

## SEVERITY OUTCOME OF ACUTE ISCHEMIC STROKE IN CORELLATION TO HYPERGLYCEMIA

Genalin A. Estandian, M.D.,\* Carmenchu Rueda, M.D.,\*\* Clara Rivera, M.D.,\*\* Melanio Grayda, M.D.\*\*\* and Johnny Lokin, M.D.\*\*\*\*

### ABSTRACT

**Background:** Stroke is the third leading cause of death worldwide. Degree and incidence of hyperglycemia were thought to be related to severity of acute stroke. The research aims to investigate the correlation of hyperglycemia and stroke severity outcome.

**Objectives:** 1) Determine prevalence of acute ischemic stroke with hyperglycemia. 2) Correlate outcome of acute ischemic stroke with hyperglycemia.

**Materials and Methods:** All 18 years old and above with acute stroke symptoms were screened. Those who qualify were subjected to Fasting Blood Glucose and/or HgbA<sub>1c</sub> and imaging study. Capillary Blood Glucose was monitored using blood glucose monitor (Elite, Bayer) upon admission to 48-72 hours. Functional capacity at days 3, 7, 14 and 30 were recorded using Modified Rankin Score. Participants who were known diabetics with or without medicine, with cranial imaging showing hemorrhagic stroke and below 18 years old were all excluded.

**Results:** Total eligible subjects were 18, 11 males (61%); 7 females (38.9%). There were 27.8% hyperglycaemic; normoglycemic were 72.2%. Mean age were 63.2 years. Correlation of Modified Rankin Score and Capillary Blood glucose did not show correlation (p value = 0.882). Subjects were followed-up at days 3, 7, 14 and 30 utilizing MRS. The study shows trend of poor functional capacity if Modified Rankin Score is higher on admission and as time progressed.

**Keywords:** Acute Ischemic Stroke, Hyperglycemia

### INTRODUCTION

Stroke is the third leading cause of death worldwide. It is estimated that 21 per 1,000 patients per year experienced a first stroke, two thirds of them requires medical intervention. Stroke is a significant healthcare burden recognized globally. According to the World Health Organization, by the year 2020, there will be an epidemic of stroke. During the 2004 World Stroke Day Declaration, it was said that if nothing is done the predicted number of people who will have stroke will double by 2020. If we apply what we have known already, half of the number of strokes could have been prevented,<sup>1</sup> Cerebral venous occlusion resulting in venous infarct constitutes about 1% of the strokes.

The problem of stroke has a particularly strong impact. Stroke is the predominant vascular disease in many parts of Asia.<sup>1</sup> In 1990 alone, the World Health Organization estimated that there are 2.1 million people who died of stroke in Asia.<sup>2</sup> Despite the importance of stroke in Asia, there have been very few prospective international studies of stroke within this region. Stroke is a heterogeneous disease. Ischemic and hemorrhagic strokes are the 2 main types of stroke, with very different pathogenesis and outcome.<sup>3</sup>

Diabetic persons have a high susceptibility to atherosclerosis and up to 80% of those with DM type 2 suffered glucose intolerance prior to the disease. The risk of ischemic strokes is approximately doubled among the diabetic than the non-diabetic persons. Furthermore, post stroke hyperglycemia leads to a greater risk of mortality and poorer outcome.<sup>2</sup> Clinical studies suggested that hyperglycemia is a risk factor for stroke and increases brain injury during stroke or cardiac arrest.<sup>4,5,6</sup>

The etiology of Hyperglycemia in Acute Stroke may be attributable to several underlying mechanisms. These mechanisms include: a non-specific reaction to acute stress; autonomic, hormonal, and metabolic alterations as a result of tissue injury; uncovering of underlying latent diabetes by the acute stroke; activation of the hypothalamo-pituitary-adrenal axis attributable to a direct

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\*Medical Resident, Department of Internal Medicine, De los Santos-STI Medical Center, E. Rodriguez Quezon City

\*\*Consultant, Department of Internal Medicine, De los Santos-STI Medical Center

\*\*\*Consultant, Department of Internal Medicine, De los Santos-STI Medical Center; Adult Cardiology Consultant Philippine Heart Center, Quezon City

