Capstone Practicum Report Final

Project title: Establishing the compliance rate to stroke treatment guidelines at a tertiary hospital in Rwanda and identifying the related barriers to their use.

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DECLARATION

I, Dr. Stephenson Musiime, hereby declare that the practicum capstone thesis has been written by me without any external unauthorized help, that it has been neither presented to any institution for evaluation nor previously published in its entirety or in parts. Any parts, words, or ideas in the thesis, however limited, that are quoted from or based on other sources, have been acknowledged as such without exception.

Signature: Stephenson Musiime Date: May 2, 2018

DEDICATION

This work is dedicated to my wife Winniefred Busingye Musiime, my daughter Yvonne Mutoni Musiime and my sons James Musiime, Joel Mutarindwa Musiime and Joshua Dovante Musiime. Their moral and material support during these two years at University of Global Health Equity was significant.

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ABSTRACT

Background: Compliance to stroke treatment guidelines is crucial in the care and outcome of stroke patients. This study aimed at establishing the current compliance rate to the guidelines and identifying the possible barriers to their use at Oshen-King Faisal Hospital in an effort to increase the compliance rate to their use. Literature has shown that stroke has high prevalence both in developed and developing countries including in Rwanda. It has been found that following evidence-based guidelines improves the outcome of stroke patients. Studies have identified barriers to use of stroke treatment guidelines and possible measures to overcome them.

Methodology: The study was conducted at Oshen-King Faisal Hospital (KFH). Medical files of stroke patients admitted to the hospital between January and December 2017 were audited against the stroke treatment guidelines to establish the current compliance rate. Self-administered questionnaires were distributed to all clinicians who handle stroke cases to identify the possible barriers to use of the stroke treatment guidelines.

Results: Fifty stroke files were audited and it was found that the current compliance rate to stroke treatment guidelines is 76%, which is below the hospital target of 90%. Fifty-five clinicians completed the questionnaire and the main barriers to use of stroke treatment guidelines identified were the guidelines being time consuming and not user-friendly, a lack of training on the guidelines, low familiarity with and unknown location of the guidelines.

Discussion: This study found that the compliance rate to stroke treatment guidelines is lower than the hospital target and the main barriers to its use were mainly related to the guidelines themselves. Therefore KFH management should put in place measures that remove the identified barriers and facilitate compliance to the stroke treatment guidelines.

Conclusion: Compliance to stroke treatment guidelines at KFH is low but can be improved if the identified barriers are addressed and put in place by hospital management

TABLE OF CONTENTS

DECLARATION 2

DEDICATION 3

ACKNOWLEDGEMENT 4

LIST OF TABLES 9

CHAPTER ONE: INTRODUCTION 10
1.1 Problem Statement 11
1.2 Objectives 11
1.3 Setting and Beneficiaries 11
1.4 Layout of the Capstone Report 12

CHAPTER TWO: LITERATURE REVIEW 14
2.1 Prevalence of Stroke Disorders Globally 14
2.2 Prevalence of Stroke Disorders in Developed Areas 15
2.3 Prevalence of Stroke Disorders in Developing Areas including Rwanda 15
2.4 The Burden of Stroke 16
2.5 Management of Stroke 16
2.6 Importance of Using Stroke Treatment Guidelines 17
2.7 Barriers to the use of Standard Treatment Guidelines in Clinical Practice 17
2.8 Interventions to Improve Compliance on Treatment Guidelines 18
2.9 Role of Clinical Audits in Improving Patient Care 19
2.10 Gap in Clinical Practice 20

CHAPTER THREE: METHODS 21
3.1 Setting 21
3.2 Design 21
3.3 Sample 22
3.4 Measures 22
3.5 Data Collection Tools 22
3.6 Data Collection Method 23
3.7 Data Management 23
3.8 Data Analysis 24
3.9 Assessment of Risks to Participants 24

CHAPTER FOUR: RESULTS 26
4.1 Compliance Rate to Stroke Treatment Guidelines 26
4.2 Perceived Barriers to Use of Stroke Treatment Guidelines 29

CHAPTER FIVE: DISCUSSION 32

Proposed intervention 34
Limitations...35
CHAPTER SIX: CONCLUSION...36
REFERENCES 37
APPENDICES..39
Appendix 1: Data Collection Form 39
Appendix 2: Health Care Professional Survey on Stroke Treatment Guidelines at KFH ...40
Appendix 3: Stroke initial assessment form...41
Appendix 4: Ischaemic stroke Management Guideline 46
Appendix 5: Haemorrhagic stroke Management Guideline..51

LIST OF TABLES `

Table 1: Compliance rate to stroke treatment guidelines 26

Table 2: Compliance rate to stroke treatment guidelines per criterion assessed 27

Table 3: Perceived barriers to use of stroke treatment guidelines by clinicians at KFH...............30

CHAPTER ONE: INTRODUCTION

Strokes, also known as cerebrovascular accidents, are a group of different conditions that present as neurological deficits occurring due to interruption of the blood flow to the brain (Zhang et al., 2012). Stroke occurs when a blood vessel is blocked or bursts, cutting off the blood supply to a particular part of the brain (Truelsen et al., 2001). It is a global health problem as it is the second cause of death worldwide according to the World Health Organization (WHO) after ischemic Heart Disease, and is a major cause of adult disability (Cadilhac et al., 2017; WHO 2015). The WHO 2015 data for stroke mortality in Rwanda, found that death from stroke alone accounted for 7.23% of the total death, ranking Rwanda number 42 in the world (WHO 2015). Oshen-King Faisal Hospital (KFH) receives about 60 stroke cases annually and more than a half of these succumb to the disease while a significant proportion of the survivors develop long-term neurological deficits (Nkusi et al, 2017). The outcome of stroke depends on how the case was assessed and managed once in hospital. The stroke outcomes in developing countries are better due to using and adhering to evidence based guidelines. Many studies have shown that clinical practice that is evidence-based can improve patient outcomes (Alberts et al., 2004; Basow, 2008; Glasziou et al., 2016; Zhang et al., 2012) . Adherence to treatment guidelines increases the likelihood of favorable outcomes and reduces related mortality and morbidity (Considine & Mcgillivray, 2010). However, it has been found that compliance rate with standard treatment guidelines by clinicians is low in many countries (McGlynn et al., 2003).

To improve on the care and outcomes of patients with stroke, physicians at KFH developed evidence-based standard treatment guidelines to provide explicit guidance for clinicians, managers, patients and caregivers involved in the management of stroke cases. However, despite

the request by the hospital management to comply with treatment guidelines in general as a measure to improve the care of patients, clinicians' compliance rate to stroke treatment guidelines at KFH is low. The two previous clinical audits conducted in 2010 and 2015 showed that the overall compliance rate was 71%, though the score for the hospital to be internationally reaccredited in September 2019 is at least 90%. However, only a few files were audited in both previous surveys, 21 in 2010 and 16 in 2015, and the clinicians working in the same units conducted the audits therefore there was a possibility of bias. Also, neither of these previous studies tried to identify the possible barriers. The aim of this study is to establish the current compliance rate to the stroke treatment guidelines, identify the perceived barriers to their use, develop a solution to overcome these barriers in an effort to increase the compliance rate so as to reduce the morbidity and mortality rates of stroke patients at KFH.

