COLLEGE OF HEALTH SCIENCE

SCOOL OF NURSING AND MIDWIFERY

SURVIVAL IN HOSPITAL AND PREDICTOR OF MORTALITY AMONG ADULT STROKE PATIENTS IN SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE ADDIS ABABA ETHIOPIA 2019

BY

TADESSE SAHLE (BSC.)

THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES OF ADIS ABABA UNIVERSITY IN PARTIAL FULLFILMENT OF MASTER OF SCIENCE DEGREE IN ADULT HEALTH NURSING

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APPROVAL SHEET

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COLLEGE HEALTH SCIENCE SCHOOL OF ALLIED SCIENCES DEPARTMENT OF NURSING AND MIDWIFERY

I, the undersigned MSc student, declare that I have submitted my original work on a title **"**SURVIVAL IN HOSPITAL AND PREDICTOR OF MORTALITY AMONG ADULT STROKE PATIENTS IN SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE ADDIS ABABA ETHIOPIA 2019**"** for the examination.

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Name of Co-Advisor	Signature	Date

APPROVAL BY THE BOARD OF EXAMINATION

This thesis by Tadesse Sahle is accepted in its present form by the board of examiners as satisfying thesis requirement for the degree of master's in Adult Health Nursing.

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Statement of DECLARATION

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this thesis entitle on: **"**SURVIVAL IN HOSPITAL AND PREDICTOR OF MORTALITY AMONG ADULT STROKE PATIENTS IN SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE ADDIS ABABA ETHIOPIA 2019**"**.

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List of Abbreviations and Acronyms

AAU	Addis Ababa University
AHA	American Heart Association
CNS	Central Nervous System
CVD	Cardio Vascular Diseases
EMSS	Emergency Medical Service System
FMOH	Federal Minister of Health
GCS	Glasgow-Coma-Scale
HDL	High Density Lipoprotein
HMIS	Health Management Information System
HS	Hemorrhagic Stroke
ICH	Intra Cerebral Hemorrhage
IS	Ischemic Stroke
LDL	Low Density Lipoprotein
NCD	Non Communicable Diseases
SAH	Sub Arachnoid Hemorrhage
SPHMMC	Saint Paul's Hospital Millennium Medical College
TASH	Tikur Anbesa Specialized Hospital
WHO	World Health Organization

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Abstract

Background: Stroke is sudden loss of blood supply to the brain leading to permanent tissue damage caused by, embolic, thrombotic or hemorrhagic events. Almost 85% of strokes are ischemic stroke.

Stroke is 'silent' brain, retinal and spinal infarcts and silent cerebral hemorrhages. Stroke is typically characterized by a neurological deficit attributed to an acute focal injury of the central nervous system by a vascular cause, like, Intracerebral hemorrhage subarachnoid hemorrhage and cerebral infarction. When we see death due to stroke separately from other cardiovascular diseases, stroke led the fifth among all causes of death, behind diseases of the heart, cancer, chronic lower respiratory disease, and unintentional injuries/accidents.

Objectives: To assess survival in hospital and predictor of mortality among adult stroke patient in Saint Paul's Hospital millennium Medical College Addis Ababa Ethiopia 2019

Methodology: Institution based Retrospective cohort was conducted. Patients who were admitted to SPHMMC from January 2016 to December 2018, with a primary diagnosis of stroke (Ischemic Stroke or Hemorrhage stroke) Data entered to Epi-Data version 4.3 and analyzed using SPSS 24 statistical software. Predictor with p-value <0.05 will be considered as significant association with stroke mortality in multivariate cox regression.

Results: Totally 251 stroke patients chart were included in this study among those 128 (51%) were female and 123 (49%) were male stroke patient, 135(53.8%) hemorrhagic stroke and 116 (46.2%) ischemic Stroke. the overall incidence rate was 9.5 deaths per 1000 person-day observations. The overall mean and median survival time of adult stroke patient was 178 and 79 days respectively. GCS level less than nine has lower survival time with mean survival time of 28.135 with (95% CI: 11.285-44.986).

Conclusion: In the current study, nearly one third of the patients were died during the follow up period. Predictor of mortality with adult stroke patients was decreased GCS and presence of pneumonia.

Key words: stroke, survival, event and predictor of stroke mortal

1. INTRODUCTION

1.1. Back ground

Stroke is 'silent' brain, retinal and spinal infarcts and silent cerebral hemorrhages (1). Stroke is typically characterized by a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, like, Intracerebral hemorrhage (ICH) subarachnoid hemorrhage (SAH) and cerebral infarction (2).

Stroke is sudden loss of blood supply to the brain leading to permanent tissue damage caused by, embolic, thrombotic or hemorrhagic events. Almost 85% of strokes are ischemic. The incidence of stroke differs over the life course. age increased incidence of stroke increased, incidence rates between 10 and 20 per 10,000 individuals in the age range of 55–64, while incidence rates increase to 200 per 10,000 individuals for those aged over 85years (3).

Stroke is a major cause of disability and death worldwide (2,4,5).Decreasing of stroke mortality over the past decades indicates a major improvement in population health and which implies for both sexes and for all racial and age groups. in addition to the on the whole impact on fewer lives lost to stroke, the major turn down in stroke mortality seen among people <65 years of age represents a decrease in years of potential life lost(6).

When we see death due to stroke separately from other cardiovascular diseases (CVDs), stroke led the fifth among all causes of death, behind diseases of the heart, cancer, chronic lower respiratory disease, and unintentional injuries/accidents. Adherence to a Mediterranean-style diet that was higher in nuts and olive oil was associated with a reduced risk of stroke (4). Declining consequences of mortality decreased incidence of stroke and decline case-fatality rates. Cardiovascular risk factor control interventions led to important improvements in stroke outcomes (6)

Intracerebral hemorrhage (ICH) accounted lower than ischemic stroke which is 9% to 27% hemorrhagic strokes worldwide, with high early case fatality and poor functional outcome. In view of recent randomized controlled trials (RCTs) of the management of ICH, the European Stroke Organization (ESO) has updated (7).

Burden of physical function like:-grip strength and walking speed were consistently associated with survival and recovery after ischemic stroke. Inflammation, kidney function, and frailty also appeared to be determinants of survival and recovery following an ischemic stroke. These markers of vulnerability may identify targets for differing pre and post-stroke medical management and rehabilitation among older adults at risk for poor stroke outcomes (8).

Emergency medical service system (EMSS) is necessary elements in all stroke care and to give first aid. Using emergency medical service (EMS) are the favored ways of providing optimal pre-hospital stroke care and transfer to stroke centers. Beginning with public education on recognizing signs and symptoms of stroke this is important in the stroke chain of survival are most significant to avoid early complication of stroke which are controlled by first aid (9).

Hypertension (35%), dyslipidemia (28.6%), and diabetes (22.9%) accounts the most commonly recognized risk factors for stroke respectively. Regarding to stroke warning signs of stroke sudden unilateral weakness (61.4%), sudden trouble with speaking (25.7%), and sudden trouble with walking, loss of balance, or dizziness (21.4%) (10).

Specific time frames have been well-known for the emergency medical service system EMSS to follow on dispatch, response, and on-scene activities and this should be monitored continuously (9).

1.2. Statement of the problem

Even though Attention of World Health Organization (WHO) is prevention of non-communicable diseases (NCD) the absolute number of people who have a stroke every year, stroke survivors, related deaths, and the overall global burden of stroke disability are great and increasing. To improve understanding of stroke determinants and burden worldwide, and to establish causes of disparities and changes in trends in stroke burden like mortality, morbidity, economy degradation in developed and developing countries based on different income levels(5,11).

People with stroke survivors and incident stroke increased from 50% to 100%, this show that at present used primary stroke prevention strategy are not enough effective and require additional revision. The risk factor for stroke is similar to other NCDs. Among the modifiable risk factors are unhealthy diet, tobacco use, harmful use of alcohol and physical inactivity (12). Developing countries of Asia stroke mortality and the disabled survivors' number will also raise due to lack of health care facilities (13).

Nearly 7.0 million Americans with Age greater than 20 years had a stroke and the total prevalence was an estimated 2.5%.In the National sample from the inpatient, admission for acute ischemic stroke raised significantly for both sex (males and females) and for certain ethnic groups among 18 to 54 years (14).

About 795 000 strokes happen in the United States each year. On average, each 40 seconds, somebody in the United States has a stroke, and on average, every 4 minutes, someone dies of a stroke this implies that stroke burden is high still in United States (4) .

Stroke incidence is declining in several developed countries while in Africa, especially hemorrhagic stroke, has increased highly over the last 20 years (15).According to this study most of African country has less income this led to great burden for rehabilitation and This highly increased can only be expected to unabated unless widespread coordinated efforts based on plausible paradigms that incorporate established and accumulating scientific evidence are promptly instituted.