\*\*\*\*Consultant, Department of Internal Medicine, De los Santos-STI Medical Center; Professor, University of Santo Thomas, Manila; Past President of Philippine Neurological Association

Reprint request to: Genalin A. Estandian, M.D., De los Santos - STI Medical Center, E. Rodriguez St., Quezon City, Philippines.

effect of brain ischemia on the pituitary and irritation of the glucose regulatory centers in the brain by a stroke. Among these mechanisms, the most popular stroke related hyperglycemia is the stress response with activation of hypothalamo-hypophyseal-adrenal axis, which leads to an increase in cortisol and catecholamine levels. Patients with hyperglycemia will have a poor stroke outcome because severe stroke induces higher levels of catecholamines and corticosteroids. This represents an epiphenomenon associated with a poor outcome rather than having any causal relationship.<sup>15</sup>

Hyperglycemia in Acute Ischemic Stroke Outcome is associated with worst clinical outcome according to Moulin *et al*, 1997. A meta-analysis on Stroke patients who is hyperglycemic revealed more than three-fold increase in 30-day mortality for non-diabetic with hyperglycemia compared with a two fold increase for diabetic with hyperglycemia on admission.<sup>7</sup> This is complicated by the high prevalence of post-stroke hyperglycemia. In one series of acute stroke patient, it was estimated that up to 68% had post-stroke hyperglycemia. It is possible that post-stroke hyperglycemia is primarily a stress response in relation to stroke size and severity.<sup>8</sup> However, post-stroke hyperglycemia is prevalent across all clinical subtypes and severities of stroke and is not restricted to those severely affected alone. Although some studies have suggested that stress hyperglycemia may occur as a result of neuroendocrine dysregulation in response to insular cortex lesions. It remains unclear whether hyperglycemia arises as an epiphenomenon of stroke in general neither consequence of specific anatomic involvement, nor as a reflection of underlying hyperglycemia.<sup>9</sup> Baird, MRCP *et al*, conducted a prospective study to clarify the effect of persistent hyperglycemia after stroke. They concluded that persistent hyperglycemia after ischemic stroke is an independent determinant of infarct expansion which is associated with worse clinical outcome severity.

### *Background of the Study*

A high proportion of patients suffering an acute stress such as stroke or myocardial infarction may develop hyperglycemia, even in the absence of a pre-existing diagnosis of diabetes. Both human and animal studies suggest that this is not a benign occurrence and that stress-induced hyperglycemia is associated with a high risk of mortality after both stroke and myocardial infarction. Moreover, recent evidence shows that glucose lowering with insulin reduces ischemic brain damage in animal models of stroke. Despite these observations, the relationship

between glucose levels and outcome after stroke in diabetic and non-diabetic patients has not been well characterized, and those studies that have examined this relationship have reported conflicting results.

Hyperglycemia without pre-existing diabetes mellitus has been recognized in acute stroke for a long time. Diabetes mellitus is clearly a risk factor for the occurrence of stroke and for its poor prognosis. It is also linked to increased mortality and morbidity among critically ill and stroke patients. However, there is no consensus on whether hyperglycemia per se is the cause of poor stroke outcomes. The influence of persisting hyperglycemia after stroke has not previously been examined.<sup>10</sup> The incidence and degree of hyperglycemia were related to the severity of acute stroke and hospital mortality was significantly higher in hyperglycaemic patients.<sup>8</sup> Since then, the association between hyperglycemia and stroke outcome has been published in many more studies. Henceforth, the researcher would like to investigate on hyperglycemia if there is correlation to an acute ischemic stroke severity outcome in our own setting.

### *Objectives*

1. To determine the prevalence of acute ischemic stroke with hyperglycemia.
2. To correlate the outcome of acute ischemic stroke with hyperglycemia.

### *Significance of the Study*

The findings of this study will be very helpful to the physicians, particularly the resident physicians in lowering the capillary blood sugar of critically ill patients especially among acute ischemic stroke, since they are the front liners in handling the patients. This study will make the medical residents aware in maintaining a normoglycemic serum level of acute stroke and critically ill patient to reduce the risk of organ failure and even death. Lastly, this study can be used as reference for future researches.