1.1 Problem Statement

The current compliance rate to stroke treatment guidelines at KFH is unknown.

1.2 Objectives

1. To establish the current compliance rate to stroke treatment guidelines at KFH by January 2018.
2. To identify the barriers to use of stroke treatment guidelines at KFH by February 2018.

1.3 Setting and Beneficiaries

This study was conducted at KFH a private teaching hospital affiliated with the University of Rwanda with 160-inpatient beds, located in Gasabo District, Kigali City, Rwanda. It receives

referral cases from other tertiary hospitals in the country as it has all departments including critical care units and specialized neurosurgical services as well as highly specialized clinicians.

The beneficiaries of this study will be the stroke patients who access KFH. This includes KFH employees who normally use this facility for their medical care since they are potential stroke cases. The clinicians in areas that manage stroke cases will be empowered and motivated to manage stroke cases appropriately. Compliance to stroke treatment guidelines is likely to positively influence compliance to other treatment guidelines in general with likely better outcomes. Additionally, the hospital management will benefit from this study by identifying what to put in place to facilitate compliance to the stroke and other treatment guidelines in general.

1.4 Layout of the Capstone Report

Chapter one discusses the definition of stroke, its impact globally and in Rwanda, the role of complying with stroke treatment guidelines and previous studies on stroke guideline compliance. It includes the problem statement, objective of the study, setting and beneficiaries. It also includes the need for this study.

Chapter two includes the literature review on the prevalence and what is known about stroke globally, its burden and how it is managed. It also covers the importance of using stroke treatment guidelines, barriers to the use of guidelines in clinical practice, interventions to improve compliance of guidelines and role of clinical audits in clinical practice.

Chapter three describes the methodology of this study including the calculation of the compliance rate to the stroke treatment guidelines and the identification of the possible barriers to use of the stroke treatment guidelines through self-administered surveys.

Chapter 4 presents the findings of the study. It presents the overall compliance rate, the compliance rate for each criterion and comparison of the scores for nurses and doctors. It presents criteria that need equipment in relation to those that do not. It also presents the most frequent perceived barriers of clinicians to use of the stroke treatment guidelines.

Chapter 5 discusses and analyzes the results of the study in comparison to other studies on compliance to guidelines.

Chapter 6 provides a conclusion of the study and presents recommendations based on the findings of the study.

CHAPTER TWO: LITERATURE REVIEW

Stroke is a rapid onset of neurological deficit lasting more than a day, with no obvious cause other than a blood vessel related (Truelsen et al., 2001; WHO, 1990). There are two types of strokes: ischemic and hemorrhagic (Gomes et al., 2013). Majority of stroke cases (87%) are ischemic whereby blood flow to the brain is cut off by a clot or atherosclerosis (Gomes et al., 2013). The cut-off of oxygen to the area of the brain leads to ischemia and cell death with a likelihood of long-term brain damage. Hemorrhagic stroke is less common (10 - 15%) but it has the highest mortality and morbidity (Gebremariam et al., 2016; Gomes et al., 2013). It occurs when a blood vessel ruptures and the accumulated blood causes pressure on the brain resulting in loss of function of that part of the brain.

2.1 Prevalence of Stroke Disorders Globally

The burden of stroke worldwide is on the rise, affecting all age groups including children and youth with increasing cases, related death, disability-adjusted life year (DALYs), and financial impacts, particularly in low- and middle-income countries (LMIC) (Krishnamurthi et al., 2015; Mukherjee et al., 2011). In 2013, cases of ischemic stroke were about 5 times higher in LMIC than in developed ones, and twice as high for hemorrhagic stroke (Krishnamurthi et al., 2015)

2.2 Prevalence of Stroke Disorders in Developed Areas

About 700,000 stroke cases occur in the United States annually and approximately 24% of them succumb to the illness (Ingall, 2004). Stroke is a global health problem, increasing in incidence with time even in developed countries including the United States, France, Germany, Italy, Spain, and the United Kingdom due to their aging populations (Zhang et al., 2012). However, it has been found that despite the increase in incidence in these countries, the related mortality is decreasing due to improved care of stroke cases (Zhang et al., 2012).

2.3 Prevalence of Stroke Disorders in Developing Areas including Rwanda

The incidence of stroke in Africa and other LMIC settings, especially hemorrhagic stroke, has risen substantially over the last 20 years (Krishnamurthi et al., 2015). According to these authors, the prevelance for both ischemic and hemorrhagic stroke nearly doubled between 1990 and 2013. About 85% of global stroke deaths and 87% of DALYs occur in developing countries (Adeloye, 2014; Feigin et al., 2011). The 2002 Global Burden of Disease report found that three African countries (Angola, Liberia and Sierra Leone) had the highest stroke mortalities and DALYs worldwide (Adeloye, 2014). A cohort study in Rwanda showed that stroke has high mortality and morbidity rates in the country; 96 stroke patients were followed up for one year and the results showed that at one year-follow up, 24.7 % had no or mild disability, 14.3% were significantly disabled while 61% had died (Nkusi et al, 2017). The differences in stroke outcomes for both developed and developing countries is using and adherering to evidence based treatment guidelines.

2.4 The Burden of Stroke

Stroke does not only cause high mortality and morbidity but also has significant financial implications. Stroke is a costly disease to individuals including from losing the ability to work, to their family members through abandoning all their activities to take care of their sick relative, as well as to society in general whereby the services previously rendered by this patient are no longer possible, especially if this patient is an expert in a particular field (Carlo, 2009). In 2008, the estimated stroke related cost in the United States was $65.5 billion, 67% of which was direct cost from physicians and other health professionals, acute and long-term care, medications and other medical consumables while the remaining 33% was indirect costs that included lost productivity resulting from morbidity and mortality (Carlo, 2009). More to that, studies have shown that about a third of those who recovered from stroke eventually developed post stroke clinical depression requiring additional cost for the medical care required (Ojagbemi et al., 2017).

2.5 Management of Stroke

Stroke is a critical emergency requiring urgent interventions both before arrival to and in hospital by an interdisciplinary team including internists, intensivists, neurosurgeons, critical care nurses, occupational therapists, physiotherapists and nutritionists. Clinicians in the care of stroke patients should use validated assessment tools and comply with standardized protocols for the better outcomes (Berglund et al., 2015; Dishoeck et, 2014; Foundation, 2017; Middleton et al., 2016). Stroke patients should be managed in stroke units whenever available or in a setting where close monitoring is feasible. Medications should be given in the stipulated time frames as per the guidelines in addition to timely interventions and investigations.

