (11%)
Marital status	
Married	129 (71.3%)
Widow/widower	35 (19.3%)
Divorced	10 (5.5%)
Single	7 (3.9%)
Work type	
Office	63 (34.8%)
Manual	52 (28.7%)
Not working	65 (35.9%)
Unknown	1 (0.6%)
Smoking	
Current smoking	10 (5.5%)
Past smoking	29 (16%)
Alcohol	
Current alcohol use	51 (28.2%)
Past alcohol use	35 (19.3%)
History of Hypertension	128 (70.7%)
Regular meds	88/128 (68.8%)
History of DM	36 (19.9%)
Regular meds	26/36 (72.2%)
History of CVA	45 (24.9%)

Chief complaints of the study population

Almost all patients (n=180, 99.4%) presented with weakness of one side of the body, followed by inability to talk (n=142, 78.4%) and loss of consciousness (n=107, 59.1%). The ratio of right sided weakness to left sided weakness was 1:1.2. 19.9 % (n=36) of patients presented with fever while 12.7% (n=23) presented with difficulty in breathing and convulsions. Minority of the participants presented with headache, vomiting and inability to walk as their chief complaint (Table 2).

Table 2: Chief complaints of the study population

CHIEF COMPLAINTS	All (N=181)	HEMORRHAGIC CVA (N=19)	ISCHEMIC CVA (N=18)
Weakness of one side of the body	180 (99.4%)	18 (94.7%, CI, 84.6;104.8)	18 (100%, CI, 100;100)
Inability to talk	142 (78.4%)	17 (89.5%, CI, 75.7;103.3)	13 (72.2%, CI, 51.5;92.9)
Loss of consciousness	107 (59.1%)	7 (36.8%, CI, 15.1;58.5)	8 (44.4%, CI, 21.4;67.3)
Fever	36 (19.9%)	3 (15.8%, CI, -0.6;32.2)	5 (27.8%, CI, 7.1;48.5)
Difficulty in breathing	23 (12.7%)	1 (5.3%, CI, -4.8;15.4)	3 (16.7%, CI, -0.5;33.9)
Convulsions	20 (11%)	2 (10.5%, CI, -3.3;24.3)	5 (27.8%, CI, 7.1;48.5)
Headache	10 (5.5%)	2 (10.5%, CI, -3.3;24.3)	1 (5.6%, CI, -5.0;16.2)
Vomiting	9 (5%)	1 (5.3%, CI, -4.8;15.4)	2 (11.1%, CI, -3.4;25.6)
Inability to walk	8 (4.4%)	1 (5.3%, CI, -4.8;15.4)	0

Physical findings of the study population

The overall inter-quartile range of GCS score of the study population was 9-12 but was slightly lower in the group with Ischemic CVA (7-13). More than one-fourth (27.6%) of the total participants presented with GCS <10 and approximately one-tenth (10.5%) presented with GCS <8.All patients had mouth deviation and nearly all (97.2%) had hemiplegia at the time of presentation. 16.6% participants had crepitations during physical examination (Table3).

Table 3: Physical findings of the study population

PHYSICAL FINDINGS	All (N=181)	CT REPORTED HEMORRHAGIC CVA (N=19)	CT REPORTED ISCHEMIC CVA (N=18)
Hemiplegia	181 (100%, CI, 100;100)	19 (100%,CI, 100;100)	18 (100%, CI, 100;100)
Mouth deviation	176 (97.2%, CI, 94.8;99.6)	18 (94.7%, CI, 84.6;104.8)	18 (100%, CI, 100;100)
GCS <10	50 (27.6%, CI, 21.1;34.1)	6 (31.6%, CI, 10.7;52.5)	6 (33.3%, CI, 11.5;55.1)
Crepitations	30 (16.6%, CI, 11.2;22)	1 (5.3%, CI, -4.8;15.4)	3 (16.7%, CI, -0.5;33.9)
Febrile	20 (11%, CI, 6.4;15.6)	315.8%, CI, -0.6;32.2)	3 (16.7%, CI, -0.5;33.9)
Seizures	20 (11%, CI, 6.4;15.6)	2 (10.5%, CI, -3.3;24.3)	5 (27.8%, CI, 7.1;48.5)
Unequal pupils	7 (3.9%, CI, 1.1;6.7)	2 (10.5%, CI, -3.3;24.3)	1 (5.6%, CI, -5;16.2)
Pale	5 (2.8%, CI, 0.4;5.2)	0	0
Cold extremities	5 (2.8%, CI, 0.4-5.2)	2 (10.5%, CI, -3.3;24.3)	1 (5.6%, CI, -5;16.2)

Vital signs of the participants

More than half (n=105, 58%) of the study patients had SBP of more than 140mmHg and98.3% had MAP of >60 at the time of presentation. Overall, there were one-third (n=67, 37%) of the study participants who presenting with tachycardia and one-tenth (n=20, 11%) presented with fever. These findings were similar between the hemorrhagic and ischemic groups. Minority of the population (n=2, 1.1%) had hypoglycemia at the time of presentation (Table 4).