In sub Saharan African country burden of stroke is high. Early mortality, comparatively high in-hospital death, and deprived functional outcome are common in Ugandans who experience acute stroke. Factors connected with mortality and functional effect were mainly non modifiable. (16)

In Ethiopia based on verbal autopsies from burial surveillance of 58 010 deaths in Addis Ababa from 2006 to 2009, about 11% of the deaths were attributed to stroke. The mortality rate increased with age (15–34 years: 1%; 35–54 years: 7%; 55–74 years: 16%; > 74 years: 18%. study conducted in ethiopia about stroke mortality, in Felege Hiwot Referral Hospital Bahir Dar 11% (32), in Shashemene Referral Hospital 13.3% (33) and TASH (19.2%)(31).even though Recently Ethiopia federal minister of health (FMOH) focused on non-communicable diseases (NCD) there is no availability of recorded data on stroke survival and predictor of stroke mortality. so further study is needed in Ethiopia to prevent stroke mortality and risk factor of mortality (17).

2. LITRATURE REVIEW

2.1. Magnitude of stroke mortality

According to a retrospective cohort conducted in Netherland Among 747 patient During follow-up, more than half of the patients 465 (62%) are died (18). another study conducted with the same design in Chang Gung on 1416 ICU patient among this 805 hemorrhagic stroke and 611 ischemic stroke The in-hospital mortality rates of ischemic and hemorrhagic strokes were 15.9 and 20.4 %, respectively (19).

In Study conducted in Azerbaijan a total of 1036stroke patients Among this 228 patients (22%) died within 30 days of after stroke occurrence (20).

By using mixed cohort design retrospective and prospective for 30 month 12 month conducted in Hôtel-Dieu de France university hospital in Beirut (Lebanon), on 62 ICU patients 16 (25.8%) died in the ICU and 7(11%) died in the year following hospital discharge (21). another study conducted with the same study design in Nigeria among 120 patients included. 74(61.7%) males and 46(38.3%) females 42 died at the end of study. from the death 32 (76.1%) died within the first seven days. Eight more patients died by the end of 30 days The last two died by the end of the three months of observation (22).

Finding Multi-center retrospective cohort conducted in Singapore Patients who were admitted to any one of the three tertiary public hospitals. Ischemic stroke patients survived significantly longer than hemorrhagic patients (Intracerebral Hemorrhage (ICH) then followed by Subarachnoid Hemorrhage (SAH)). The average survival time for Ischemic Stroke (IS) patients were 3.6 years; while the time for ICH 3.0. For SAH patients, once they survived the first month, they were more likely to survive the following 5 years (23).

According to prospective cohort study conducted in Uganda out of 127 patients, 8 (6.3 %) died within 7 days and 34 (26.8 %) died within 30 days from stroke onset (11 out of 39 hemorrhagic strokes (28.2 %), 23 out of 88 ischemic strokes (26.1 %). The mean survival point in time was 25.7 days and the average duration of hospital settle was 8.9 days. At 30 days from stroke onset there were 91 survivors (71.7 %) and among them, 49 (53.9 %) had satisfactory outcome (28 totally independent and 21 independent) (16).

In Study conducted at China at 3 and 12 months after stroke were recorded and assessed Total of 1070 patients aged 75 years and older with acute ischemic stroke (AIS) during the study periods The mortality, dependency, and recurrence rates at 3 months after stroke were 12.3%, 38.2%, and 8.6% in men; the corresponding rates were 7.8%, 44.8%, and 7.7% in women, respectively. Mortality at 3 months after stroke was significantly higher in men than in women (24).

In Study conducted in urban and rural Portugal: Incidence and 7-Year Survival Community-Based Study On 688 patients, 204 (29.7%) died during the first year; at the end of study 484 survivors. 59 patients (11.3%), 34 patients (30.6%), 7 patients (30.4%) and 11 patients (36.7%) patients had died after the first IS, PICH, SAH and undetermined stroke, respectively (25).

2.2. Risk factor for stroke mortality

2.2.1. Socio demographic predictor of stroke mortality

Globally Based on sex the differences women have a higher lifetime risk for stroke and more than half of the death due to stroke (26).

A Study in Netherlands (18) hemorrhagic stroke patient, Singapore (23) ischemic stroke patient, Azerbaijan (20) for all stroke type patient and Uganda (16) for all stroke type patient elder or advanced age is relevant predictors of mortality. Also being male is the predictor of mortality in Netherlands (18). For Ischemic stroke patients, the death rates decrease with admitting year; being Malay or other ethnic group was at elevated adjusted relative risk of death as compared with Chinese (23).In China atherosclerotic stroke aged 75 years and older at 3 and 12 months after stroke with AIS during the study periods Overall, sex, was associated with only mortality at 3 months. Age was associated with mortality at 3 months after stroke and 12 months after stroke (24).

According to retrospective study in Chang Gung on intensive care unit (ICU) ischemic stroke group, patients advanced age was the predictor of in-hospital mortality (19).With the same study design in Nigeria on hundred and twenty patients among the Predictors of mortality Age have significant association among 120 stroke patient there were 52 patients who were more than 60 years. Twenty four (46.2%) of these patients died and twenty eight (53.8%) survived.

Sixty eight patients were less than 60years. Eighteen (26.5%) of these patients died while fifty (73.5%) of them survived (22)

2.2.2. Patient Base line data predictor of stroke mortality

A Study in Uganda increased body temperature (fever) is predictor of mortality for stroke patients (survivors less likely to have fever) also highly increased fasting blood glucose level is predictor of mortality for stroke patients (less elevated glucose in survivors) both indicate highly significant (16).

According to retrospective study conducted in Chang Gung In hemorrhagic stroke group, patients with mortality had significantly higher pulse rate and lower systolic BP than those who survived (19).

2.2.3. Diagnosis and neurologic assessment related mortality of stroke

A Study conducted in Zimbabwe total of 108 patients out of this 44.0% of the patients died with aspiration pneumonia in hospital (27). In Nigeria two patient exposed to aspiration pneumonia and two of them died (22). The level of consciousness was assessed with the Glasgow coma scale. The Glasgow coma score was <10 in twenty nine (24.2%) patients and ≥ 10 in ninety one (75.8%) patients. As much as twenty (69%) of the twenty nine patients with a GCS <10 died while only nine (31%) survived. Of the ninety one patients who had a GCS score ≥ 10, twenty two (24.1%) died while as many as sixty nine (75.9%) survived (22).Uganda less initial level of consciousness is predictor of mortality for stroke patients (less altered consciousness in survivors) less initial level of consciousness is predictor of mortality for stroke patients (16). According to Prospective study conducted in Nigeria level of consciousness has significant association with stroke mortality but not for sex. (22).

2.2.4. Pre-existing risk factor as predictor of mortality

The leading causes of death for stroke are Cerebrovascular disease, pneumonia and ischemic heart disease complication respectively (23).Also this study show that the leading cause of death for men is pneumonia complication for women was Cerebrovascular disease complication. DM account for approximately 90% risk factor for all stroke (28). In Netherland peripheral vascular

disease is the predictor of mortality in stroke patient (18).In Azerbaijan alcohol consumption haven't significantly associated with stroke mortality (20).

In china mortality at 12 months after stroke was associated with hypertension. Men, alcohol drinking was associated with both mortality and dependency at 3 and 12 months after stroke. Stroke severity was an independent risk factor for mortality, dependency, and recurrence at 3 and 12 months after stroke for women (24).

according to retrospective study conducted in Chang Gung In hemorrhagic stroke group, patients with mortality higher frequency of heart disease than those who survived ($P < 0.01$,) (19).

In united-state Patient on mechanical ventilation in the setting of acute ischemic stroke had a significantly higher probability of death, both in the short-term and at 1-year following the index hospitalization. (29).

2.3. Conceptual frame work

The conceptual frame work is adapted from different literature (16,20,23)factors that directly affect outcome variable time to death which is affected by variables like patients socio demographic data, diagnosis and neurological assessment of the patients, pre-existing stroke risk factors and patients base line data. .