2.6 Importance of Using Stroke Treatment Guidelines

Treatment guidelines are documents developed with the aim of assisting healthcare workers to appropriately manage patients (Gopalakrishnan et al., 2014). Standard treatment guidelines usually promote interventions that are evidence-based and have proved to be beneficial in decreasing morbidity and mortality. The guidelines ensure that consistency of care is delivered and health outcomes are improved (Woolf et al, 1999). Using evidence-based treatment guidelines improves significantly stroke-related outcomes (Gattellari et al., 2014). A study conducted in four districts in Lombardia, Italy found that survival and treatment effectiveness directly correlated with guideline compliance (Micieli et al., 2002). A similar study conducted in South Africa showed that following treatment in a stroke unit reduces mortality as well as the likelihood of dependency after stroke (Ershova et al., 2014). There is need for KFH clinicians to follow stroke treatment guidelines in order to improve on the outcomes of their stroke cases. This is possible if the barriers to use of the guidelines are identified and removed.

2.7 Barriers to the use of Standard Treatment Guidelines in Clinical Practice

Despite the benefits, adherence to standard treatment guidelines is a common problem worldwide among physicians (Cabana et al., 1999). A study in the United States showed that patients received only 55% of the recommended care as described in the guidelines and ranged from 52.2% for screening to 58.5% for follow-up care (McGlynn et al., 2003). Another study on adherence to asthma treatment guidelines observed irregularity in documentation of clinical signs, delayed bronchodilator treatment in emergency and severe cases with 0% documentation

in action plan to 54% in discharge advice. Adherence in areas of clinical assessment, management and follow up also needed improvement (Yasin et al., 2017).

Another study conducted in South Africa found that compliance with diagnosis based on the clinical guideline was 56% by nurses and 75% by doctors while drug management compliance was 56.6% by doctors and 63.6% by nurses (Siko et al., 2017). Adherence to antibiotic guidelines for community acquired pneumonia in Australia was around 75-80% (Sedrak et al., 2017). These studies indicate that poor adherence to treatment guidelines is seen in both high income and LMIC.

Barriers to treatment guideline compliance must be identified and removed in order to promote adherence. Most identified barriers can be categorized into four key areas, they are 1) patient, 2) health system, 3) clinician, including poor collaboration and inadequate knowledge, and 4) lack of political will (Baatiema et al., 2017). Patients' financial constraints and needs may conflict with the guideline recommendations and lead to poor compliance (Baatiema et al., 2017a; Spallek et al., 2011). Health system barriers may include limited time and resource constraints, the quality and ease to use of the guidelines, high workload, insufficient training provided by the organizations, inaccessibility of information, failure to motivate or facilitate clinicians to use the guidelines (Baatiema et al., 2017a; Baatiema et al., 2017b; Cabana et al, 1999; Keiffer et al., 2015; Spallek et al., 2011).

2.8 Interventions to Improve Compliance on Treatment Guidelines

Some studies were conducted focusing on interventions that can improve compliance. The interventions that can improve compliance included providing an easily accessible and user-friendly electronic guideline, healthcare provider education on the use of guidelines, availability

of hard copies, provision of information through professional societies, and providing consultancies to answer questions about the guidelines (Cabana et al., 1999 ; Jeffery et al., 2015; Taba et al., 2012). One study suggested that interventions focused on increasing physician familiarity with and motivation to follow guidelines may be helpful in increasing compliance (Meurer et al., 2011). Similarly, improving self-efficacy can improve patient care according to the treatment guideline (Meurer et al., 2011). One proposed intervention is use of clinical audit (Dehghan et al., 2013) which would show what is currently being done compared to what is recommended.

2.9 Role of Clinical Audits in Improving Patient Care

Clinical audit is the process of measuring what clinicians do for the patient in relation to what is supposed to be done (Bissonnette, 2016). It is the major way for continuously improving the quality of patient care (Dehghan et al., 2013). The audit identifies the gap in the care of patients and the likely cause of the failure to meet the standards. This helps in setting priorities and putting measures in place to improve the care of patients. The activities in a clinical audit include treatment guideline development, analyzing what is being done compared to what is recommended in the guideline, identifying gaps and reasons for the failure to meet standards, then take actions to improve what is being done (Yorston & Wormald, 2011).

A study conducted in Uganda, showed that clinical audit lead to improvements in the quality of care for patients with post partum hemorrhage, severe pre-eclampsia and eclampsia (Lumala et al., 2017). A similar study done in Tanzania found that clinical audits are applicable in low resource settings and can help to improve quality of care in obstetrics including management of pre-eclampsia and eclampsia (Kidanto et al., 2012). A clinical audit carried out at Butare

University teaching hospital Rwanda improved clinical documentation completion rate from 57% to 96% (Kamanzi et al., 2015) .

2.10 Gap in Clinical Practice

There is no previous accurate clinical audit with a more diverse sample conducted at KFH to establish the compliance rate to stroke treatment guidelines and identify barriers to use of the guidelines. The findings of this study will be used to assist KFH in developing strategies to improve the compliance to stroke clinical guidelines and in turn improve clinical outcomes of stroke patients. The results may also be applicable to improving compliance to other guidelines in the hospital since many of the barriers could be similar.

CHAPTER THREE: METHODS

3.1 Setting

This quantitative descriptive cross sectional study was conducted at Oshen-King Faisal Hospital, a private teaching hospital with 160-inpatient beds, located in Gasabo District, Kigali City, Rwanda. Approximately 60 stroke cases are admitted in KFH annually, mostly via the Accidents & Emergency Unit to Medical, Surgical and Private wards if stable or, to High Dependency or Critical Care Units if critically ill. Nurses and medical officers in Accidents & Emergency department assess the stroke cases and then call upon residents and consultants in internal medicine or neurosurgical unit to take over the management of the patient.

3.2 Design

The study conducted a retrospective cross sectional medical record audit to assess the stroke clinical guidelines compliance rate and a prospective study using a questionnaire to assess the barriers to the use of those guidelines. Medical files for all stroke patients admitted to this hospital during this study period (January 2017 to December 2017) were audited against the identified criteria from the stroke treatment guidelines, analyzing the results and identifying the compliance rate. Questionnaires were then distributed to all nurses and doctors who manage stroke patients for the identification of the perceived barriers to the treatment guidelines use.

3.3 Sample

This study included two samples:

1. For stroke treatment guideline compliance rate: All stroke patient files admitted and discharged from KFH between January 2017 and December 2017.
2. For factors affecting compliance: Nurses and doctors involved in the care of stroke cases (i.e. unit managers, directors, heads of departments, nurses, and medical doctors) from Accidents & Emergency unit, Medical ward, Critical care units and Urusaro wards were invited to voluntarily participate in a self-administered questionnaire. Those who were on leave were excluded.

3.4 Measures

Five indicators were measured:

1. The overall clinical guideline compliance rate.
2. The compliance rate of each individual criterion.
3. The compliance rate by disciplines - nurse-assessed and doctor-assessed.
4. The compliance rate of criteria that require special equipment compared to the rest.
5. The frequency of the factors that affect the compliance to stroke treatment guidelines.