Table 4: Vital signs of the study population

VITAL SIGNS	All (N=181)	CT REPORTED HEMORRHAGIC CVA (N=19)	CT REPORTED ISCHEMIC CVA (N=18)
SBP - Median (IQR)	145 (126-171)	150 (124-167)	145 (122-186)
SBP >140mmHg	105 (58%)	12 (63.2%,CI, 41.5;84.9)	10 (55.6%, CI, 32.6;78.5)
DBP - Median (IQR)	91 (79-107)	97 (80-107)	84 (63-97)
DBP >90mmHg	95 (52.5%)	10 (52.6%, CI, 30.1;75.1)	8 (44.4%, CI, 21.4;67.3)
MAP - Median (IQR)	109 (96-127)	112 (95-127)	104 (84-125)
MAP <60mmHg	3 (1.7%)	1 (5.3%, CI, -4.8;15.4)	1 (5.6%, CI, -5;16.2)
Tachycardia(>100beats/min)	67 (37%)	7 (36.8%, CI, 15.1;58.5)	6 (33.3%, CI, 11.5;55.1)
Tachypnea(>20 breaths/min)	110 (60.8%)	12 (63.2%, CI, 41.5;84.9)	9 (50%, CI, 26.9;73.1)
SPO2 (<90%)	6 (3.3%)	1 (5.3%, CI, -4.8;15.4)	2 (11.1%, -3.4;25.6)
Febrile(>37.5^{o}C)	20 (11%)	3 (15.8%, CI, -0.6;32.2)	3 (16.7%, CI, -0.5;33.9)
Hypoglycemia(<3.5mmol/l)	2 (1.1%)	0	0
>11mmol/l	16 (8.8%)	2 (10.5%, CI, -3.3;24.3)	4 (22.2%, CI, 3;41.4)
Not recorded	40 (22.1%)	5 (26.3%, CI, 6.5;46.1)	3 (16.7%, CI, -0.5;33.9)

Key: IQR – Inter-quartile Range

Differential Diagnosis of the study population

More than half (n=97, 53.6%) of the study population had hypertension as a differential diagnosis at the time of presentation and approximately one-fifth had aspiration pneumonia (12.7%), seizure disorder (11.1%) and space occupying lesion (11.1%) as another differential diagnosis. Meningitis, renal impairment and electrolytes imbalance, each was suspected in3.3% of the participants (Table 5).

Table 5: Differential Diagnosis of the study population

DIFFERENTIAL DIAGNOSIS	All (N=181)	CT REPORTED HEMORRHAGIC CVA (N=19)	CT REPORTED ISCHEMIC CVA (N=18)
Hypertension	97 (53.6%, CI, 46.3;60.9)	11 (57.9%, CI, 35.7;80.1)	11 (61.1%, CI, 38.6;83.6)
Aspiration pneumonia	23 (12.7%, CI, 7.8;17.5)	1 (5.3%, CI, -4.8;15.4)	3 (16.7%, CI, -0.5;33.9)
Seizure disorder	20 (11.1%, CI, 6.5;15.7)	2 (10.5%, CI, -3.3;24.3)	5 (27.8%, CI, 7.1;48.5)
Space occupying lesion	20 (11.1%, CI, 6.5;15.7)	2 (10.5%, CI, -3.3;24.3)	1 (5.6%, CI, -5;16.2)
Diabetes Mellitus	17 (9.4%, CI, 5.1;16.6)	0	2 (11.1%, CI, -3.4;25.6)
Meningitis	6 (3.3%, CI, 0.7;5.9)	1 (5.3%, CI, -4.8;15.4)	0
Renal impairment	6 (3.3%, CI, 0.7;5.9)	1 (5.3%, CI, -4.8;15.4)	0
Electrolytes imbalance	4 (2.2%, CI, 0.1;4.3)	0	0
Others*	14 (7.7%, CI, 3.8;11.6)	2 (10.5%, CI, -3.3;24.3)	3 (16.7, CI, -0.5;33.9)

*others include-, renal impairment, rheumatic heart disease, gastroenteritis and UTI

Risk factors among the study participants

Almost all (n=166, 91.7%) of the participants were not involved in doing any sort of physical exercise. This was equal among the groups of patients who underwent CT-scan as well. Almost half of the total study population had history of alcohol intake (47.5%) and one-fifth had history of previous CVA (24.9%). One-fifth of the total population had history of smoking (21.5%), BMI >30(19.9%) and history of diabetes mellitus (19.9%). In this table, patients with previous history of alcohol intake and current alcohol intake has been considered together as a risk factor, similarly, past and current smoking has also been combined. A small proportion (5.5%) of participants presented with atrial fibrillation (Table 6).