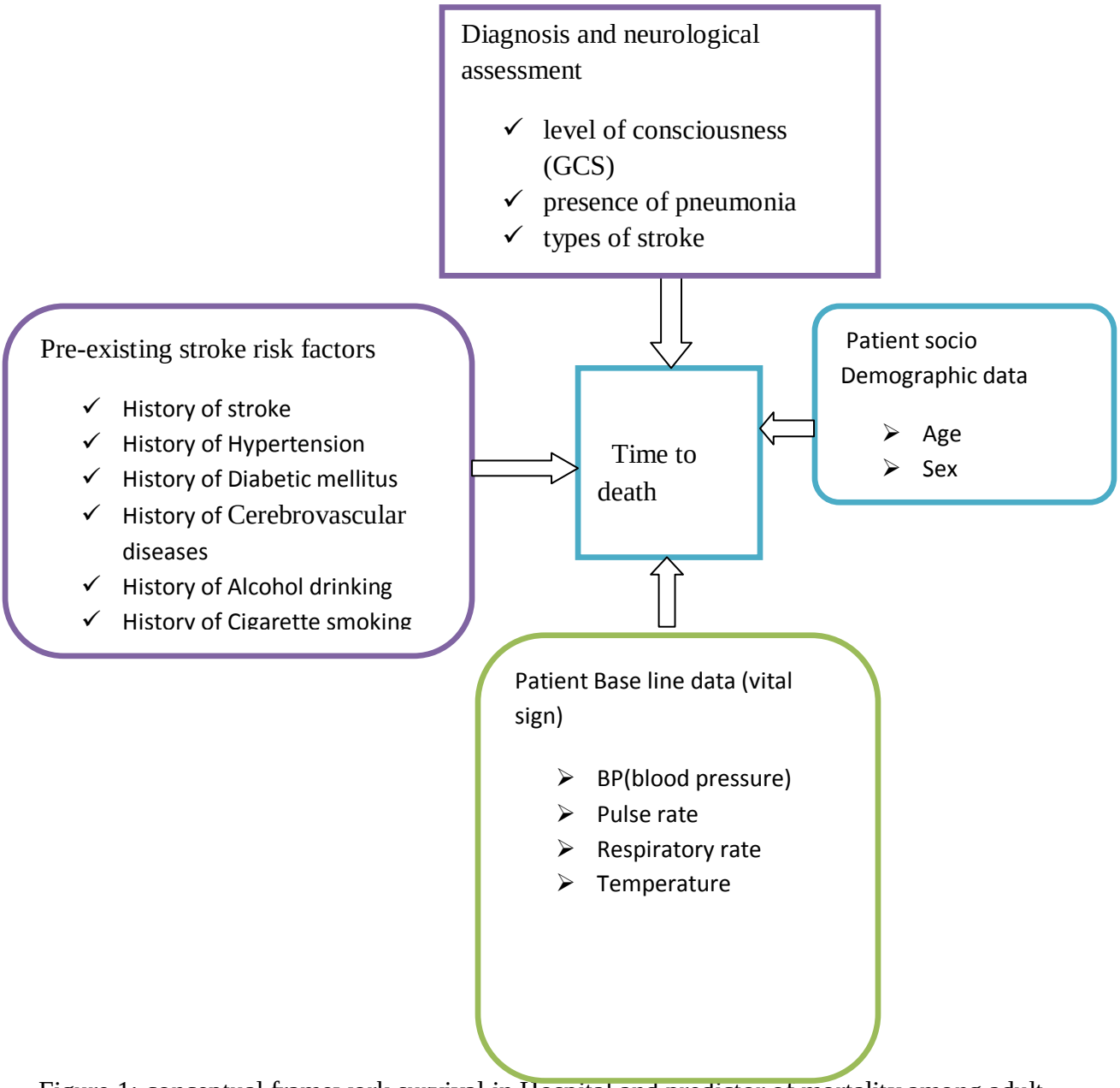

Figure 1: conceptual framework survival in Hospital and predictor of mortality among adult stroke patients in SPHMMC, Addis Ababa, Ethiopia 2019.

2.4. SIGNIFICANCE OF THE STUDY

Stroke is one of the major health problems. It has a lot of burden in the community like: - mortality, disability, economically and others. Even though there are presence of stroke treatment in a given health institution, it would not be adequate without detailed attention on prevention of stroke.

Burden of physical function like:-grip strength and walking speed were constantly associated with survival and healing after ischemic stroke. swelling, kidney function, and frailty also appeared to be indictor of survival and recovery following an ischemic stroke (8).this burden led to disability which needs rehabilitation and psychological support. Beside predictor of mortality there are modifiable as well as non-modifiable factor so deeply analysis this factor is clue for prevention of stroke

Specifically stroke Survival analysis and predictor of mortality of stroke is not assessed in our country this study would be the baseline for further study and also helpful to identify predictor of mortality which is direction for policy makers for prevention of stroke.

3. OBJECTIVES

3.1. General objectives

To asses survival in hospital and predictor of mortality among adult stroke patient in Saint Paul's Hospital millennium Medical College Addis Ababa Ethiopia 2019

3.2. Specific objectives

To assess survival status among adult stroke patient in Saint Paul's Hospital millennium Medical College Addis Ababa Ethiopia 2019

To identify predictor of mortality among adult stroke patient in Saint Paul's Hospital millennium Medical College Addis Ababa Ethiopia 2019

4. MATERIALS AND METHODS

4.1. Study Area and the Study Period

The study conducted in Addis Ababa, a capital city of Ethiopia at SPHMMC. Addis Ababa has ten sub-cities in which the City lies at an altitude of 7,546 feet (2,300metres). SPHMMC is one of the governmental Hospitals. Addis Ababa is the capital of Ethiopia and according to the national census of 2007, its largest and most populous city with over 3.3 million people. St. Paul's Hospital was built in 1969 (was named St Paul General Specialized Hospital until 2008) by Emperor Haile Selassie in collaboration with the German Evangelical Church, as a source of medical care for underserved populations. It currently has 480 beds, with an annual average of 300,000 patients and a catchment population of more than 5 million. Approximately 75% of the patients receive medical services free of charge. There is over 2000 clinical and non-clinical staff in over 18 departments(30). The study period was from 1st march to 30th April 2019 in Saint Paul hospital millennium medical college Addis Ababa, Ethiopia..

4.1 Study design

Institution based Retrospective cohort was conducted. Patients who were admitted to SPHMMC from January 2016 to december2018, with a primary diagnosis of stroke (Ischemic Stroke (IS) or Hemorrhage stroke (HS), were included.

4.2 Population

4.2.1 The source population

All Stroke Patients who were admitted to SPHMMC.

4.2.2 The study population

All Stroke Patients who were admitted to SPHMMC from January 2016 to December 2018.

4.2.3 Sample unit

All Stroke Patients who were admitted to SPHMMC from January 2016 to December 2018 fulfill inclusion criteria.

4.2.4 Study unit

Each selected adult stroke patient in SPHMMC from January 2016 to December 2018**.**

4.3 Sample Size Determination and Sampling Procedure

4.3.1 Sample size calculation

The sample size were determined using the formula for single population proportion formula is used to calculate the sample size by considering the following statistical assumptions: P = proportion of survival rate among stroke patient, 50%, since there was no research done in the same setting ($Z\alpha/2$ = Z score of 95% CI, d= Margin of error (5%) .

.

$$\frac{(Z\alpha/_2)^2 P \times Q}{d^2}$$

$((1.96)^2 \times 0.5 \times 0.5)/0.05^2$

=384

Since the total population is less than ten thousand correction formula is needed

$$nf = \frac{ni \times N}{ni + N}$$

= (384×562÷ (384+562))

=228 by adding 10% contingency, the sample size

=228+23

=251

4.3.2 Sampling technique and procedure

Stroke patient MRN was taken from the HMIS- data base. The total patient from January 2016-December 2018 admitted to SPHMMC from January 2016 to December 2018 were 562. We have found the number of admission for each year. The samples were proportionally allocated for each year, and with systematic sampling; the study participants of each year were selected as follows. First, numbering the units of each year on the frame from 1 to N (N=total admission of

each year), then we determine the sampling interval (K) by dividing the number of units in the population by the desired sample size of each year (n=sample size of each year).

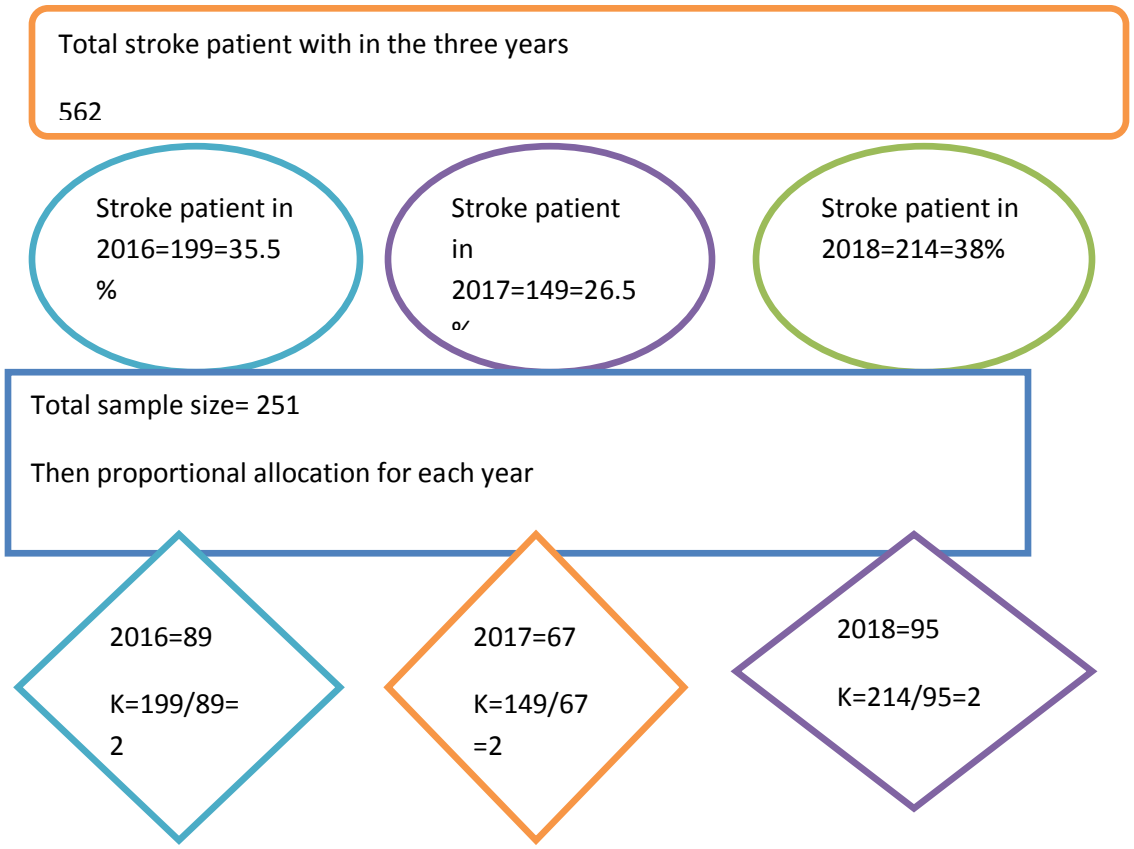

Figure 2: schematic presentation of sampling procedure for Survival in hospital and predictor of mortality among adult stroke patient admitted to SPHMMC from [2016-2018]