### *Definition of Terms*

1. Acute Stroke – pertains to the rapid development of focal or global disturbance of cerebral function, lasting more than 24 hours of leading to death with no apparent cause other than a vascular in origin (WHO 1973).
2. Hyperglycemia – it refers to capillary blood glucose level  $\geq 7$ mmol/L (126 mg/dl) on admission to

48-72 hours of monitoring, with normal HbA<sub>1c</sub> was defined as  $\leq 6.2\%$  or normal FBS without pre-existing diabetes mellitus.<sup>16</sup>

3. Diabetes Mellitus – it represents the FBS > 7 mmol/L on 2 separate occasion, with symptoms of diabetes with a random blood sugar  $\geq 11$  mmol/L (200mg/dl).<sup>16</sup>
4. National Institute Health Stroke Scale (NIHSS) – is accepted widely for measuring acute stroke deficits in clinical trials.
5. Modified Rankin Scale (mRS) – developed to assess functional outcome after stroke symptoms. A score of 0-2 having an independent state and a score of 3-5 is a dependent state.

#### *Scope and Delimitation*

This study was conducted for four months in De los Santos-STI Medical Center which is located in E. Rodriguez Avenue, Quezon City. Subjects are recruited as they come. No randomization was done because the types of subjects enrolled are very specific. Only twenty patients were enrolled, two subjects were eliminated. One of them did not consent for CBG monitoring while the other one, the patient's relative didn't signed the Informed consent. Thus, 18 subjects remained in the study. The researcher used a National Institute Health Stroke Scale (NIHSS) as a method in screening the subjects with acute ischemic stroke. The Fasting blood sugar and/or the Hemoglobin A<sub>1c</sub> were done by a qualified Medical Technologist, to screen the subjects to make sure there was no pre-existing Diabetes Mellitus. A human factor can affect the results of Capillary Blood Glucose since two or more qualified nurses did the CBG monitoring. Also, to eliminate technical factors the instrument use (Elite, Bayer) was calibrated daily by the Medical Technologist. Cranial Imaging like the CT scan or MRI is a confirmatory test for acute ischemic stroke. Modified Rankin Score (MRS) is used as outcome measurement upon admission and on days 3, 7, 14 and 30 for prognostication purposes. Scores are based on a scale of 0-6, lower scores indicating better functioning. (Please see appendix). The research is centered on the effect of hyperglycemia on the severity outcome among acute ischemic stroke patients using Modified Rankin Score (mRS) according to their functional activity which is the primary endpoint. This study did not include the effects of hyperglycemia in relation to the infarct location and size since another imaging modality like Cranial MRI on follow-up for comparison in the actual infarct size volume. Other risk factors that may affect the severity outcome of acute stroke was not also determined.

#### *Review of Related Literature and Studies*

Many studies have been conducted to determine and analyze the effects of hyperglycemia in the severity outcome of acute ischemic stroke. A comprehensive review of related studies and literature was done by the researcher to serve as a guide in the development of the present study. Mostly foreign studies and literature were deemed by the researcher to be analyzed and correlated to the present study problem.

The presence of hyperglycemia prior to stroke or cardiac arrest can increase neuronal damage caused by brain ischemia. Acute hyperglycemia shows this effect in animal models of stroke. However, chronic hyperglycemia with additional acute elevation of blood glucose was more common pre-morbid states of stroke patients. The effect of chronic hyperglycemia on regional cerebral blood flow (rCBF) is unclear but blood flow changes may play a role in this ischemic cell damage. Both acute and chronic hyperglycemia are associated with decreased rCBF and the mechanism for this effect does not appear to adapt to chronic hyperglycemia.<sup>12</sup>

Hyperglycemia was found to be the only independent predictor of intracerebral hemorrhage in a study of 138 patients with ischemic stroke treated with tissue Plasminogen activator. Serum glucose levels higher than 200mg/dL (11.1 mmol/L) were associated with a 25% symptomatic hemorrhage rate.<sup>13</sup> Although there was compelling evidence that hyperglycemia has an effect on the outcome, debate continues as to whether the effect is independent of the influence of diabetes mellitus or initial stroke severity.<sup>10</sup>

In Asia, few studies have been done regarding stroke. The risk factors for early death after acute stroke in Asia mirror those in Europe and North America. For instance, elderly and diabetic patients have a uniformly higher death rate regardless of the type of stroke. The detrimental effects of diabetes on the outcome of cerebrovascular disease are in accordance with previous reports that diabetics have poorer outcome after stroke and coronary artery disease than non-diabetics. This observation may have important implications. The aging populations and the escalating number of diabetes in Asia add more significance to their observations.<sup>3</sup>