3.5 Data Collection Tools

Two data collection tools were used:

1. A clinical audit form with 30 assessment criteria based on the KFH's stroke guidelines, was used as a checklist with options of "yes" or "no" or "NA". "Yes" is checked if the criterion is fulfilled, "No" if not fulfilled, and "NA" if that criterion was not applicable to that patient (Appendix 1). This determined the compliance rate (as a percentage) to the guidelines.
2. A questionnaire with 16 questions that covered knowledge-related and attitude-related questions with options of "yes" or "no" to assess the perceived enablers and barriers to use of the stroke treatment guidelines. This questionnaire was piloted on 9 clinicians and modified based on their feedback (Appendix 2).

3.6 Data Collection Method

The file audit was conducted from mid-December 2017 to mid-January 2018. Stroke cases admitted and discharged from KFH between January and December 2017 were identified from admission books in all wards handling stroke cases and were followed by retrieving their files from medical records unit. Thereafter each file was audited by ticking "yes" if the criterion was assessed or "no" if not or "NA" if the criteria was not applicable to that patient.

The second part of this study was a prospective cross sectional study carried out in January 2018. The clinicians in the areas that manage stroke cases were contacted individually and in groups during clinical meetings to discuss the study and seek their consent to participate in the study. Only those who consented were given the questionnaires.

3.7 Data Management

The data from the checklist were entered into an excel spreadsheet. The compliance to the

clinical guidelines for each file was then calculated by the sum of all completed criteria ("yes") divided by the total number of criteria (max 30, less the "not applicable" ones) and expressed as a percentage. The overall compliance was the average of all samples. In addition, the compliance rate of each individual criterion was calculated. According to KFH categorization set by Council for Health Service Accreditation of Southern Africa (COHSASA), a score of less than 75% is poor while that one between 75% and 90% is satisfactory and above 90% is good and eligible for international accreditation. The data from the questionnaires of all participants were compiled together in an excel spreadsheet to calculate the frequency rate and percentages of each the perceived enablers and barrier.

3.8 Data Analysis

Descriptive statistics were used to analyze the overall compliance rate, the individual criterion compliance rate, and the factors affecting compliance from the self-administered questionnaire answers.

3.9 Assessment of Risks to Participants

For file audits, no participants are included and there were no patient identifiable information recorded. For the questionnaire, participants may worry about exposing themselves to judgment of not following the clinical guidelines when answering the questionnaire, and thus worry about their job appraisal. This risk will not happen since the questionnaire did not collect any private identifiable information of anyone or anywhere and only the principal investigator (PI) will

access this data. The results of the study will be presented in aggregated form, will be used specifically in this study and not to be used to evaluate the performance of the participants by the hospital administration. The PI ensured that clear explanations were provided to all participants.

CHAPTER FOUR: RESULTS

4.1 Compliance Rate to Stroke Treatment Guidelines

The overall compliance rate to the stroke treatment guidelines by clinicians was 76%. Of the 50 stroke files audited only 6 (12%) met the hospital required compliance rate of 90% and above, while 24 (48%) had rates ranging 75%-90%, and 20 (40%) had compliance rates below 75% (Table 1).

Table 1: Compliance rate to stroke treatment guidelines

Sample (N)		50
Overall		76%
Range	90% and above	6 (12%)
	75 - 89%	24 (48%)
	Below 75%	20 (40%)
Discipline	By physician	74%
	By nurse	84%
Equipment	Required	84%
	Not required	72%

Out of the 30 criteria assessed, four criteria had a 100% compliance and included 1) Duration of symptoms, 2) Initial diagnosis and differentials made, 3) Computed Tomography scan (CT scan) /Magnetic Resonance Imaging (MRI) of brain done and 4) Severity assessment which may warrant Intensive Care Unit (ICU) admission done.

The 4 criteria that scored the lowest compliance rates were 1) Neck stiffness/Kerning's test done (8%), 2) Swallowing function/capacity if GCS less than 12 was checked (16%), 3) Cranial nerves evaluated (21%) and 4) Presence of headache (44%) (Table 2).

Table 2: Compliance rate to stroke treatment guidelines per criterion assessed

Criteria	Assessed by nurse or doctor or both	Compliance rate %
Duration of symptoms	Both	100%
Initial diagnosis and differentials made	Doctor	100%
CT scan/MRI of brain done	Doctor	100%
Severity assessment which may warrant ICU admission done	Doctor	100%
History of weakness	Both	98%
Acute management (e.g. treatment of HT) done as per guideline	Doctor	98%
Renal function (U&E) done before CT scan with contrast	Doctor	96%
Blood pressure checked	Nurse	94%
Review by a Specialist was done within 16 hours	Doctor	94%
Ward education tool administered	Nurse	94%
A lipogram and other further tests were done before discharge	Doctor	92%
Oxygen saturation on room air	Nurse	90%
If CT scan/MRI done, was it within 4hrs after initial assessment	Doctor	90%
Collaboration with patient/care givers on management	Doctor	90%
Education/Counseling for patient/care givers given	Doctor	90%

Drug history	Doctor	82%
Hydration/Nutrition	Doctor	80%
Risk factors profile	Doctor	78%
An ECG was done in Accidents &Emergency	Nurse	74%
Level of consciousness checked	Doctor	72%
CT scan/MRI reviewed by clinician and documented in file	Doctor	66%
Full cardiovascular examination completed	Doctor	64%
Speech assessed	Doctor	58%
Home based care after discharge planned	Doctor	57%
Control of bladder/bowel sphincters measured	Doctor	54%
Capillary blood sugar checked in A&E	Nurse	45%
Presence of headache	Doctor	44%
Cranial nerves evaluated	Doctor	21%
Swallowing function/capacity if GCS less than 12 was checked	Doctor	16%
Neck stiffness/Kerning's test done	Doctor	8%

Out of the 30 criteria, 7 are usually assessed by nurses and include 1) Duration of symptoms, 2) Oxygen saturation on room air, 3) Blood pressure checked, 4) Capillary blood sugar checked in Accidents & Emergency, 5) Electrocardiogram was done in Accidents & Emergency, 6) History of weakness and 7) Ward education tool administered. Doctors usually assess the remaining criteria. The criteria assessed by nurses had an average compliance rate of 84% while the one for doctors was 74%.

Out of these 30 criteria, 7 of them require special equipment to complete the assessment and include 1) A CT scan/MRI of brain, 2) Renal function (U&E) done before CT scan with contrast, 3) Blood pressure checked, 4) Lipogram and other further tests were done before discharge, 5) Oxygen saturation on room air, 6) An ECG was done in Accidents & Emergency (A&E) and 7) Capillary blood sugar checked in A&E. The average compliance rate of these criteria that require special equipment was 84% compared to those that do not require special equipment, which had an average compliance rate of 72%

4.2 Perceived Barriers to Use of Stroke Treatment Guidelines

Fifty-five clinicians responded to the questionnaires. All of them agreed that stroke treatment guidelines improve patient outcomes (100%) and 53 (96%) of them agreed that the stroke treatment guidelines are helpful in patient care. A majority of them 52 (95%) said that there was a good reason to follow the stroke treatment guideline while 46 (84%) knew about the stroke treatment guidelines of KFH and 46 (84%) said that it does not create extra workload. However, only 42 (76%) reported they always follow the stroke treatment guidelines when treating stroke patients (Table 3).