4.4 Eligibility criteria

4.4.1 Inclusive criteria

Age greater than or equal (≥) 15years

Ischemic Stroke or Hemorrhage stroke confirmed by CT scan (compute tomography) or MRI (magnetic resonance imaging)

4.4.2 Exclusive criteria

Patient chart which has no complete information

Diagnosis date before 1st January 2016 and after 31th december2018 was excluded.

4.5 Methods of data collection

Patients who were admitted to SPHMMC from January 2016 to December 2018, with a primary diagnosis of stroke (Ischemic Stroke (IS) or Hemorrhage stroke (HS)), were included. Study patients' data was extracted from the hospitals' in-patient Department admission and discharge register, which contains patients' demographics, MRN (medical record number), admission and discharge dates and HMIS diagnoses. Stroke presentation was identified by HMIS admission diseases classification. Then patient chart was searched by using MRN.

4.6 OPERATIONAL DEFINITION

Event is defined as Death of patient due to stroke at the time of hospital stay from January 2016 to december2018.

In hospital Survival time was defined as length of time in days from date of admission due to stroke until the patient left the hospital rather than death from January 2016 to december2018

Censored is Patients who were referred to other hospital, against medical advice and discharge from the hospital or patients who didn't develop the event.

Incomplete patient chart refers to charts which have no date of admission and major variable.

4.7 Study variables

4.7.1 Dependent variable

Time to death

4.7.2 Independent Variable

Age

Sex

Religion

Patient baseline data (vital sign)

Diagnosis and neurologic assessment factor

Pre-existing stroke risk factors

4.8 Data Collection

4.8.1 Data collection tools and procedures

By using standardized tools all information taken from patient charts. The data extraction sheet is adapted and modified from different related studies **(16,20,23)**.

Available information on the patient records were observed and appropriate data extraction check list was prepared in English. Death was confirmed by reviewing medical death certificate in the hospital

4.8.2 Data Quality Control

Data quality was assured by designing a proper data abstraction tools. Pre-test was done 5 %(13) of the sample size at SPHMMC by adult stroke patient chart that was registered before one month 1st January 2016.

To check usually recorded variables on the patient's medical record for the actual study. Consequently, some unrecorded variables were reduced from the checklist like: - HDL, LDL and fasting plasma glucose level. Others variables arranged as per usual records of those variables.

Training was given concerning the data abstraction tool and data collection process for data collectors. During the data collection time, close supervision and monitoring was carried out by investigator to ensure the quality of the data. Daily evaluation of the data for completeness and encountered difficulties on the time of data collection was attended accordingly. Data entry was done using EpiData 4.3 software. Finally, all the collected data were checked by investigator for its completeness and consistency during the data management, storage, and analysis. Consistency was examined through random selection of cards by the principal investigator.

4.8.3 Data analysis

The variables age, gender, religion, diagnosis and neurologic assessment, patient base line data and pre-existing stroke risk factor. The main outcome of the study is survival which is defined as days from index admission date to the patient left the hospital.

Before analysis, data was coded. Errors were corrected identified at the time after review of the original data using the code numbers. After this data was entered using Epi-Data version 4.3 and analyzed using SPSS 24 statistical software. Continuous data, depending on the distribution, was described either in mean and standard deviation or median. Frequency distribution was used for categorical data. Finally the outcome of each participant was dichotomized into censored or death. Kaplan Meir was used to estimate mean survival time and cumulative probability of survival and log-rank tests was used to compare survival curves after admission. The Cox-proportional hazard regression model assumption was checked using Schoenfeld residual test and variables having P-value >0.05 were considered as fulfilling the assumption. Bivariate Cox-proportional hazards regression model was fitted for each explanatory variable. Accordingly, those variables having p-value $\leq$ 0.25 in the bivariate analysis was fitted to the multivariable cox-proportional hazards regression model with 95% confidence interval and P-value < 0.05 was considered as statistically significant. Hazard ratio with 95% confidence interval and p-values were used to measure the strength of association and to identify statistical significant results.

4.9 Ethical considerations

Ethical clearance secured from Addis Ababa University College of health sciences and SPHMMC. A formal letter written to the study hospital (SPHMMC) then institutional research review board of SPHMMC review the proposal and wrote formal letter to all concerned authorities and permission secured at all levels. Confidentiality kept patient name not recorded. Data extracted from the chart labeling and coding.

4.10 Dissemination of the Result

The results of the study will be presented and submitted to Addis Ababa University, College of Health Sciences, school of Nursing and Midwifery. A copy of the findings will also be disseminated to SPHMMC and Peer review journals for publication.

5 RESULTS

Totally chart of 251 adult stroke patients were included in this study among those 128 Fifty o (51%) were female and 123 (49%) were male stroke patient. Based on their religion distribution 113(45%) were orthodox, 82(32.7%) were Muslim, 49(19.5%) were protestant and 7(2.8%) were catholic religion follower. Based on their age distribution 87(34.7%) were age less than fifty years 54(21.5%) were age fifty one up to sixty, 50(19.9%) were age sixty one up to seventy and 60(23.3%) were age above seventy one years. Maximum and minimum age of the patients was 95 and 18 years respectively with mean 57.6, median 60 and standard deviation of 17.8 years.

Among those patients 135(53.8%) hemorrhagic stroke and 116 (46.2%) ischemic Stroke, 107(42.6%) of them develop pneumonia, in hospital mortality rate 41(30.3%) from 135 of hemorrhagic and 36(31%) from116 ischemic stroke patients were Dead respectively. From the total patients 128 (51%) of them develop disability, 77(30.7%) of them dead and46 (18.3%) doesn't develop disability. Maximum Glasgow-coma-scale of the patient were 15, minimum were 3, range 12, mean 11.62 median 13, mode 15 with standard deviation of 3.334 and sum of 251 patients Glasgow-coma-scale 2916.

Maximum systolic blood pressure of the patient were 220, minimum were 70, range 150, mean 132.53 with standard deviation of 28.814. Maximum pulse rate of patient were 150, minimum were 30, range 120 and mean 86.94with standard deviation of 18.824. Maximum respiratory rate of patient were 48, minimum were 12, range 36 and mean 22.12with standard deviation of 5.182. Maximum body temperature (^{o}C) of patient were 41, minimum were 35.6, range 5.4 and mean 36.975 with standard deviation of 0.8120. Table one below describes this.

Table 1: Patients' base line data (vital sign) with their statistical parameters of adult stroke patients admitted to SPHMMC, Addis Ababa, Ethiopia, from January 1st 2016 – December 31th 2018

Vital sign (base line data) of the patients	Statistical parameters					
	Mean	Median	Std. Deviation	Range	Minimum	Maximum
Systolic blood pressure(mmHg)	132.53	130.00	28.814	150	70	220
Diastolic blood pressure(mmHg	81.79	80.00	18.781	119	40	159
Pulse rate (Beat per minute) of patient	86.94	84.00	18.824	120	30	150
Respiratory rate (Breath per minute) of patient	22.12	20	5.182	36	12	48
Body temperature (^{o}C)of the patient	36.975	36.9	.8120	5.4	35.6	41