## **MATERIALS AND METHODS**

### *Inclusion Criteria*

#### *Subjects*

All patients, 18 years old and above who presented with acute stroke symptoms were included. Stroke

onset is taken at the time the neurologic dysfunction is first observed. For a patient who awakens with symptoms, onset of time was regarded as the time they were last seen to be symptom-free. All patients should have a National Institute of Health Stroke Scale (NIHSS) score of  $\geq 4$  and a Modified Rankin Score (MRS) of  $\geq 1$ . Informed consent was obtained from the patient or next of kin.

#### *Glucose*

Fasting Serum Glucose and/or HgbA<sub>1c</sub> are all measured upon admission. Serial Capillary Blood Glucose monitoring was measured using the blood glucose monitor (Elite of Bayer) upon admission up to 48 or 72 hours from admission. Hyperglycemia is defined as a mean glucose level 7 mmol/L (126 mg/dl) over the monitoring period and a normal HgbA<sub>1c</sub> was defined as 6.2%.<sup>16</sup>

#### *Imaging Study*

Patients were subjected to Cranial CT Scan or MRI with evidence of acute ischemic stroke.

#### *Exclusion Criteria*

#### *Subjects*

Patients who are below 18 years old, known diabetic, with or without medications were excluded. Those who have no cranial CT Scan or MRI and with imaging showing hemorrhagic stroke were also excluded.

#### *Outcome Measurements*

Assessment of severity of stroke outcome was measured by using Modified Rankin Score (mRS) for functional capacity. Reassessments were scheduled at day 3, 7, 14 and 30 after the admission.

#### *Data Collection*

Total populations of 49 patients of acute ischemic stroke were assessed for eligibility. Twenty nine patients were diabetic, hence were excluded. Only 20 patients meet the eligibility criteria, but 18 patients were only enrolled. Two eligible patients were excluded due to no Capillary Blood Glucose monitoring and no informed consent (Refer to fig 1). The following data were analyzed from the subjects:

1. Age
2. Gender
3. Presence or Absence of Hyperglycemia

4. mRS
5. NIHSS

#### *Statistical Analysis*

#### *Sample Size*

The sample size analysis was based on the power calculation wherein Z is 95%. (Refer to table I). The calculated population size is 16 patients.

#### *Statistical Treatment*

Statistical treatment of data uses the SPSS version 12. The frequency was used to determine the prevalence of acute stroke with hyperglycemia. Percentile of Hyperglycemia patient was determined in the group. The hyperglycaemic groups are 27.8% while the normoglycemics are 72.2% in the enrolled subjects. Correlation of Modified Rankin Scale (mRS) and Capillary Blood Glucose are correlated using Pearson Correlation 2 tailed. NIHSS and mRS were correlated using Pearson Correlation 2 tailed done on admission. Lastly, Microsoft Excel was used in obtaining the trend of MRS over time of observation.

## **RESULTS**

A total of 49 patients were screened. Twenty subjects meet the criteria but only 18 of them completed the study (Refer to fig. 1). The distribution of subjects are 11 male subjects which accounts for 61%. On the other hand females are 7, accounting for 38.9% (Refer to table IV). The hyperglycaemic groups are 27.8% while the normoglycemics are 72.2% in the study (Refer to table III; fig. 2). Correlation of Modified Rankins Score and Capillary Blood glucose shows there is no correlation of the two variables since the p value is non-significant at 0.882 (See table V). Subjects were followed-up at days 3, 7, 14 and 30 from the ictus by using Modified Rankin Score as measurement of functional capacity for acute stroke outcome. The graph shows inclination of poor functional capacity if mRS is higher on admission as time progressed (See table VI; fig. 3).

## **DISCUSSION**

Based on the said results, this study did not show correlation of hyperglycemia and the severity outcome of acute ischemic stroke. However other factors might contribute to the severity of stroke. The prognosis of stroke that contributes to its severity

may be due to age, stroke location, stroke size, and other pre morbid conditions.