Table 6: Risk factors among the study participants

RISK FACTORS	ALL (N=181)	HEMORRHAGIC CVA (N=19)	ISCHEMIC CVA (N=18)
No physical exercise	166 (91.7%, CI, 87.6;95.7)	19 (100%, CI, 100;100)	17 (94.4%, CI, 83.7;105)
Hypertension	128 (70.7%, CI, 64;77.3)	13 (68.4%, CI, 47.5;89.3)	16 (88.9%, CI, 74.3;103.4)
Regular meds	88/128 (68.8%)	7/19 (53.8%)	14/18 (87.5%)
Alcohol	86 (47.5%, CI, 40.2;54.7)	10 (52.6%, CI, 30.1;75)	12 (66.7%, CI, 44.9;88.4)
History of CVA	45 (24.9%, CI, 18.6;31.2)	6 (31.6%, CI, 10.7;52.5)	6 (33.3%, CI, 11.5;55)
BMI >30	36 (19.9%, CI 14.08;25.72)	5 (26.3%, CI, 6.5;46.1)	4 (22.2%, CI, 3;41.4)
Diabetes Mellitus	36 (19.9%, CI, 14;25.7)	1 (5.3%, CI, -4.7;15.3)	4 (22.2%, CI, 3;41.4)
Regular meds	26/36 (72.2%)	1/1 (100%)	4/4 (100%)
Smoking	39 (21.5%, CI, 15.5;27.5)	6 (31.6%, CI, 10.7;52.5)	6 (33.3%, CI, 11.5;55)
Work Type			
Not working	65 (35.9%, CI, 28.9;42.9)	5 (26.3%, CI, 6.5;46.1)	9 (50%, CI, 26.9;73.1)
Manual	52 (28.8%, CI, 22.2;35.4)	4 (21.1%, CI, 2.7;39.4)	2 (11.1%, CI, -3.4;25.6)
Office	63 (34.8%, CI, 27.9;41.7)	10 (52.6%, CI, 30.1;75.1)	7 (38.9%, CI, 16.4;61.4)
Atrial Fibrillation	10 (5.5%, CI, 2.1;8.8)	1 (5.3%, CI, -4.7;15.3)	3 (16.7%, CI, -0.5;33.9)

Radiological Investigations of the study population

CT-scan brain was done in about one-fifth (20.4%) of the total participants due to financial constraints. Among all patients, about 5% presented with irregular pulse. X-ray was done in 5 (2.8%) patients (Table 7).

Table 7: Radiological Investigations of the study population

INVESTIGATIONS	NUMBER OF TESTS DONE (N=181)	FREQUENCY OF ABNORMAL RESULTS
CT-Scan brain	37 (20.4%)	37 (100%)
ECG	170 (94%)	10 (5.9%)
Chest X-ray	5 (2.8%)	5 (100%)

Complications among the study population due to CVA

The total number of participants that developed aspiration pneumonia and seizures as a complication was approximately one-tenth (12.7%) and (11%) respectively of the total population (Table 8).

Table 8: Complications among the study population due to CVA

COMPLICATIONS	Total (n=181)	Hemorrhage (n=19)	Ischemia (n=18)
Aspiration	**23**(12.7%, CI, 7.8;17.5)	**1**(5.3%, CI, -4.7;15.3)	**3**(16.7%, CI, -0.5;33.9)
Seizure	**20**(11%, CI, 6.4;15.5)	**2**(10.5%, CI, -3.2;24.2)	**5**(27.8%, CI, 7.1;48.5)

Mortality and outcome of patients with CVA

The total ED mortality of CVA patients was found to be 2.2 %, 95%CI (0.06-4.34%). This is overall same in the group that underwent CT-scan as well as the group that did not undergo CT-scan. Similarly, the 24-hour mortality of stoke patients was similar in both groups and there was no statistical significant difference in mortality rate between patients that underwent CT-scan compared to those who did not undergo CT-scan (p-value 0.60). The 30-day mortality rate in the group that underwent CT-scan was almost half compared to the other group, although this difference was not statistically significant (Table 9).

Table 9: Mortality and outcome of patients with CVA

Mortality	**TOTAL (n=181)**	**CT done (n=37)**	**No CT (n=144)**	**p-value**
ED mortality	4 (2.2%, CI, 0.06;4.34)	1(2.7%, CI, 2.5;7.9)	3(2.1%, CI, -0.2;4.4)	**1.00**[¶]
24 hour mortality	6 (3.3%, CI, 0.7;5.9)	2(5.4%, CI, -1.9;12.7)	4(2.8%, CI, 0.1;5.5)	**0.60**[¶]
30-day mortality	58** (32.6%, CI, 25.71;39.49)	8(21.6%, CI, 8.3;34.9)	50* (35.5%, CI, 27.6;43.4)	**0.18**[Δ]
Functional outcome (Mean)				
mRS at discharge	4.45±1.4	4.7±0.9	4.57±1.3	
mRS at 30 days	4.43+1.5	4.43±1.2	4.43+1.5	

*n=141 as three patients were lost to follow up in no CT group
**n=178 as three patients were lost to follow up
[¶] Fishers exact test used
[Δ] Chi square test was used

Outcome of participants based on modified Rankin scale

There was significant difference in the distribution of mRS score at discharge in a group that had CT vs. those who didn't have, p value 0.02 with more of the patients who didn't have CT scan done, scoring either a 3 or 6 mRS score, and more of patients with CT scoring a 2,4 or 5. In the 30 days, there was no significant difference (p=0.23) in the distribution of mRSs core at discharge in a group that had CT versus those who didn't receive the CT scan (Table 10).