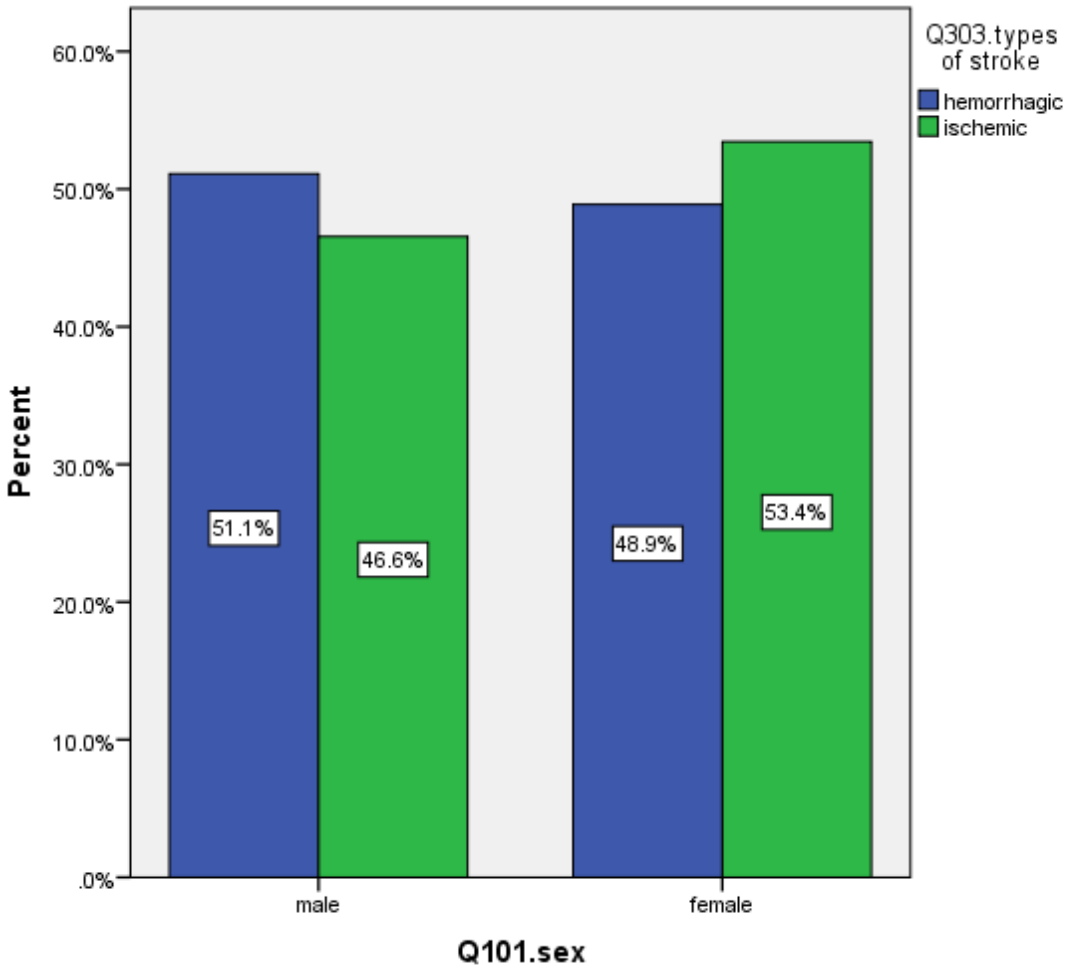

Figure 3: sex with types of stroke among adult stroke patients in SPHMMC from January 1st 2016 December 31/2018

Among 251 stroke patients most of them178 (70.9%) has previous history of hypertension, 173(68.9%) of them has previous history of alcohol drinking 110(43.8%) of them has previous history of Diabetic mellitus, 96(38.2%) of them has previous cardiovascular diseases 56(22.5%) of them has previous history of smoking and 49(19.5%) of them has previous history of stroke.

Table 2 :pre-existing risk factor of stroke among adult stroke patients admitted in SPHMMC, Addis Ababa, Ethiopia, January 1st 2016 _ 31th December 2018.

Variable	Category	Frequency	Percent
History of Stroke	No	202	80.5
	Yes	49	19.5
	Total	251	100.0
History of hypertension (HTN)	No	73	29.1
	Yes	178	70.9
	Total	251	100.0
History of diabetic mellitus (DM)	No	141	56.2
	Yes	110	43.8
	Total	251	100.0
History of cardio vascular diseases (CVD)	No	155	61.8
	Yes	96	38.2
	Total	251	100.0
Alcohol Drinking	No	173	68.9
	Yes	78	31.1
	Total	251	100.0
Smoking	No	195	77.7
	Yes	56	22.3
	Total	251	100.0

From123 of adult male stroke patient 46 (37.3%), from 128 adult female stroke patient 31(25.2), from 87 adult stroke patient age less than fifty years 22(25.2%, from 54 adult stroke patient age

fifty one up to sixty 13(24%), from 50 adult stroke patient age sixty one up to seventy 15(10%) and from 60 adult stroke patients age above seventy one year 27(45%) of them were dead respectively.

From 55 adult stroke patient with GCS level of less than nine 52(94.5%), from196 adult stroke patient with GCS level greater than or equal to nine 25(12.7%), From 107 stroke patient who develop pneumonia 65(60.7%),Among 135 Hemorrhagic adult stoke patient 41(30.3%), From 116 ischemic stroke patient 36 (31%) of them were dead respectively.

From 49 patient who had previous history of stroke 21(42.8%), from 202 patient who had no previous history of stroke 56 (27.7%), From 96 patient who had previous History of CVD 42(43.7%), from 155 stroke patient without previous History of CVD 35(22.6%) were dead.from178 stroke patient with previous History of hypertension 63(35.4%), from 73 stroke patient without previous History of HTN 14(19.2%), From 110 stroke patient with previous history of DM 48(43.6%) of them were dead.

From 60 adult stroke patient with body temperature ≥37.5 °C 42 (70%), From 197 adult stroke patient with pulse rate greater than one hundred 48(24.4%), From 116 adult stroke patient with respiratory rate greater than twenty 59(50.9%), From 95adult stroke patient with systolic blood pressure greater than twenty 27(28.4%) of them were dead.

Table 3: patient status among adult stroke patients admitted in SPHMMC, Addis Ababa, Ethiopia from 1st January – December 31th 2018.

Variable	category	Patient status	
		Dead n/N (%)	Censored n/N (%)
Sex	Male	46/123(37.3)	77/123(62.7)
	Female	31/128(25.2)	97/128(74.8)
Age Group	<51	22/87(25.2)	65/87(74.8)
	51–60	13/54(24)	42/54(76)
	61–70	15/50(10)	35/50(90)
	≥71	27/60(45)	33/60(5.5)
GCS Level	GCS <9	52/55(94.5)	
	GCS ≥9	25/196(12.7)	171/196(87.3)
Types of stroke	Hemorrhagic	41/135(30.3)	94/135 (69.7)
	Ischemic	36/116(31)	80/116(69)
Presence of pneumonia	Yes	65/107(60.7)	42/107(39.3)
	No	12/144(8.3)	132/144(91.7)
History of stroke	Yes	21/49(42.8)	28/49(57.2)
	No	56/202(27.7)	146/202(72.3)
History of CVD	Yes	42/96(43.7)	54/96(56.3)
	No	35/155(22.6)	120/155(77.4)
History of HTN	Yes	63/178(35.4)	115/178(64.6)
	No	14/73(19.2)	59/73(90.8)

Continued from table three patient status among adult stroke patients admitted in SPHMMC

History of DM	Yes	48/110(43.6)	62/110(56.4)
	No	29/141(20.6)	112/141(79.4)
History of drinking	Yes	37/78(47.4)	41/78(52.6)
	No	40/173(23.1)	133/173(76.9)
Grouped body Temperature	< 37.5 ℃	35/191(18.3)	156/191(81.7)
	≥37.5 ℃	42/60(70)	18/60(30)
Grouped SBP	<130	27/95(28.4)	68/95(71.4)
	≥130	50/156(32.1)	106/156 (67.9)
Grouped DBP	<80	28/90(31.1)	62/90(68.9)
	≥80	49/161(30.4)	112/161(69.6)
Grouped Respiratory rate	≤20	18/135(13.3)	117/135(86.6)
	>20	59/116(50.9)	57/116(49.1)
Grouped pulse rate	≤100	48/197(24.4)	149/197(75.6)
	>100	29/54(53.7)	26/54(46.3)

5.3 Survival status of adult stroke patients

Totally 251 adult stroke patient were included in the study that were admitted to SPHMMC the overall mean and median hospital stay was 178 (95%CI: 129.929-226.071) and 79(95%CI: 63.459-94.541) days respectively. From the total 77 (30.7%) of the study participant were died during the follow up period and from this male accounts 46(59.7%) and female 31(40.3%).From adult stroke patient included in the analysis174 (69.3%) were censored. The total extent of follow-up was 8081 person-day, with an incidence rate of 9.5 deaths per 1000 person-day observation (95%CI: 7.621-11.913)

5.4 **Overall Survival Function**

The overall Kaplan- Meier estimate showed that the probability of in-hospital survival of adult stroke patients are high in the first day of admission, which relatively falls as follow up time increases (see figure). During the first day of hospital stay, a maximum (99.6%) probability of survival was observed. During the 4th day of hospital stay 95.6% probability of survival was observed .The overall mean and median survival time of adult stroke patient in the study was found to be almost 178 and 79 days. (See figure 4).