Table 3: Perceived barriers to use of stroke guidelines by clinicians at KFH

Statement	Score out of 55
Following the stroke treatment guidelines can improve patient outcomes.	55 (100%)
The stroke treatment guidelines are helpful in patient care.	53 (96%)
I know the stroke treatment guidelines of KFH	46 (84%)
I agree with the recommendations in the stroke treatment guidelines.	45 (82%)
The hospital policy obliges us to follow the stroke treatment guidelines	45 (80%)
Patients often follow the treatment suggested by the guidelines.	43 (78%)
Patients often can pay for the treatment recommended by the guideline	43 (78%)
The needed equipment to execute the guidelines is available	43 (78%)
I always follow the stroke treatment guidelines when treating stroke patients	42 (76%)
I am familiar with the content of the stroke treatment guidelines	41 (75%)
It is easy to locate the stroke treatment guidelines in my work location	37 (67%)
The stroke treatment guidelines is user-friendly	33 (60%)
I have been trained on the stroke treatment guidelines	26 (47%)

Using the stroke treatment guidelines is time consuming.	19 (35%)
Following the treatment guideline creates extra workload for me	9 (16%)

The 5 main perceived barriers to use of stroke treatment guideline identified in this study were 1) Lack of training on the guidelines, 53% had not been trained on the guideline, 2) The stroke treatment guidelines perceived as not user-friendly, 40%, 3) Using the stroke treatment guidelines perceived as time consuming, 35%, 4) Treatment guidelines not easy to locate at the work station, 33% and 5) Not familiar with the content of the stroke treatment guidelines, 25% (Table 3).

CHAPTER FIVE: DISCUSSION

This cross sectional quantitative study, is the first one conducted at KFH with the aim of establishing the compliance rate to KFH stroke treatment guidelines and identifying the possible barriers to their use. The overall compliance rate to stroke treatment guidelines was 76%, which is below the Council for Health Service Accreditation of Southern Africa (COHSSA)-set hospital target of 90%. While it is well known that adherence to evidence-based guidelines improves patient outcomes, low compliance rates is a global issue. Most studies found that the compliance rate to different treatment guidelines ranged between 56% to 76% (Jahansefat et al., 2016; Rello et al., 2002; SHAFI et al., 2014; Siko et al., 2017).

In our study, the three least compliant criteria were 1) Cranial nerves evaluated (21%), 2) Swallowing function/capacity if GCS less than 12 was checked (16%) and 3) Kerning's test done (8%). These are purely physical examinations criteria with no equipment required to perform the assessments. The only resources required to fulfill these criteria are time, clinical acumen, attitude and behaviour of clinicians who assess stroke patients. It is probable that there is always little time to do a complete physical examination of the patient as required by the guidelines, but also mindset by the clinicians examining the patient. Some of them may not understand the importance of complete physical examination of stroke patients, therefore the need to use stroke guidelines, which informs the clinicians what needs to be assessed.

Unavailability of required equipment to comply with particular criteria was not a significant barrier since the criteria that required equipment had better average compliance rates (84%) than those that do not need any equipment (72%). Among the criteria that need equipment to be

assessed, only two scored less than 90%. These are: 1) An ECG was done in Accidents & Emergency, 74% and 2) Capillary blood sugar checked in A&E, 45%. The most likely explanation is lack of ECG paper and Glucostix for doing capillary blood sugar, which may occur from time to time. This is achievable for KFH to ensure that A&E does not run of Glucostix and ECG paper. The results also showed the nurses had a better compliance score than the doctors, possibly due to work-overload where a doctor on call sees all ward patients with minimal time to spend on each case while a nurse is only assigned to 6-10 patients.

The second part of this study aimed at identifying the perceived barriers to use of the KFH stroke treatment guidelines. The study found that all the clinicians knew the importance of using stroke treatment guidelines in patient care in terms of better outcomes. The majority of the clinicians knew about its existence, agreed with its recommendations and thought that it does not create extra workload. However, only three-quarters of the participants reported they always followed the guidelines during the care of stroke cases, which is almost the same as the overall compliance rate noted from the file audit (76%). The guidelines being perceived as not user-friendly and time consuming was the most frequent barrier identified in this study.

The KFH stroke guideline is a 24-page document, which includes some details that may not be required during the initial assessment of stroke cases. This makes it tiresome and time consuming to follow by clinicians during busy calls. More than a half of the clinicians reportedly were not trained on the stroke treatment guidelines, and a quarter of them were not familiar with the guidelines. These two barriers also could have accounted for the low compliance to the KFH stroke treatment guidelines because according to literature, low familiarity may lead to low

utilization. Equally important finding in this study was about a third of the participants did not know where the guidelines are located. This also may have contributed significantly to the low compliance. In this study, a fifth of the clinicians thought that they are not obliged to follow the stroke treatment guidelines by hospital management. This in itself may lead to reluctance of some clinicians following the guidelines since no one will reprimand them for not following it.

The barriers identified in this study are similar to the ones in others studies where they were mainly about familiarity with the guidelines, lack of motivation, lack of awareness and guideline related factors like user-friendliness (Alhirish et al., 2010; Fischer et al., 2016; Mccluskey et al., 2013; Mosavianpour et al., 2016; Sedrak et al., 2017).

Some of the measures that KFH management can put in place to increase the compliance rate to stroke treatment guidelines include training of clinicians on the guidelines so as to increase their familiarity and availing a more user-friendly and easily accessible online stroke treatment guidelines. These have been identified in literature as measures to increase the compliance rate to evidence based guidelines (Cabana et al., 1999 ; Jeffery et al., 2015; Taba et al., 2012). This is feasible since all nurses' and doctors' rooms have computers with Internet connection.

Proposed intervention

Currently, clinicians use either internal medicine or surgical assessment forms as initial assessment tool for stroke patients. These forms, as they were not created specifically for stroke patients, neglect some important criteria that should be assessed for every stroke patient, and do not follow KFH stroke treatment guidelines. Based on the findings of this study, the PI discussed

with some of the concerned clinicians and managers such as the Head of Quality Assurance Division and Head of Medical Specialized Services and proposed to KFH management to adopt the 3 stroke assessment forms (Appendices 3, 4 and 5). These stroke assessment forms are modifications of the original ischemic and haemorrhagic stroke treatment guidelines of KFH. They were made user-friendly and include all the necessary criteria that must be covered in the assessment of stroke patients. By using these forms correctly, clinicians will be following the stroke guidelines. The forms serve as reminders of the guideline criteria and can help maximize the compliance. As a recommendation, KFH management should set a policy obliging the clinicians who handle stroke cases to adopt the proposed stroke assessment forms, thus promote higher compliance to the stroke guidelines and better patient outcomes. The hospital management also should ensure basic consumables including ECG papers and Glucostics are always available in the hospital

Limitations

In our study, the barriers of using the stroke guidelines were assessed using a self-administered questionnaire. The responses acquired by using a questionnaire are inherently subjective. The possibility of "social desirability" whereby the participants say what is desirable but not exactly what they do cannot be ruled out in this study. This can be minimized by an observational study. Also, many questions are close-ended answers; respondents were not provided the opportunities to elaborate their answers. An in-depth qualitative interview with some probing would be more informative. The third limitation is that the compliance rate was based on a retrospective file audit whereby some criteria could have been assessed but not documented in the file. In this case an observational study to see what is actually done would be more accurate.