Table 10: Outcomes of participants based on modified Rankin scale

mRS	mRS at Discharge			mRS at 30 days		
	CT DONE N=37	CT NOT DONE N=141	p-value =0.02	CT DONE N=37	CT NOT DONE N=141	p-value =0.23
1	0	5 (3.5%)		1 (2.7%)	7 (5%)	
2	1 (2.7%)	1 (0.7%)		1 (2.7%)	4 (2.8%)	
3	2 (5.4%)	28 (19.9%)		8 (21.6%)	35 (24.8%)	
4	10 (27%)	28 (19.9%)		6 (16.3%)	21 (14.9%)	
5	18 (48.7%)	37 (26.2%)		13 (35.1%)	24 (17%)	
6	6 (16.2%)	42 (29.8%)		8 (21.6%)	50 (35.5%)	

[±]Fischer's exact test was used
[Δ]Chi square test was used

CHAPTER FOUR

4.1 DISCUSSION

Our study has found that the proportion of cerebrovascular accident (CVA) among all adult patients presenting to the emergency medicine department at Muhimbili National Hospital (EMD-MNH) is less than 2 percent. This is similar estimate to what was previously described in a study by Reynolds et al done in 2012 in the same department in which the proportion of cerebrovascular accident was 1.98%(42). Across Sub Saharan Africa (SSA), there is a limited data describing the Emergency Department (ED) burden of CVAs, with most studies describing the in-hospital rates of CVA and providing variable prevalence across different parts of Africa (43,44). Most of our population presents to this centre as referral cases having received care in different district and Regional hospitals, and this may explain the relatively low percentage rates, as these may be the only patients who makes it to EMD-MNH for advanced neurological care, as deemed necessary by the initial providers at the primary level.

The median age in our study was 61 years (IQR 51 to 71 years), this age is similar to what is observed in most other studies in low-income and lower middle-income countries(45,46), where reports indicate almost synonymous age ranges, but slightly lower age than what is shown in high-income countries which have studies reporting average age of above 70 years (46,47). This shows that CVA affects younger age group in low-income and lower middle-income countries as compared to high-income countries, supporting the suggestions that risk factors for CVA (including hypertension) may go unnoticed and unattended in low-income and lower middle-income countries, mostly because of poverty, poor health systems and poor health seeking behaviors, all of which predispose individuals to early CVA illnesses (48). Our male to female ratio of 1:1.2 is comparable to most other studies in SSA (49), however differs slightly from the overall gender distribution of EMD-MNH, as observed in previous studies (42). There is need for further study with a larger sample size to compare proportions between males and females and to look into possible factors that contribute to more females.

In this study, only about one-fifth of all patients received CT-scan testing as part of their care while in EMD and throughout their hospitalization despite having clinical characteristics that warrant CT-scan investigations (50), a much lower rate than what has been reported in other centers of similar settings across SSA(51). In this study, we believe that this low rate of patients getting CT scan may be due to two main factors: availability and cost. During the study period, CT-Scan machine at our site was non-functional and patients were required to get a CT scan done outside of the hospital at private facilities and at their own cost, which includes the ambulance transfer cost. The cost of CT scan at most private facilities around Dar es Salaam at the time of the study was around $150 -250. This is a very high cost which is far beyond the reach of our patients, most of who live beyond poverty line (53). On the other hand, the availability of CT scan at our centre makes this access possible, as the cost was around $50 (with some patients getting free CT scan depending on their ability to pay, which was pre-determined by the hospital management).

Among those patents that underwent CT-scan, the proportion of patients with hemorrhagic versus Ischemic CVA was found to be similar. Our finding paints a slightly different picture to what has been previously described in a systemic review of 870 articles from 1960-2014 on CVA in Africa by *Mayowa O Owolabi et al*, where the proportion of hemorrhagic CVA was found to be higher than the ischemic(44). This systemic review, further shows that the overall proportion of hemorrhagic CVAs in Africa is likely higher compared to **high-income** countries.

Over ninety percent of patients in this study self-reported a sedentary life style, with no physical exercise, nearly half of the participants reported to be regular consumer of undifferentiated alcohol, and over one-fourth of the total participants had obesity as a risk factor. Furthermore, the rate of smoking and diabetes was one-fifth of the overall study population. These highlights the overwhelming rates of risk factors present in our study population, suggesting the urgent need for appropriate health interventions to curb the risk factors and mitigate the risk factors. Lastly, over two thirds of the study population had

underlying hypertension. Despite being high, the rate of hypertension is still lower than experienced in other studies in some SSA (53).