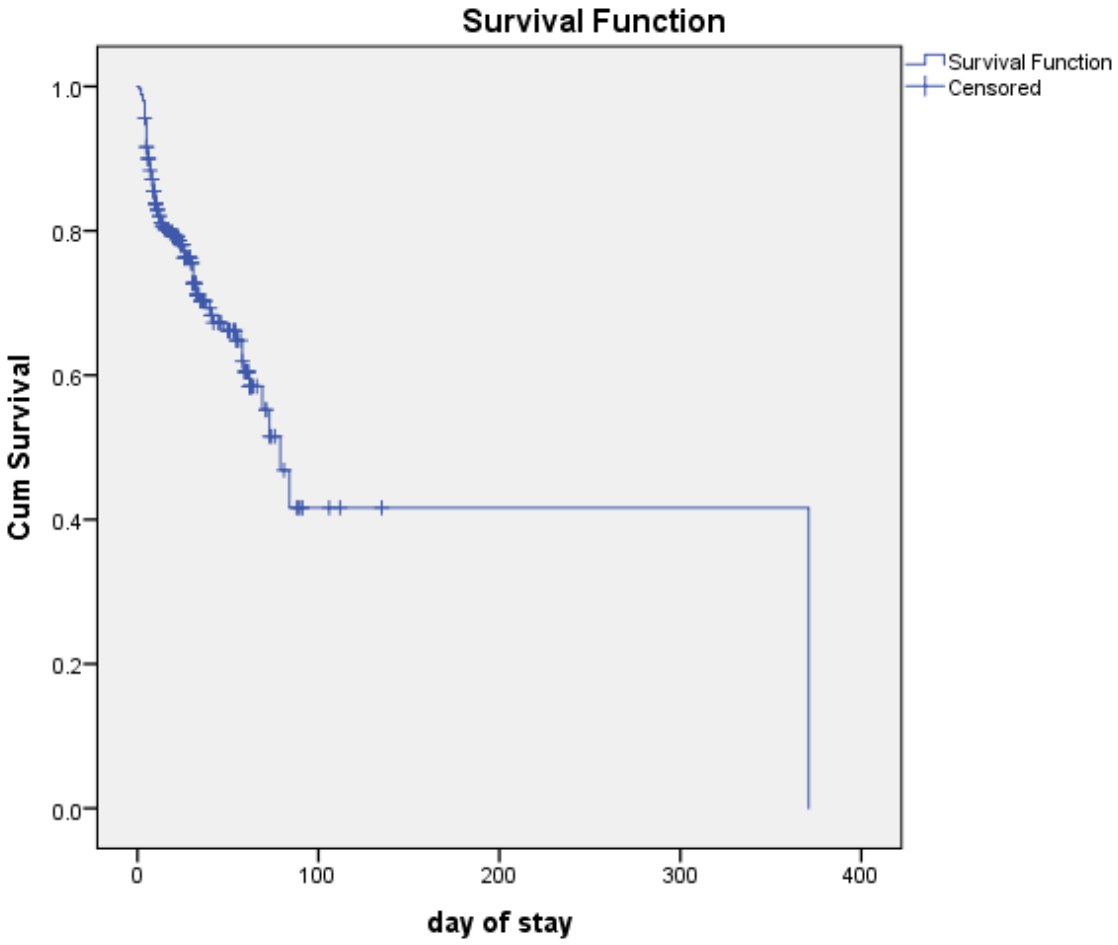

Figure 4: Overall Kaplan-Meier survival in hospital estimate of adult stroke patients admitted to SPHMMC, Addis Ababa, Ethiopia 1st January 2016- 31th December 2018.

5.5 Survival function and Comparison of different categorical variables

The Kaplan-Meier estimator survival curve gives the estimate of survivor function among different groups of variables to make comparisons. Separate graphs of the estimates of the Kaplan-Meier survivor functions were constructed for categorical variables as described below. In general, the pattern that one survivorship function lying above another means the group defined by the upper curve has a better survival than the group defined by the lower curve or had a more favorable survival experience than the group defined by the lower curve. But, the statistical question is whether the observed difference seen on the plot is significant or not. This can be showed by log rank test. From the graph below, there are very clear differences among the various groups survival ship.

In this study, adult stroke patient who had GCS level less than nine has lower survival time with mean survival time of 28.135 with (95% CI: 11.285-44.986) as compared to those who had GCS level greater than nine with mean survival time of 107.393 with (95% CI: 94.961-119.825). (See Fig. 5).

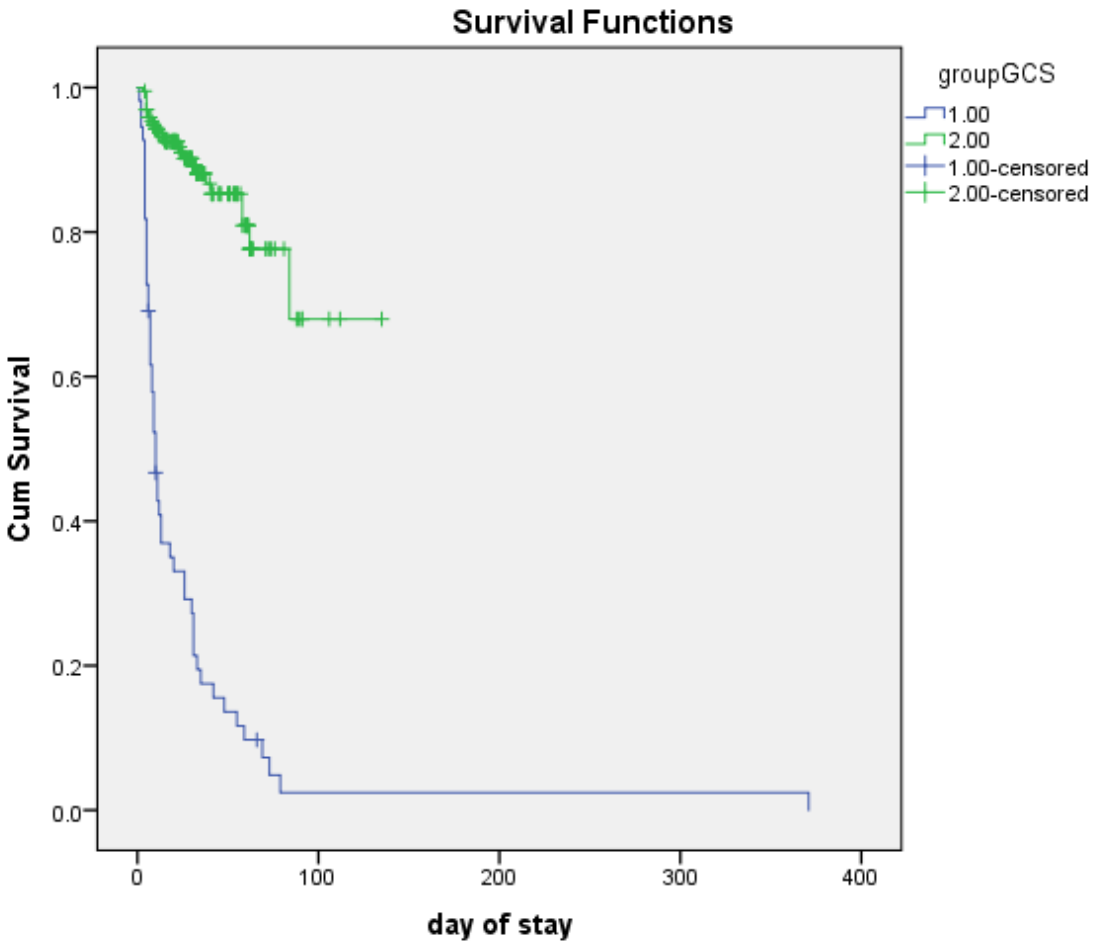

Figure 5: The Kaplan-Meier survival curves compare survival time of adult stroke patients with categories of GCS level in SPHMMC, Addis Ababa, Ethiopia from January 1st 2016- December 31th 2018

In this study, adult stroke patient who develop pneumonia has lower survival time as compared to those who didn't develop pneumonia. (See Fig. 6).

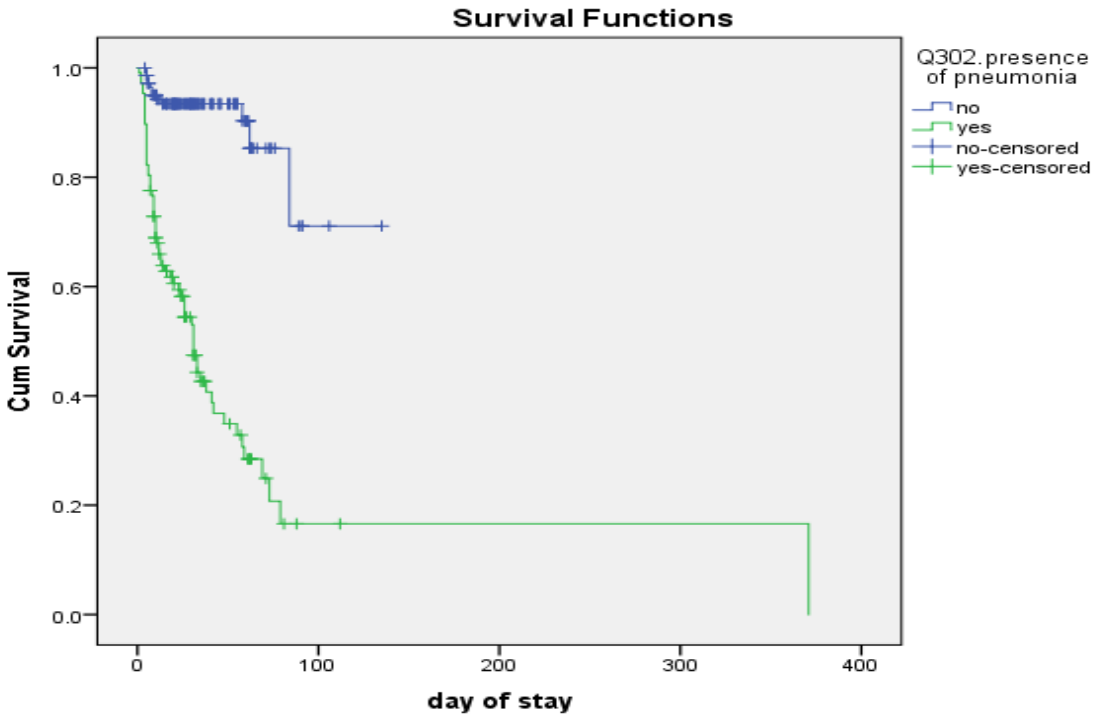

Figure 6: The Kaplan-Meier survival curves compare survival time of adult stroke patients with categories of pneumonia in SPHMMC, Addis Ababa, Ethiopia from January 1st 2016 – December 31th, 2018.