CHAPTER SIX: CONCLUSION

This study found that the compliance rate to stroke treatment guidelines is lower than the hospital target of 90%, the number needed for international accreditation. The guidelines were not user-friendly and were time consuming to use. There was a lack of training on the stroke treatment guidelines and clinicians were not familiar with the contents as well as location of the guideline. We proposed KFH to use user-friendly stroke initial assessment forms, which contain all criteria that must be assessed as required by the guidelines. The proposed stroke assessment forms can serve as a user-friendly reminder to increase the compliance rate to the stroke treatment guidelines. KFH management should review and adopt the new stroke assessment forms. The hospital management also should ensure basic consumables including ECG papers and Glucostics are always available in the hospital. A follow up clinical audit on stroke guideline compliance should be conducted six months after the adoption of the stroke assessment forms.

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APPENDICES

Appendix 1: Data Collection Form

Patient's MR number: ________

Clinician's code number: ________

Diagnostic (Assessment) Criteria:

Number	Criteria	Yes	No	N/A
1	History of weakness			
2	Duration of symptoms			
3	Risk factors profile			
4	Drug history			
5	Presence of headache			
6	Level of consciousness checked			
7	Speech assessed			
8	Blood pressure checked			
9	Hydration/Nutrition			
10	Neck stiffness/Kerning's test			
11	Capillary blood sugar checked in A&E			
12	Oxygen saturation on room air			
13	Full cardiovascular examination completed			
14	Cranial nerves evaluated			
15	Control of bladder/bowel sphincters measured?			
16	Swallowing function/capacity if GCS less than 12 was checked?			
17	Review by a Specialist was done within 16 hours			
18	Initial diagnosis and differentials made			
19	Severity assessment which may warrant ICU admission done			
20	An ECG was done in A&E			
21	CT scan/MRI of brain done			
22	If CT scan/MRI done, was it within 4hrs after initial assessment			
23	CT scan/MRI reviewed by clinician and documented in progress notes			
24	Renal function (U&E) done before CT scan with contrast			
25	A lipogram and other further tests were done before discharge			
26	Acute management (e.g. treatment of HT) done as per guideline			
27	Collaboration with patient/care givers on management			
28	Education/Counseling for patient/care givers given			
29	Ward education tool administered			
30	Home based care after discharge planned			

Appendix 2: Health Care Professional Survey on Stroke Treatment Guidelines at KFH

Please check the box of each of the following statements according to your experience:

Statement	Yes	No
1. I know the stroke treatment guidelines of KFH		
2. I am familiar with the content of the stroke treatment guidelines		
3. I have been trained on the stroke treatment guidelines		
4. I always follow the stroke treatment guidelines when treating stroke patients		
5. The hospital policy obliges us to follow the stroke treatment guidelines		
6. It is easy to locate the stroke treatment guidelines in my work location		
7. The stroke treatment guidelines is user-friendly		
8. I agree with the recommendations in the stroke treatment guidelines.		
9. The stroke treatment guidelines are helpful in patient care.		
10. Following the stroke treatment guidelines can improve patient outcomes.		
11. Using the stroke treatment guidelines is time consuming.		
12. Patients often follow the treatment suggested by the guidelines.		
13. Patients often can pay for the treatment recommended by the guideline		
14. The needed equipment to execute the guidelines is available		
15. Following the treatment guideline creates extra workload for me		
16. There is no reason for me to follow the guidelines		

Thank you for participating in this study

Appendix 3: Stroke initial assessment form

Main complaint and its duration …………………………………………………………

…………………………………………………………………………………………..

History of the present illness:

☐Weakness ☐Paralysis ☐Loss of sensation ☐Numbness

☐ Headache ☐Unable to speak or Confused ☐Vision disturbance

☐Nausea and Vomiting ☐Seizures ☐Loss of consciousness

Past Medical Surgical/Risk factors History:

Diabetes: ☐No ☐Yes

History of any heart disease: ☐No ☐Yes, specify……………………………

Known peripheral vascular disease: ☐No ☐Yes, specify……………………………

History of hypertension: ☐No ☐Yes

Arteriovenous malformations: ☐No ☐Yes

Recurrent headache (migraine): ☐No ☐Yes

Current medications: (include prescribed medications, herbal medications & vitamins)

…………………………….. ……………………………..

…………………………… ……………………………..

Personal & Social History

Smoker: ☐No ☐Ex ☐Yes Number per day ____ Duration (years) ________

Alcohol: ☐No ☐Yes, Units per week __________

Recreation**……………………**

Drug use: ☐No ☐Yes What ________Frequency______ Duration (years) ________

Physical examination

Vital signs:

Pulse	BP	Respiration	O_2 Sat	Weight	Height	BGL

BMI……………………

State of hydration ……………………

Neurological examination:

a) Level of consciousness (Glasgow coma scale):

Eye response	______	/4
Verbal response	______	/5
Motor response	______	/6
Total GCS	______	**/15**

, /z>

b) Speech: ☐Normal ☐Abnormal

c) Meningeal irritation (neck stiffness or Kerning's sign): ☐Positive ☐Negative

d) Pupils size, symmetry and reaction to light: ……………………………………………

e) Gag reflex (ability to swallow): ☐Present ☐Absent

f) Muscle power of limbs and face: □Normal □Abnormal, Specify……………………….

g) Cranial nerve especially nerve VII and eye movements (III, IV, VI)

Specify………………………………………………………….

h) Fundoscopy: Specify………………………………

Cardiovascular examination

a) Arterial pulse features especially rhythm and rate ……………………………

b) Carotid artery bruit: □Yes □No

c) Heart examination, rhythm. e.g. atrial fibrillation, murmurs e.g. aortic regurgitation or mitral stenosis, Specify………………………………………………………….

d) Evidence of heart failure: □Yes □No

Genitourinary/gastrointestinal system examination

Control of bladder/bowel sphincters: □Normal □Abnormal

Specify the findings……………………………………………………..

Respiratory system

Breathing pattern: □Normal □Abnormal

Specify the findings……………………………………………………..

The patient with the following parameters require IMMEDIATE ICU admission before other investigation procedures:

- Unconscious with GCS < 7
- Hypotension BP < 100/60 mm Hg

- Encephalopathy
- Arterial dissection e.g. carotid

Summary of clinical findings …………………………….……………………

Problem list/differential diagnoses………………………………………..