Related studies demonstrated that hyperglycemia after stroke is common and associated with a poorer outcome done to animals as well as humans. According to Baird *et al.*, persistent hyperglycemia, defined as blood glucose  $\geq 7.0$  mmol/L, in the first 72 hours after acute stroke, was associated with an increase in infarct size and worse stroke outcome.<sup>10</sup>

Current guidelines recommend to lower blood glucose but disagree on the threshold at which to intervene, and makes no comment on specific insulin treatment regimens or treatment targets. The heterogeneity of the stroke population may indicate that standard protocols cannot be applied to all patients. Nutritional intake varies between stroke patients and non-stroke patients. Adjustment for oral intake is difficult following stroke nutritional maintenance to achieve the targeted glucose level.<sup>9</sup>

## CONCLUSION

This study exhibits no direct relationship between hyperglycemia and severity outcome of acute ischemic stroke but other factors might interplay like age, previous transient ischemic attack, smoking, dyslipidemia, hypertension, coronary heart disease, valvular heart disease and malignancy.

## RECOMMENDATIONS

In the light of the foregoing findings, the following recommendations were drawn: A larger sample size, longer mean follow up, and a randomized controlled trial should be done to strengthen or disprove the results of this study. A more precise continuous glucose monitoring device should be used in future studies to eliminate or lessen technical error. This may serve as a starting point for other related researches to investigate different strategies in lowering blood glucose levels in patients with acute ischemic stroke.

## ACKNOWLEDGEMENT

We would like to acknowledge Mr. Alvin Atlas and Dr. Macario Reandelar who have helped in the completion of this study.

**Table I. Computation of Population**

Sample Population Calculation	
$N = \frac{z^2 pg}{d^2}$	
Z = 95%	
$N = \frac{(1.96)^2 (0.979) (0.021)}{(0.05)^2} = 15.19 \sim 16 \text{ patients}$	

Legend:

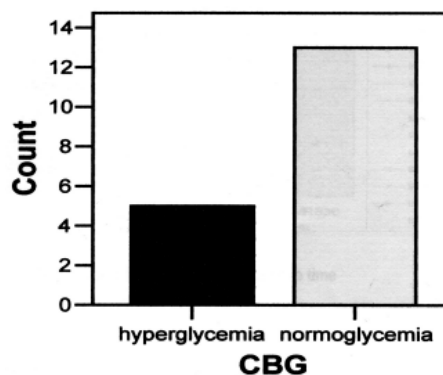
N = sample size  
Z = Confidence Interval  
P = population size  
D = alpha error

**Table II. Clinical Characteristics on Admission**

Characteristics:	No. (%)
Number of patients	n = 18
Age in years (mean, sd)	63.2 ± 11.9
Gender (M/F)	11/18, 7/18
Admission plasma glucose (mg/dl) (mean, sd)	141.3 ± 24.5
Admission HbA1c (%) (mean, sd)	5.8 ± 0.919
Admission NIHSS (mean, sd)	6.5 ± 4.76
Admission MRS (mean, sd)	2.5 ± 1.04
Co-Morbids	
Hypertension	16/18
COPD	1/18
Dyslipidemia	8/18
Valvular Heart Disease	2/18
Malignancy	1/18
Post TIA	2/18
Location of Infarcts	
Lacunar	11/18
Parietal	5/18
Right MCA	1/18
Temporal	1/18

**Table III. Frequency of Capillary Blood Sugar in Acute Stroke**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hyperglycemia	5	27.8	27.8	27.8
	Normoglycemia	13	72.2	72.2	100.0
	Total	18	100.0	100.0	



**Fig 2.** Shows the Percentage of Hyperglycemia and Normoglycemia

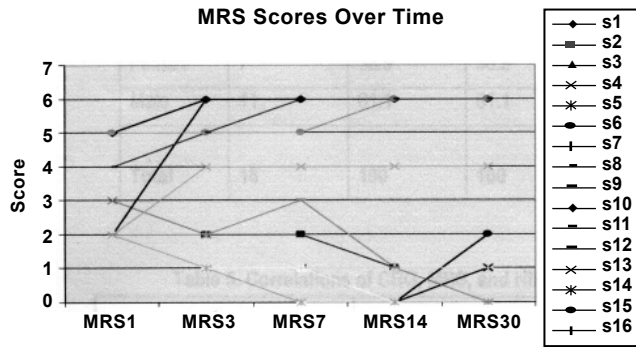


Fig 3. Shows Relationship of MRS As To Time

Table IV. Frequency and Percentage Distribution According to Gender

Gender	Frequency	Percent	Valid Percent
Female	7	38.9	38.9
Male	11	61.1	61.1
Total	18	100	100

Table V. Correlations of CBG, MRS and NIHSS

		CBG	MRS	NIHSS
CBG	Pearson	1	-.038	-.218
	Correlation			
	Sig. (2-tailed)		.882	.386

Correlation is significant at the 0.01 level (2-tailed).