Most of patients in study population presented with features of neurological deficits (54), as main presenting complaints and physical findings. The overall median GCS score for patients in this study was found to be 12, with further re-analysis revealing that approximately one-fourth of all patients, and one-third of patients with hemorrhagic CVA had GCS<10. The very low GCS among these patients can be attributed to severity of the disease condition, but also we believe delays in arrival at our site, as noted earlier due to late referrals and also poor health seeking behavior at the primary sites which together may contribute to delay in receiving care and worsening the initial presentations. More than half of the study participants presented with above normal blood pressure indicating the underlying and ongoing hypertension as one of the predisposing factors to developing CVA. Interestingly, over ten percent of our patients had fever (Temperature > 38.5 C), at presentation, indicating the need to evaluate for possible infections, and sepsis among patients with CVA in our settings. Some studies in both high-income and low-income and lower middle-income countries have reported the presence of fever in patients with CVA, and most of the patients in these studies were found to have infection (55,56).

Seizure was reported in nearly one-tenth of the total participants, similar to what has been reported in previous studies (57,58) and in literature. Seizure is one of the common complication of CVA, and its presence usually indicates infection (58). In our patient population, the presence of seizure as a complication and also the presence of fever in presentation may suggest the need for rigorous evaluation for sepsis and infection among the differential diagnoses, and especially in patients with no clear-cut CT evaluation or results. Over ten percent (n=23, 12.7%) of our patients had aspiration pneumonia while in the EMD, and in this study we are unable to tell whether this was a result of the initial incident at the primary site or during referral, or EMD management. In patients with CVA, aspiration pneumonia caries high mortality and usually has been associated with prolonged morbidity (59). Despite the severe consequences of aspiration pneumonia in CVA, this complication can

easily be avoided by simply tucking in the chin when swallowing, coughing after every second or third mouthful to clear any aspirated material, followed by a clearing swallow and exercises to improve specific aspects of swallowing function, techniques which requires very little resources commitments and also can be learned by even the lowest cadre in the health care system (60), as such we believe simple interventional protocols can be instituted and save much more lives.

The EMD mortality, 24 hours mortality and 30 days mortality among CVA patients was found to be 2.2%, 3.3%, and 32.6% respectively. The morality reported in our study is higher than the EMD and overall hospital mortality rates (61), and the mortality reports in other community based studies in Tanzania (45,62). We are unable to determine the exact factors that might have contributed to this overall large mortality rate, however we believe that the severity of illness and resources needed to provide standard care for CVA patients (63), might play crucial role in causing this high mortality. In our hospital of 1500 bed capacity, there were only 5 ICU beds during the time of this study. This severely limits the capacity of the hospital to provide the best high dependent care to patients in need, most of which might be CVA patients. In this study, we found no statistically significant difference in mortality among patients who underwent CT-scan against those who did not undergo CT-scan.

In our study, the overall mean modified Rankin Scale (mRS) at 30-days was found to be higher compared to what has been observed in other studies across Africa (53). There was a clinically significant difference in the distribution of mRS score at discharge in a group that had CT scan done versus those who didn't have CT scan done (p value 0.02). The clinical significance of the mRS remains unclear and the observed difference disappeared when the same groups were analyzed at 30 day.

CHAPTER FIVE

5.1 STUDY LIMITATION

This was a single centered hospital based study so the results may not be generalized to the general community. However, Muhimbili receives patients from across Tanzania, and we believe the population represented here gives a general picture of what is in the referring hospitals.

CT brain could not be done for all patients because the CT scan machine was broken at our study site and majority of patients were unable to afford the test outside of MNH. Despite this limitation, we believe that the result of our study provides the overview of clinical profile and outcome of CVA patients who did and did not receive CT-scan, and paves a way to a larger study that can build and replicate the same results at large scale.

5.2 CONCLUSIONS

The proportion of CVA among adult patients presenting to EMD-MNH is less than two percent, with no detectable difference in distribution among patients with hemorrhagic versus ischemic CVA. Most patients had risk factors associated with CVA, and presented with hypertension, respiratory compromise, fever and physical findings of neurological compromise. The 30-days mortality rate was 33%, and there was no clear relationship between availability of results of CT Brain Scan and overall clinical progression of patients.

5.3 RECOMMENDATIONS

There is need for community campaigns for advocating preventive strategies (risk factors) and health education regarding CVA and adherence to medicine. Furthermore, emphasis needs to be on community awareness of hypertension as one of the biggest risk factor for CVA and need for proper control/management of hypertension.

There is need for clear management and guidelines regarding CVA at district and regional hospitals to recognize it early and initiate appropriate management to reduce morbidity and mortality.