Diagnostic studies

A. ECG for arrhythmias, cardiac ischemia must be done while in Accidents & Emergency

   Specify ECG findings………………………………………………..

B. Imaging and radiological investigations.

   - CT scan without contrast of the brain should be done within 2 hours of assessment for possible intracerebral haemorrhage.

     CT scan with contrast only to be done after renal function test is normal.

     CT Scan results: ……………………………………………….

   - MRI of the brain if the patient has no contra-indication and there is a need for more detailed soft tissue pathology e.g. older haemorrhage

   - MR Angiogram for minor CVA due to micro haemorrhage, aneurisms, AV malformation

   Note: A specialist should review all stroke patients within 16 hours and imaging results documented in the patient file.

C. Laboratory tests

- Determine blood glucose by glucometer/dextrostix if not yet done
- Full blood count
- Electrolytes
- Renal function
- Lipid profile
- Treponema Pallidum Haemagglutination test (TPHA)
- Coagulation profile

If	**Guideline to follow:**
Ischaemic CVA	Ischaemic CVA management guidelines
Haemorrhagic CVA	Haemorrhagic CVA management guidelines

Appendix 4: Ischaemic stroke Management Guideline

Acute:

1. Ensure airway, hydration and oxygenation (give oxygen if SaO2 <94%) of unconscious patient.
2. If present, treat hypoglycaemia or hyperglycaemia (Acceptable Blood Glucose level range 140-180mg/dl).

Medications

3. Aspirin 300mg stat orally (NG tube) IV or rectally, continue Aspirin 75mg -150mg daily.

Note:

4. Patients with ischemic stroke who are not receiving reperfusion therapy should receive antiplatelet therapy as soon as brain imaging has excluded hemorrhage.
5. Thrombolysis if patient presents within 4.5 hours of ischemic stroke onset and no contraindications.
   - **a.** Thrombolytic agent to be administered as early as possible, preferably within 60 minutes of the patient's arrival in the ED
   - b. Intravenous rtPA (0.9 mg/kg, maximum dose 90mg) is recommended for selected patients who do not have contraindications for thrombolytic therapy.
6. NB: Do not give antihypertensive Drug even when BP is elevated except in hypertensive emergency such as:
   - a) Hypertensive encephalopathy
   - b) Big artery dissection

c) Very accelerated BP >210/120 mm Hg

7. When considering Thrombolysis in a patient with elevated BP (systolic >185 mm Hg or diastolic >110 mm Hg). Refer to details of BP lowering measures mentioned below.

   a. If it is essential to lower BP, do not lower it further than 20% of admitting BP in the first 24 hours

   b. The MAP as calculated by formula diastolic BP+1/3 (systolic BP-diastolic BP) should not exceed 130mm Hg.

   c. Overall, do not lower it further than 2/3 of admitting BP in the first 72 hours.

8. In case of hypertensive emergency (diastolic >120 mm Hg), use IV antihypertensive such as:

   a) IV Labetalol 20mg over two minutes initially, then 1-2mg/min continuous infusion not to exceed a maximum of 300mg per day,

   b) IV Nitro-glycerine with a starting dose of 10 to 20 mcg/min titrated upward by 10 mcg/min q 5 min to maximum antihypertensive effect or

   c) IV hydralazine, initial dose of 20-40 mg IV/IM and repeat as required until goal BP.

9. Patients aged 60 years and under with malignant middle cerebral artery territory infarction should undergo urgent neurosurgical assessment for consideration of decompressive hemicraniectomy.

10. When undertaken, hemicraniectomy should ideally be performed within 48 hours of stroke onset.

11. Cerebral haemorrhagic stroke ***(refer to haemorrhagic CVAs guideline No. G06/2013);***

Later investigations

a. Echocardiography
b. Doppler of carotid arteries
c. Chest x-ray
d. Any other test as clinically indicated. (Pregnancy test, EEG, Toxicology screens)

Follow-up / Review

In close collaboration with the patient and the family, identify risk factors and treat them where applicable:

a) Age
b) Tobacco smoking
c) Alcohol consumption
d) Diabetes
e) Hypertension
f) Obesity
g) Atherosclerosis

Note:

1. Protect against recurrence of stroke e.g. Use of Statins, ACEI for treatment of Hypertension, treatment of atrial fibrillation, etc.

2. Routine use of therapeutic anticoagulation in patients without cardio-embolism (e.g. atrial fibrillation) following TIA/stroke is not recommended

3. Avoid DVT by prophylaxis with low molecular weight heparin e.g. Enoxaparin.
4. Continue nursing care of a paralysed or unconscious patient e.g. 2 hourly turning, oral care, feeding.
5. Caution to prevent a risk of aspiration pneumonitis/pneumonia
6. Physiotherapy and general rehabilitation
7. Prevent development of pressure sores or treat as occur.

Patient's Rights and Education/ Counselling/ Referral

a. General Education

- About stroke and how it occurs
- Diagnosis and prognosis
- Procedures/ Tests
- Immediate and on-going treatment/nursing care/rehabilitation
- Medications – what, when, why, how it works and adverse effects
- Reduction of future risk
- When to call a health professional

b. Targeted Education

This will largely depend on the residual physical and psychological problems the patient experiences post stroke.

c. Counselling

As required by the patient and family, specific to their ability to manage residual changes to the person's physical abilities, self-esteem and roles.

d. Administer and complete the multi disciplinary Education Tool and ensure that it is signed by all parties including the patients and/or caretaker.

Appendix 5: Haemorrhagic stroke Management Guideline

Admit all patients with an intracerebral haemorrhage (ICH) to an Intensive Care Unit setting for better monitoring and management including mechanical ventilation if needed (GCS ≤ 8 to ICU & between 9-13 to HDU)

1. **Ventilation Management.**

Indication for intubation:

a) Imminent respiratory insufficiency and/or Glasgow Coma Scale (GCS) score ≤8.

b) Hypoxia (PaO_2 < 60 mmHg or $PaCO_2$ > 50 mm Hg) or obvious risk of aspiration with or without impairment of arterial oxygenation.