Table VI. MRS Over Time

Subject	MRS1	MRS3	MRS7	MRS14	MRS30
S1	5	6	6	6	6
S2	2	2	2	1	0
S3	2	1	1	1	1
S4	3	2	1	0	1
S5	2	1	1	0	1
S6	2	1	1	0	2
S7	2	6	6	6	6
S8	2	1	1	0	0
S9	2	1	1	0	0
S10	2	1	0	0	0
S11	2	1	1	0	0
S12	2	1	1	0	0
S13	2	4	4	4	4
S14	2	1	0	0	0
S15	5	5	5	6	6
S16	2	2	1	1	1
S17	4	5	6	6	6
S18	2	2	3	1	0

**NATIONAL INSTITUTE HEALTH STROKE SCALE (NIHSS) BASE ON THE FOLLOWING PARAMETER:**

Factors	Scale definition	Score
	0 = Alert; keenly responsive	
1. Level of Consciousness	1 = Arousal by minor stimulation to obey, answer, or respond 2 = Requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements. 3 = Responds only with reflex motor or Autonomic effects or totally unresponsive, flaccid areflexic.	
2. Best Gaze	0 = Normal 1 = Partial gaze palsy; gaze is abnormal in one or both eyes, but forced deviation or total gaze paresis is not present. 2 = Forced deviation, or total gaze paresis not overcome by the oculocephalic maneuver.	
3. Visual	0 = No visual loss 1 = Partial hemianopia. 2 = Complete hemianopia. 3 = Bilateral hemianopia (blind including cortical blindness).	
4. Facial Palsy	0 = Normal symmetrical movements 1 = Minor paralysis (flattened nasolabial fold, Asymmetry on smiling) 2 = Partial paralysis (total or near-total paralysis of lower face) 3 = Complete paralysis of one or both sides (absence of facila movement in the upper and lower face).	
5. Motor Arm	0 = no drift; limb hold 90° or 45° for full 10 secs. 1 = Drift; limb holds 90° or 45° but drifts down before full 10 secs; does not hit bed or other support. 2 = Some effort against gravity; limb cannot get to or maintain (if cued) 90° or 45°, drifts down to bed, but has some effort against gravity. 3 = No effort against gravity; limb falls. 4 = No movement. UN = amputation or joint fusion, explain: 5a Left arm; 5b Right arm	

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6. Motor Leg	0 = No drift; holds 30° position for full 5 seconds. 1 = Drift, leg falls by the end of the 5 secs period does not hit bed. 2 = Some effort against gravity; leg falls to bed by 5 secs. but has some effort against gravity. 3 = No effort against gravity; leg falls to bed immediately. 4 = No movement. UN = Amputation or joint fusion, explain: 6a Left leg; 6b Right leg.	3 = Mute, global aphasia; no usable speech or auditory comprehension.
7. Limb Ataxia	0 = Absent 1 = Present in one limb. 2 = Present in two limbs. UN = Amputation or joint fusion, explain	10. Dysarthria 0 = Normal 1 = Mild to moderate dysarthria; patients slurs at Least some words and at worst, can be understood with some difficulty. 2 = Severe dysarthria patient's speech is so slurred as to be unintelligible in the absence of or proportion to any dysphasia, or is mute/anarthric. UN = Intubated or other physical barrier, explain:
8. Sensory	0 = Normal; no sensory loss. 1 = Mild to moderate sensory loss; patient feels pinprick less sharp or dull on the affected side; or there is a loss of superficial pain with pinprick but patient is aware of being touched. 2 = Severe to total sensory loss; patient is not aware of being touched in the face, arm, and leg.	11. Extinction and Inattention 0 = No abnormality 1 = Visual, taste, auditory, spatial, or personal inattention or extinction to bilateral simultaneous stimulation in one of the sensory modalities. 2 = Profound hemi-inattention or extinction to more than one modality; does not recognize own hands or orients to only one side of space.
9. Best Language	0 = No aphasia; normal 1 = Mild to moderate aphasia; some obvious loss of fluency or facility of comprehension, without significant limitation on ideas or form of expression. Reduction of speech and/or comprehension, however, makes conversation about provided materials, difficult or impossible. 2 = Severe aphasia; all communication is through grafmentary expression; great need for inference, questioning, and guessing by the listener carries burden of communication. Examiner cannot identify materials provided from patient response.	