The log-rank test was conducted (table 4) to check for the existence of any significant differences in survival among various levels of the categorical predictors considered in the study. Accordingly, the Kaplan-Meier analysis indicated significant evidence of differences in survival times in the categories.

The table below describes how to evaluate whether or not overall Kaplan Meier curves for two or more categories of covariates are statistically equivalent using the log-rank test. Therefore, based on this statistical test procedure covariant:- GCS Level, body temperature, pulse rate, respiratory rate, previous history of CVD, previous history of DM, previous history of alcohol drinking, previous history of smoking and presence of pneumonia are statistically significant (P-Value<0.05). In the table below, we observed that, the maximum mean survival time is 253.945(95%CI: 201.168-306.721) stroke patient with body temperature < 37.5 ℃ minimum mean survival time is 28.135(11.285-44.986) stroke patient with GCS level < nine.

Table 4: mean and median survival time and log-rank test survivor functions among adult stroke patients in SPHMMC from January 1st 2016- December 31/2018.

Variable	Category	Survival		Log Rank test
		Mean	median	X^2
GCS Level	GCS <9	28.135(11.285-44.986)	10(7.358-12.642)	154.761***
	GCS ≥9	107.393(94.961-119.825)		
Presence of pneumonia	NO	113.331(97.728-128.934)		
	Yes	85.648(46.057-125.239)	31(24.305-37.695)	71.588***
History of CVD	NO	90.453(75.164-105.742)	84	
	Yes	137.010(79.988-)	58(30.109-85.891)	11.498**
History of DM	NO	242.859(178.669-307.050	371	
	Yes	60.689(45.994-75.384)	59(36.829-81.171)	12.522***
History of drinking	NO	222.734(164.750-280.717)	371	
	Yes	50.933(38.800-63.066)	55(28.135-81.865)	13.208***
History of smoking	NO	234.818(176.537-293.099)	371	
	Yes	41.968(31.094-52.841)	33(18.683-47.317)	27.804***
Group Temperature	< 37.5 ℃	253.945(201.168-306.721)	371	
	≥37.5 ℃	32.798(25.039-40.557)	18(.000-39.438	63.003***
Group Respiration	≤20	107.295(92.130-122.460)		
	>20	103.575(52.792-154.358)	42(22.379-61.621)	34.927***
Group pulse	≤100	189.342(125.353-253.331)	84(68.082-99.918)	
	>100	58.266(40.882-75.649)	35(3.080-66.920)	14.149***

NB: *Significant (P-value < 0.05), **significant (p-value<0.01) and significant (p<0.001)***

5.6 Fitted cox proportional hazard model of adult stroke patient mortality predictors

The relationship between the baseline variables and the risk of mortality was analyzed using Cox proportional hazard regression model. The Cox proportional hazard model in Table shows that presence of pneumonia, GCS level, respiratory rate, body temperature, previous history of cardiovascular diseases, previous history of diabetic mellitus, previous history of alcohol drinking and previous history of smoking were statistically significant (p-value $\leq$ 0.25) predictors of adult stroke patient mortality in bivariate analysis. Moreover, to identify independent predictors of mortality and survival, multivariate cox regression was performed for all predictors found to be significantly predicted with survival in the bivariate analysis. However, only GCS level and presence of pneumonia were predictors of mortality in the multivariate analysis.

The result of multivariate analysis shown that with GCS level less than nine were more than four times more likely to die as compared to those who had GCS level greater than or equal to nine (AHR: 4.268(95%CI: 2.257-8.071) with p-value< 0.001). The hazard ratio for adult stroke patient with presence of pneumonia were 3 times more likely dead as compared to those adult stroke patient without presence of pneumonia(AHR: 3.051(95% CI:1.290-7.217) with p-value =0.011).

Table 5: Results of Bivariate and Multivariate Cox regression analysis of adult stroke patients admitted in SPHMMC, Addis Ababa, Ethiopia, from January 1st 2016- December 31th 2018.

Variable	category	Dead n/N (%)	crude HR 95 % CI	P value	Adjusted HR 95 % CI
Sex	Male	46/123(37.3)	1.486(0.93-2.35)	0.093	0.865(0.497-1.50)
	Female	31/128(25.2)	1		1
GCS	GCS <9	52/55(94.5)	11.290(6.97-18.27)	0.000	4.268(2.257-8.071) ***
Level	GCS ≥9	25/196(12.7)	1		1
Pneumoni	Yes	65/107(60.7)	8.926(4.814-16.551)	0.000	3.051(1.290-7.217) *
a presence	No	12/144(8.3)	1		1
History of	Yes	21/49(42.8)	1.577(0.953-2.611)	0.077	0.964(0.516-1.803)
stroke	No	56/202(27.7)	1		1
History of	Yes	42/96(43.7)	2.135(1.359-3.354)	0.001	1.42(0.625-2.084)
CVD	No	35/155(22.6)	1		1
History of	Yes	63/178(35.4)	1.587(0.886-2.842)	0.120	0.827(0.400-1.712)
HTN	No	14/73(19.2)	1		1
History of	Yes	48/110(43.6)	2.257(1.415-3.598)	0.001	1.134(0.643-2.000)
DM	No	29/141(20.6)	1		1
History of	Yes	37/78(47.4)	2.250(1.431-3.537)	0.000	0.967(0.465-2.009)
drinking	No	40/173(23.1)	1		1
History of	Yes	35/56(62.5)	3.145(2.000-4.944)	0.000	1.346(0.637-2.845)
smoking	No	42/195(21.5)	1		1
Temperatu	< 37.5 °C	35/191(18.3)	1		1
re	≥37.5 °C	42/60(70)	5.218(3.300-8.250)	0.000	1.431(0.784-2.611)
Grouped respiratory	≤20	18/135(13.3)	1		1
rate	>20	59/116(50.9)	4.283(2.523-7.273	0.000	1.120(0.573-2.188)
Pulse rate	≤100	48/197(24.4)	1		1
	>100	29/54(53.7)	2.355(1.482-3.743)	0.000	1.571(0.950-2.597)

*NB: *Significant (P-value < 0.05), **significant (p-value<0.01) and*** significant (p<0.001) CHR: - Crude Hazard Ratio, AHR: - Adjusted Hazard Ratio, DM: - Diabetic mellitus, CVD: - Cardio-vascular diseases.HR=1 is reference variable*.

5.7 Test of proportional hazard assumption

Testing the proportional hazard assumption is vital for interpretation and use of fitted proportional hazard models. If P-Value < 0.05 then proportional hazard assumption rejected. Therefore, in this study goodness-of-fit (GOF) particularly the Schoenfeld residuals proportional hazard assumption test for the individual covariates and global tests was used. We observed that each covariate (P-Value > 0.05) and all of covariates simultaneously (Global for Cox proportional hazard P-Value=0.997> 0.05) met the proportional hazard assumption.

6 DISCUSSION

Early diagnosis and identify predictor of mortality for stroke patient is important for stroke management for resource limited environment. This retrospective follow up study, aimed to determine in hospital survival and predictor of mortality among adult stroke patient admitted in SPHMMC.

This study shows that the overall mortality of adult stroke patient admitted in SPHMMC during the study period was 77 (30.7%) this finding is higher than study conducted in ethiopia TASH (19.2%)(31), Felege Hiwot Referral Hospital Bahir Dar 11% (32) in Shashemene Referral Hospital 13.3% (33).also higher than in other African country like in Zimbabwe (25%) (27), in Uganda(26.8%) (4), Middle east In Azerbaijan province (22%)(20) and lower than study conducted in Nigerian teaching hospital 35% (22)**.**This gap might be due to different reasons. One possible source of variation in mortality rate might be difference in sample size for example the study in Nigerian (N=120). Further, possible reason might be the difference in methodology. Also arrival time of the patients to the hospital after onset of stroke may different. They might come earlier or later other possible justification might be the difference in the study period and availability of resource for patient care and treatment modality.