Oral tracheal intubation should follow institutional protocols:

a) Maximal preoxygenation

b) Administration of drugs to avoid reflex arrhythmias and/or BP derangement, e.g., atropine, thiopental, midazolam, propofol, and succinylcholine

c) Precautions should always be taken to prevent aspiration of gastric contents.

d) All patients with endotracheal tubes receive orogastric tubes to prevent aspiration and are monitored for cuff pressure every 6 hours. Aim at cuff pressure <15cmH2O.

e) In the presence of prolonged coma or pulmonary complications, elective Tracheostomy should be performed after one week.

f) Keep PEEP of 5 mmHg

2. **The general acute care include**:

a) Team effort with the nursing and medical staff working closely together.

b) ABC/ACLS

c) Continuous Cardiac monitor; (for ischemic changes or atrial fibrillation)

d) Physiological monitoring (including Glasgow Coma Scale)

e) Oxygen therapy (keep SPO2 > 94%, PaO2l>70mmHg)

f) Treat hyperglycaemia with insulin if serum glucose >200 mg/dL

g) IV fluids -Avoid D5W and excessive fluid administration IV NS 50 mL/h

h) Oral intake: NPO initially NGT then full diet as soon as possible

i) Temperature: Avoid hyperthermia, oral or rectal acetaminophen as needed in fever (T >100.4°F).

j) Induced Hypothermia (Brain temp 33)

k) Hypotension: pharmacologically increase blood pressure

l) Position the patient propped up 30-45 °

m) Other antithrombotic therapy e.g. Aspirin

n) Anticoagulation in carefully selected patients.

o) Intravenous recombinant tissue plasminogen activator (rt-PA) in selected patients

p) Antihypertensive therapy; control hypertension by 20% of initial systolic pressure

3. Always treat clinical seizures in ICH patients with appropriate anticonvulsants.
4. Sources of fever should be treated and antipyretic medications administered to lower the temperature in febrile patients with CVA.
5. Early mobilization and rehabilitation are recommended in patients with ICH

6. Neurological care should be available within 2 hours of admission to ICU to:

    a) Evaluate surgical options in Haemorrhagic transformation following t-PA

    b) Management of life-threatening elevations of ICP

    c) Expedite patient transfer when neurosurgical expertise is needed.

Management is both Surgical and Non Surgical

Non-surgical cases include:

a) Minimally symptomatic lesions (GCS >10)

b) Situations with little chance of good outcome such as poor prognostic factors; renal failure, heart failure, poor neurological dysfunction e.t.c

c) Severe coagulopathies

d) Basal ganglia or thalamic haemorrhage

Surgical cases include:

a) Lesion with marked mass effect, oedema, midline shift

b) Lesions where symptoms appear to be due to increased ICP

c) Volume of hematoma (Types; minor < or = 10mls, moderate 10-30mls, severe > 30mls) surgery is indicated for moderate volumes

d) Cerebellar hematomas surgery is indicated for hematomas > or = 3cm in widest diameter

e) Rapid deterioration regardless of hematoma location and size

f) Favourable location e.g. lobar, Cerebellar, external capsule and non dominant hemisphere

g) Age less than 50yrs

h) Early intervention (less than 24hr)

i) Failure of medical management

Possible surgical procedures include:

a) Craniotomy for ICH with superficial hematoma

b) Surgical evacuation of hematomas associated with ICH

c) Hemicraniectomy for significant middle cerebral artery infarction

Manage specific cause as per neurosurgical guidelines

Management of Subarachnoid Haemorrhage: Manage according to neurosurgical guidelines

Management of External Ventricular Drain (EVD) follows neurosurgical guidelines

Complications of acute CVA

Early Complications of acute CVA

1. **Cerebral oedema**

a) Cerebral oedema (peaks on day 3-5, duration 10 days)

b) Intubate and hyperventilate to pCO2 of 35 mmHg

c) Neurosurgery consultation

d) Corticosteroids (not recommended for cerebral oedema)

e) Osmotherapy – use of Mannitol 20 %

f) Hyperventilation

g) Neurological consultation for decompression

h) Hemicraniectomy

2. **Deep venous thrombosis (DVT)/Pulmonary embolism (PE)**

a) Early mobilization

b) Antiplatelet therapy in patients with ischemic CVA

c) Low-molecular-weight or prophylactic-dose heparin in selected patients with ischemic CVA

d) Antithrombotic stockings in selected patients with ischemic CVA

3. Pyrexia

- Antipyretic therapy (paracetamol and/or physical cooling)

4. Pressure ulcers

a. Pressure ulcer risk assessment

b. Pressure relieving mattress

c. PAC 2 hourly

d. Regular turning (in patients without increased ICP)

5. Seizures

a) Evaluate with glucose and Serum Sodium

b) Treat with Diazepam and Phenytoin

3. Treatment of High BP

One must be careful when lowering the BP.

a) If systolic BP >230 mm Hg or diastolic >140 mm Hg 2 readings 5 minutes apart, give IV nitroprusside.

b) If systolic BP is 180 to 230 mm Hg, Diastolic BP 105 to 140 mm Hg, or mean arterial BP 130 mm Hg on 2 readings 20 minutes apart, give IV Labetalol, esmolol, enalapril, (or smaller doses of easily titratable IV)

c) If systolic BP is <180 mm Hg and diastolic BP <105 mm Hg, defer antihypertensive therapy.

d) Choice of medication depends on other medical contraindications

e) If ICP monitoring is available, cerebral perfusion pressure should be kept at >70 mm Hg.

f) In Low blood pressure Volume replacement is the first line. Isotonic saline or colloids are used.

4. Treatment of Hypotension

If hypotension persists after correction of volume deficit, continuous infusions of vasopressors if systolic is < 90 mm Hg

a) Phenylephrine2–10 µg / kg/ min

b) Norepinephrine Titrate from 0.01–1 µg / kg/ min

c) Dobutamine 5-20 µg / kg/ min

d) Dopamine 2–20 µg / kg/ min if noradrenaline and dobutamine are not available

5. ICP Treatment

a) Head elevation 30-45 degrees

b) Hyperventilation ($PaCO_2$: 33-35mmHg)

c) Hyperosmolar therapy with Mannitol hypertonic saline

d) Hemicraniectomy in life-threatening ICP - shortens ICU stay, lowers mortality rate. Muscle relaxants:

   I. Pre treatment with a bolus of a muscle relaxant or lidocaine before airway suctioning
   II. Rarely required urgently in AIS

e) Rarely, barbiturate coma

6. Osmotherapy

- The first medical line of defence is Osmotherapy.
  - Mannitol 20% (0.25–0.5 g/kg every 4 hrs). Recommended for only for 5 days.
- Maintain the osmotic gradient
  - Furosemide (10 mg every 2–8 hrs) simultaneously with Osmotherapy.
- Serum osmolarity 2 times/day targeted to 310 mOsm/L.
- No steroids

Supportive Management/Treatment

a) Nutritional supplementation
b) Nasogastric feeding, as needed
c) Early mobilization
d) Occupational therapy and planning
e) Cognitive therapy
f) Speech and care giver communications training

g) Urinary and/or faecal continence management and post discharge panning
h) Indwelling catheters for incontinence (not recommended)
i) Case management post discharge depression management
j) Antidepressants (not recommended routinely)
k) Psychological intervention to manage anxiety or depression
l) Prevention of future recurrence

Discharge criteria

The status of patients admitted to an ICU should be revised continuously to identify patients who may no longer need ICU care.

a) When a patient's physiologic status has stabilized and the need for ICU monitoring and care is no longer necessary.
b) When a patient's physiological status has deteriorated and active interventions are no longer planned, discharge to a lower level of care is appropriate
c) Discharge criteria from Critical Care Units should be similar to the admitting criteria for the next level of care such as intermediate care where available. However, not all patients require intermediate care after ICU discharge.