Emphasis on health policy initiatives should focus on increasing dedicated stroke beds and to have a dedicated stroke ward in hospital and further research is needed whereby NIH stroke scale can be used as a measure of stroke severity.

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APPENDICES

Appendix I: Consent forms (English Version)

PERMISSION FOR AN ADULT TO TAKE PART IN RESEARCH

Study title: Clinical Profile And Early Outcome Of Adult Patients With Suspected Cerebrovascular Accident Presenting To The Emergency Medicine Department At Muhimbili National Hospital In Dar Es Salaam, Tanzania.

Introduction: You are being asked to take part in this study because I am screening for prevalence of CVA with their subtypes at Emergency Medicine Department, Muhimbili National Hospital.

Your decision whether or not to participate will have no effect on the quality of your medical care. Please ask questions if there is anything about this study you do not understand.

What is the purpose of this study?

The purpose of this study is to determine the prevalence and types of stoke and the risk factors associated with it. It will also help to determine early outcome of patients.

Will you benefit from taking part in this study?

You will be a volunteer and might not personally benefit from being in this research study. However, data collected from this research will be helpful in determining risk factors associated with stoke and studies done in the future will help in detecting individuals with risk factors for CVA.

What does this study involve?

Your evaluation as part of this study will be done at EMD. It will involve collecting demographic data and documentation of any other diseases that you might be suffering from.

What are the options if you do not want to take part in this study?

Your participation in this study is completely voluntary. You will continue to receive regular care at EMD regardless of whether you participate in the study.

What are the risks involved with taking part in this study?

There are no risks involved in taking part in this study.

- **Leaving the study:** You may choose to stop taking part in this study at any time for any reason. If you decide to stop taking part, it will have no effect on your medical care.
- **New Information:** New information related to this study and specifically new information about you will be made known to you when it becomes available.

How will your privacy be protected?

The information you provide as well as the test results will be kept strictly confidential. The study information will be stored in protected computer files and in paper records stored in locked filing cabinets. Only study staff will have access to the information. The information will be maintained indefinitely.

Who may use or see your health information?

By signing this form, you allow the research team to use your health information and give it to others involved in the research. The research team includes the study director plus others working on this study at MUHAS.

Your permission to use your health information for this study will not end until the study is completed. You may ask for your study data at any time.

It is possible for a court or government official to order the release of study data including information about you.

What if you decide not to give permission to use and share your personal health Information?

If you do not allow use of your health information for this study, you may not take part in this study.

If you choose to stop taking part in this study, you may cancel permission for the use of your health information. You should let the researcher know if you want to cancel your permission. The study team will assist you in putting your wishes in writing. Information collected for the study before your permission is cancelled will continue to be used in the research.

Whom should you call about this study?

If you have questions about this study or need to report a study related injury, you can call your doctor or the research director for this study: Dr. Bhupinder Singh (0786 541480) during normal working hours. If you have questions about your rights as a participant, you may contact, Professor Mainen Moshi, Director of Publications and Research, Muhimbili University of Health and Allied Sciences, Senate Research and Publication Committee, P. O. Box 65001, Dar es Salaam, Telephone number 2150302-6.

What about the costs of this study?

There will be no costs for you if you agree to have your child participate in the study. All study costs will be supported by the research team and MUHAS.

Will you be paid to take part in this study?

There will be no payment to you for participation in the study.

If you agree that you take part in this study and you sign this consent form, you are not giving up any of your legal rights.

CONSENT

I have read the above information about CLINICAL PROFILE AND EARLY OUTCOME IN PATINETS WITH SUSPECTED CVA PRESENTING TO MNH and have been given time to ask questions. I agree to take part in this study and I have been given a copy of this signed consent form.

SIGNATURE

_____

Researcher or Designee Signature and Date Printed Name

_____

Legally Authorized Representative (Parent/legal guardian) and Date Printed Name

Appendix II: Consent forms (Kiswahili version)

RIDHAA YA KUSHIRIKI KWENYE UTAFITI HUU

Namba ya Utambulisho……

Kichwa cha utafiti: Dalili na matokeo ya awali kwa ugonjwa wa CVA kwa watu wazima katika kitengo cha dharura, Muhimbili, Dar es salaam, Tanzania.

Utangulizi: Unaombwa kushiriki katika utafiti huu kwa sababu ninafanya uchunguzi wa aina za CVA na asilimia zake katika kitengo cha dharura, Hospitali ya Taifa Muhimbili. Uamuzi wako wa kushiriki hautakua na athari zozote kwenye ubora wa huduma. Tafadhali uliza swali kama kuna kitu usichokielewa kuhusu utafiti huu.

Je dhumuni la utafiti huu ni lipi?
Dhumuni la utafiti huu ni kuchunguza ukubwa wa aina za CVA na athari zinazohusiana nao. Pia itasaidia matokeo ya awali ya wagonjwa.