**Modified Rankin Scale. The following factors are included.**

Score	Description
0	No symptoms at all
1	No significant disability despite symptoms; able to carry out usual duties and activities.
2	Slight disability, unable to carry out all previous activities, but able to look after his own affairs without assistance.
3	Moderate disability; requiring some help, but able to walk without assistance.
4	Moderately severe disability; unable to walk without assistance and unable to attend to his own bodily needs without assistance.
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention.
6	Dead
Total:	0-6

APPENDICES A

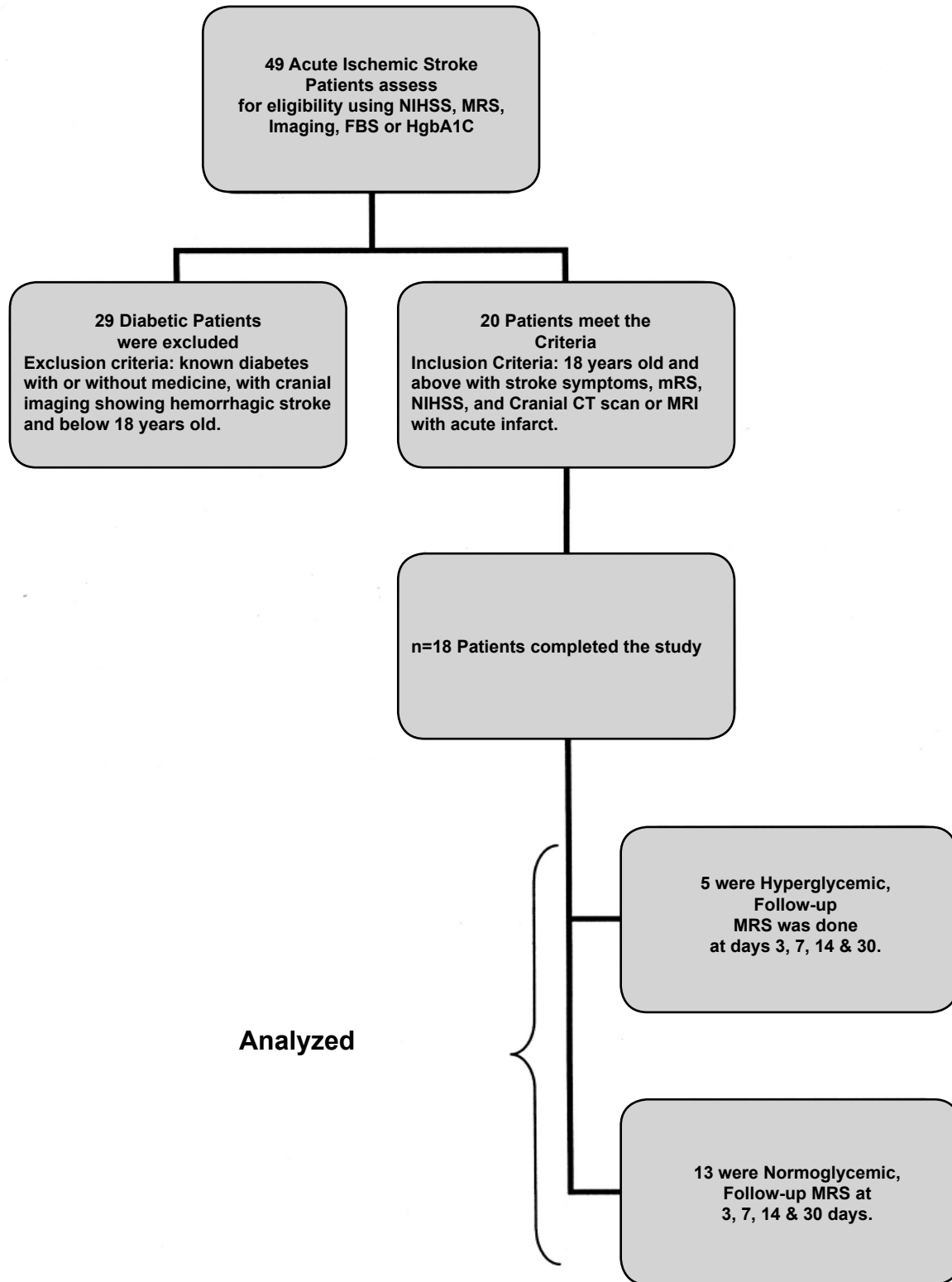


Fig 1. Flowchart of the Study

## APPENDIX B

## Consent to Participate in the Study

To Whom It May Concern:

For Qualified Patient:

I/We, \_\_\_\_\_, of legal age,  
(Name of Patient/Relative)

With a residence/postal address of \_\_\_\_\_ is hereby consent to be part in the Study of Severity Outcome of Acute Stroke in Correlation to Hyperglycemia.

This consent is given after it has been fully explained by the researcher in simple, adequate, and comprehensible words of the nature of the study and its probable adverse events that may be encountered. If I agree to be enrolled in the study, I will receive the best medical care for stroke as stated in the Guidelines for Stroke Management. I will be followed up by the qualified doctors and nurses even after my discharged. I have the right to terminate my participation in this study at any time without incurring prejudice. Lastly, all the data gathered from this study is strictly confidential. That the only person permitted to utilize the data is the researcher of this study and if required by authorized representative of the Department of Health.

\_\_\_\_\_  
Patient's Name/Relative's Name over Signature

\_\_\_\_\_  