Decreased level of GCS has strong association with adult stroke patient mortality with adjusted hazard ratio 4.787(with 95% CI: 2.414-9.473) with p-value <0.001.GCS level and stroke survival are inversely proportional. The current findings consistent with a study in Uganda (16) and in Nigeria (22). The reason might be patient with decreased GCS level can't survive patient with normal GCS level because brain control all activity of the body so they may develop air way obstruction, aspiration and they can't control hunger. Another reason might be due lack of patient care like oral care and patient positioning.in this study the survival curve in hospital stay patient with GCS level ≥ nine has long survival time than patient GCS level < nine.

In the previous Study in Netherlands (18) hemorrhagic stroke patient, Singapore (23) ischemic stroke patient, Azerbaijan (20) for all stroke type patient and Uganda (16) for all stroke type patient elder or advanced age is relevant predictors of mortality. But in this study age haven't association with stroke mortality. This may be due to younger stroke patients in this study took long time to arrive the hospital after onset of stroke.it may also related to sample size in Uganda

the sample size were one hundred twenty seven patient were included which may be most of them are advanced age.

According to this study incidence of stroke is 9.5 deaths per 1000 person-day observation (95%CI: 7.621-11.913), in Africa by using Systematic Review and Meta-Analysis 535 thousand or 89.9 (87.0–625.3) per100,000 person years new stroke cases(34) and in India incidence of stroke ranged from 105 to 152/100,000 persons per year (35). This gap might be related to using different study design and it might be the study participants differ in many socio demographic aspects and environmental aspects. Another reason might be stroke incidence in Africa by using Systematic Review using ten different researches.

According to retrospective study conducted in Chang Gung In hemorrhagic stroke group, patients with mortality had significantly higher pulse rate and lower systolic BP than those who survived (19).but in this study pulse rate and systolic BP had no association with stroke mortality. It might be related to specification of stroke type only hemorrhagic stroke were focused but in this study both types of stroke (hemorrhagic and ischemic stroke) were included. Another reason might be differ in sample size the previous study has sample size of 62 stroke patients. Beside to this patient included in this study might get better stroke management to control their pulse rate and systolic blood pressure.

In this study pneumonia associated with stroke mortality. Similarly study conducted in Zimbabwe (27),in Nigeria (22) pneumonia is predictor of mortality in stroke patient which might be related to decreased GCS that leads to abnormal lip closure, lingual incoordination, delay or absence of swallowing trigger reflex. Additionally most of the time stroke patient can't feed by themselves that means they develop aspiration if they feed without nasogastric tube or during insertion of nasogastric tube is risk for aspiration pneumonia. But there is difference pneumonia mortality rate of stroke patient who develop pneumonia in three studies above. In this study among 107 stroke patient who develop pneumonia 65 (60.7%) of them dead, in Zimbabwe (27)total of 108 stroke patients exposed to pneumonia 44.0% of the patients died and in Nigeria (22)two stroke patient exposed to aspiration pneumonia and two of them died. This percent difference might be due arrival time of patient to hospital it may be after severely complicated the condition another reason might be differ in sample size of the study.

7 LIMITATION AND STRENGTH OF THE STUDY

7.3 Strength

The study has the following strengths:

Data were also collected by Nurses who are working in medical ward and adult ICU which has an important role in the quality of the data.

The study was conducted for three consecutive years of admission with equal proportional allocation; this may increase generalization rather than using one year data and increase number of events.

Retrospective follow up study with survival analysis which consider time and censoring are used.

Since the event was death it was easy to establish temporal relationship with predictor variables which were documented at the time of admission.

7.4 Limitations

This study has the following weakness:

Since the data were collected from secondary source; some important predictors such fasting-blood sugar, HDL, LDL, nutritional status missed which may have a significant prediction with stroke mortality.

The study area covers only SPHMMC; its generalization to all hospitals of the city and Ethiopia is may not be possible and this might also decrease our precision.

8 CONCLUSION

In the current finding, nearly one third of the patients were died during the follow up period. Hence, the overall incidence rate was 9.5 deaths per 1000 person-day observations. Predictor of mortality with adult stroke patients was decreased GCS and presence of pneumonia.

9 RECOMMENDATIONS

The recommendation below was made based on our study finding:

For federal minster of health and SPHMMC

The federal minster of health works to reduce mortality of non-communicable diseases especially stroke though the incidence of death of stroke in the study area is still high, so that the government should able to strengthen services related with reducing stroke mortality.

Ethiopian federal ministry of health must focus on making the policy for the residency of risk factor of stroke

SPHMMC should carefully, follow up and regular monitoring of patients with and to focus on significantly predictors of mortality.

To health care providers of SPHMMC

A special emphasis and close follow up should be given to patients with stroke high incidence of mortality in the current study.

The health care provider should able to closely asses and give follow- up for stroke patient and identified with predictor of death in this study.

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11 ANNEX

Data Extraction checklist

Information sheet

Title of the Research: Survival In hospital and predictor of mortality among adult stroke patients in Saint Paul's hospital millennium medical college Addis Ababa Ethiopia 2019

Name of Investigator: Tadesse Sahle (BSc in Nursing)

Name of the Organization: Addis Ababa University College of health science, department of nursing and midwifery.

Name of the Sponsor: Addis Ababa University.

Introduction: This information sheet is prepared for Saint Paul's hospital millennium medical college (SPHMMC) administration and Medical and ICU coordinating office. The aim of the form is to make the above-concerned office clear about the purpose of research, data collection procedures and get permission to conduct the research.

Purpose of the Research Project: To Asses in hospital survival and predictor of mortality among adult stroke patient in Saint Paul's Hospital millennium Medical College Addis Ababa Ethiopia 2019

Procedure: In order to achieve the above purpose, information which is necessary for the study took from Medical, ICU medical HMIS Register forms.

Risk and /or Discomfort: Since the study conducted by taking appropriate information from medical chart, it doesn't inflict any harm on the patients. The name or any other identifying information recorded on the questionnaire and all information is taken from the chart kept strictly confidential and in a safe place. The information retrieved only used for the study purpose.

Benefits: The research have no direct benefit for one whose document/ record is included in this research and already died. But the indirect benefit of the research for the participant and other clients in the program is clear. This is because if program planners are preparing predicted plan

there is a benefit for clients in the program of getting appropriate care and treatment services for those survived and other newly diagnose stroke. In all, the research work has a paramount direct benefit for health care planners and managers.

Confidentiality: To reassure confidentiality the data on the chart collected not including the name of the clients and the information collected from this research project kept confidential and stored in a file cabinet. In addition, it is not be revealed to anyone except the investigator and it will be kept in a key and locked system with computer pass ward.

Person to contact: This research project reviewed and approved by the institutional review board of College of Health Science Addis Ababa University and SPHMMC. If you have any question you can contact Investigator.

Tadesse Sahle, Addis Ababa University, College of Health Science, School of Nursing and midwifery: principal investigator

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12.1.2-Data collection tools

This checklist is prepared for the collection of Patient socio demographic data, Pre-existing stroke risk factors, patient base line data or vital sign, Diagnosis and neurological assessment of the patient and other major predictors and outcomes related information that are important for the assessment of in hospital survival and predictor of mortality among adult stroke patients in Saint Paul's hospital millennium medical college Addis Ababa Ethiopia 2019. All this information retrieved from the client's registration book and from an individual patient chart without mentioning the name of the clients.

Table 6: Data Extraction sheets for survival in hospital and predictor of mortality among adult stroke patients in SPHMMC Addis Ababa Ethiopia 2019.

Question number	Question	answer	Code	Skip
	Part one Patient socio-demographic data			
Q 101	Sex	Male	1	
		Female	2	
Q 102	Age in year			
Q 103	Religion	Orthodox	1	
		Muslim	2	
		Protestant	3	
		Catholic	4	
		Other	5	
	Part two Patient base line data (vital sign)			
Q 201	Systolic blood pressure			

Q202	diastolic blood pressure			
Q203	Pulse rate			
Q 204	Respiratory rate			
Q 205	Temperature			
	Part three Diagnosis and neurological assessment			
Q 301	Initial level of consciousness GCS			
Q 302	Presence of pneumonia	Yes	1	
		No	2	
Q303	Stroke subtype	Hemorrhagic Stroke	1	
		Ischemic stroke	2	
	Part four Pre-existing stroke risk factors			

Q 401	History of stroke	Yes	1	
		No	2	
Q 402	History of hypertension	Yes	1	
		No	2	
Q 403	History of diabetic mellitus	Yes	1	
		No	2	
Q 404	History of Cerebrovascular diseases	Yes	1	
		No	2	
Q 405	History of alcohol drinking	Yes	1	
		No	2	
Q 406	History of smoking	Yes	1	
		No	2	
Q407	Date of admission DD/MM/YY			
Q 408	Patient status	censored	0	If answer for Q 507 is censored skip Q 509

		Death	1	If answer for Q 507 is death skip Q 508
Q 409	is there any disability on the patient	Yes	1	
		No	2	
Q 410	Date of death DD/MM/YY			
Q411	Date of discharge DD/MM/YY			