Je utafaidika kwa kushiriki kwenye utafiti huu?
Utapimwa kwa ridhaa yako na inawezekana kuwa binafsi usifaidike kwa kuwepo kwenye utafiti huu. Lakini tafiti zaidi zitafanyika kulinganisha viwango vya CVA na athari zake. Taarifa zitakazopatikana katika utafiti huu zitasaidia kujua athari zinazoendana na CVA ili siku za mbele ziweze kusaidia mtu kugundua athari zake.

Je Utafiti huu unahusisha nini?
Uchunguzi wako kama sehemu ya utafiti huu utafanyika katika kitengo cha dharura, Muhimbili ambapo nitachukua taarifa zako muhimu na maelezo ya ugonjwa mwingine ambao unaweza kuwa nao.

Je itakuwaje kama hutataka kushiriki kwenye utafiti huu?
Kushiriki kwako kwenye utafiti huu ni hiari kabisa. Utaendelea kupata huduma bila kujali kama umeshiriki kwenye utafiti ama la.

Je kuna athari gani za kushiriki katika utafiti huu?

Hakuna athari zozote kushiriki katika utafiti huu.

Kuondoka kwenye utafiti:

Unaweza kuamua kusitisha kuendelea kushiriki kwenye utafiti huu muda wowote na kwa sababu yoyote. Kama utaamua kuacha kushiriki hautaathiri huduma za afya yako.

Maelezo mapya:

Maelezo mapya kuhusiana na utafiti huu na hasa maelezo mapya kuhusu afya yako utajulishwa mara tu yatakapokuwa yamepatikana.

Utunzaji wa siri?

Habari mtakazotoa pamoja na majibu ya vipimo yatatunzwa kwa usiri mkubwa. Habari zihusuzo utafiti zitatunzwa kwenye kompyuta zenye ulinzi na rekodi, zilizopo kwenye makaratasi zita tunzwa kwenye makabati yanayofungwa. Ni wafanyakazi wanaohusika na utafiti tu ndio watakaoweza kuona taarifa, na taarifa hizi zitatunzwa siku zote.

Ni nani anaweza kutumia au kuona taarifa zako za afya?

Kwa kuweka sahihi kwenye fomu hii umeruhusu watafiti kutumia taarifa za afya yako na kuwapatia wengine wanaohusika na utafiti huu. Watafiti ni pamoja na mwendesha utafiti pamoja na wengine wanaohusika na utafiti huu.

Ruhusa ya kutumia taarifa ya afya yako itaisha wakati utafiti utakapokamilika. Unaweza kuomba taarifa zako wakati wowote.

Inawezekana mahakama au afisa wa serikali akaamuru kuonyeshwa kwa taarifa za utafiti ikiwa ni pamoja na taarifa zako.

Je itatokea nini kama utaamua kutotoa ruhusa ya kutumia na kushirikisha wengine taarifa zako za afya?

Kama hautaruhusu taarifa ya afya yako zitumike, hautaweza kushiriki kwenye utafiti huu.

Kama utachagua kuacha kushiriki katika utafiti huu, unaweza kufuta ruhusa ya matumizi ya taarifa za afya yako. Watafiti watakusaidia kuweka matakwa yako kwenye maandishi. Taarifa zitakazokuwa zimekusanywa kabla ya kufuta ruhusa zitaendelea kutumika kwenye utafiti.

Je utampigia nani kuhusu utafiti huu?

Kama una maswali kuhusu utafiti au ukiwa na haja ya kuripoti athari zitokanazo na utafiti, unaweza kumpigia daktari wako au mwendesha utafiti huu: Dr. Bhupinder Singh (0786 541480) muda wa masaa ya kazi. Kama una swali kuhusu haki zako kama mshiriki unaweza kuwasiliana na Profesa Mainen Moshi, Mkurugenzi wa Kamati ya Kitengo cha Utafiti, Chuo Kikuu Cha Sayansi na Tiba Cha Muhimbili, S.L.P 65001, Dar es Salaam, Namba ya Simu 2150302-6.

Je kuna gharama juu ya utafiti huu?

Hakuna gharama kama utakubali kushiriki kwenye utafiti huu. Watafiti na Chuo kikuu cha Muhimbili watasaidia gharama zote za utafiti.

Je utalipwa kwa kushiriki kwenye utafiti?

Hapatakuwa na malipo kwako kwa kushiriki kwenye utafiti

Kama utakubali kushiriki kwenye utafiti huu na ukasaini fomu hii ya ridhaa, haujiondolei haki yoyote ya kisheria.