Investigator's signature

\_\_\_\_\_  
Witness' Name and Signature

\_\_\_\_\_  
Date

Pagsang-Ayon ng Pasyente sa Pag-aaral

Sa Kinauukulan:

Sa mga Pasyenteng Kuwalipikado:

Ako si, \_\_\_\_\_, \_\_\_\_\_ taong gulang,  
(Pangalan ng pasyente o kamag-anak)

Nakatira sa \_\_\_\_\_, ay malugod na suma-ilalim sa pag-aaral ng Severity Outcome of Acute Stroke in Correlation to Hyperglycemia.

Ibinibigay ko ang pagsang-ayon matapos lubusang ipaliwanag sa akin/amin ng sapat, simple, at maliwanag ang katangian ng pag-aaral, pati ang maaring maging epekto nito. Ito man ay mabuti o masama. Kung ako man ay mapabilang sa pag-aaral na ito, makakatanggap ako ang pinakamabuting pangangalaga para sa stroke na nasasaad sa, Guidelines for Stroke Management. Ako din ay susubaybayan ng kuwalipikadong doctor at nars kung ako'y nailabas na sa ospital. Karapatan ko ang huminto sa pakikibahagi sa pag-aaral sa anumang panahon na walang anumang pag-iimbot o pagbabago ng uri ng pangangalaga sa akin. Ang mga nakalap na impormasyon ay mananatiling kompidensyal at maari lamang malaman ng mga taong may kaugnayan sa pag-aaral na ito at ng mga kinauukulan kaugnay ng patakaran ng local na pamahalaan na ipinapatupad ng Ahensiya ng Kalusugan.

\_\_\_\_\_  
Pangalan at lagda ng Pasyente/Kamag-Anak

\_\_\_\_\_  
Lagda ng Imbestigador

\_\_\_\_\_  
Pangalan at Lagda ng Saksi

\_\_\_\_\_  
Petsa

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# METRO LIPA MEDICAL CENTER

Lipa City, Batangas

is inviting the following subspecialists to practice in our hospital: Endocrinologist, Neurologist, Rheumatologist, Allergologist-Immunologist, and Hematologist. Visiting consultants will be offered free privilege to practice (free clinic space inclusive of secretaries and inclusion in the referrals).

For more information, please inquire from  
Ms. Jernalyn Belga, Tel. No.: (043) 7560549