Ridhaa

Nimesoma maelezo hapo juu kuhusu uchunguzi wa aina za CVA na matokeo ya awali kwa wagonjwa wanaohisiwa kuwa na CVA katika hospitali ya Muhimbili na nimepewa muda wa kuuliza maswali. Nakubali kushiriki katika utafiti huu na nimepewa fomu ya ridhaa hii iliyowekwa sahihi

Sahihi

_____

Sahihi ya mtafiti au kaimu na tarehe Jina kamili

_____

Sahihi ya mwakilishi wa kisheria (mzazi/mlezi) na tarehe Jina kamili

Appendix III: DATA COLLECTION SHEET

STUDY ON CVA

INCLUDE ALL ADULTS ABOVE 18 YEARS WITH ANY OF THE FOLLOWING AT TRIAGE:

☐ History of syncope or loss of consciousness

☐ History of seizure activity

☐ Asymmetric facial weakness

☐ Asymmetric arm/leg weakness

☐ Speech disturbance

☐ Visual field defect

☐ Patients brought with referral diagnosis of CVA

☐ Patients brought with imaging results of CVA

Date of Interview: ☐☐/☐☐ / ☐☐☐☐

Q. NO. ☐☐☐ MRN ☐☐☐☐☐☐☐☐ CONSENT: YES ☐ NO ☐

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

Informant: Patient himself/herself ☐ Patient's family member ☐ Others ☐

Sex: M ☐ F ☐ Date of Birth ☐☐/☐☐ /☐☐☐☐ Age: ☐☐

Marital Status: Married ☐ Divorced ☐ Single ☐ Widow/Widower ☐

Level of Education: University level ☐

A – Level secondary education ☐

O – Level secondary education ☐

Primary education ☐

None

Address: _____

SECTION B: VITAL SIGNS

BP: ____/____ Pulse: _____beats/min RR: ___cycles/min SPO_2: _____ R.A

RBG: ____mmol/l Temperature: ___^oC

SECTION C: RISK FACTORS

History of Previous CVA: Yes ☐ No ☐ If yes, which year? _____ Type of CVA: _____

TOBACCO USE

Cigarette smoking: Yes ☐ No ☐ If yes, how many cigarettes a day: _____

For how long have you been smoking? _____

If no, did you smoke in the past? Yes ☐ No ☐ If yes, how many cigarettes a day: _____

For how long did you smoke? _____

ALCOHOL USE

Do you drink alcohol beverages? Yes ☐ No ☐ If yes, how long have you been drinking? ___

What kind of alcohol do you drink?
Beer ☐ wine ☐ whisky ☐ local brew ☐

How many times a week? Daily ☐ 3-4 times/week ☐ 1-2 times/week ☐

If no, did you use alcohol in the past? Yes ☐ No ☐ If yes, for how long? _____

What kind of alcohol do you drink?
Beer ☐ wine ☐ whisky ☐ local brew ☐

How many times a week? Daily ☐ 3-4 times/week ☐ 1-2 times/week ☐

BLOOD PRESSURE

When was your BP checked by a health professional? _____

Have you ever been told to have BP? Yes ☐ No ☐ If yes, when? _____

Where you commenced on any medications for BP? Yes ☐ No ☐

Do you take you medications on regular basis? Yes ☐ No ☐

Do you visit clinics for follow-up regularly? Yes ☐ No ☐

BLOOD SUGAR

When was your blood sugar checked by a health professional? _____

Have you ever been told to have high Blood Sugar? Yes ☐ No ☐ If yes, when? _____

Where you commenced on any treatment? Yes ☐ No ☐

If yes, do you take you medications on regular basis? Yes ☐ No ☐

Do you visit clinics for follow-up regularly? Yes ☐ No ☐

SECTION D: CLINICAL PRESENTATION

GCS: _____/15 Mouth Deviation: Yes ☐ No ☐

Hemiparesis: Yes ☐ No ☐ Slurred Speech: Yes ☐ No ☐ Seizures: Yes ☐ No ☐

Pupils: Equal ☐ Unequal ☐ Patient brought to EMD with CT Brain: Yes ☐ No ☐

Chief Complaints:

PHYSICAL EXAMINATION:

	A	B	C	D	E
Normal					
Abnormal					

If abnormal, explain

	NORMAL	ABNORMAL	REPORT (IF ABNORMAL)
HEENT			
R/S			
CNS: Higher Centers			
Motor function			
Sensory function			
Gait			

Investigations done	Normal	Abnormal	Specify (If abnormal)
ECG			
Chest X-ray			
Serum Creatinine			
Serum Urea			
FBP			
Lipid Profile			

Was patient able to do CT at MNH? Yes ☐ No ☐

If yes,
Results_____
_____
_____

Final EMD Diagnosis: ☐

☐

☐

SECTION E: OUTCOME

Disposition:
- ☐ Admitted to the ward
- ☐ Admitted to ICU
- ☐ Admitted to HDU
- ☐ Discharged
- ☐ Died at EMD
- ☐ Transfer out of MNH

Outcome:
- Discharged ☐ After ____ days
- Died ☐ After ____ days

Outcome at time of discharge:

- No symptoms ☐
- No significant disability ☐
- Slight disability ☐
- Moderate disability ☐
- Moderately severe disability ☐
- Severe disability ☐