UTILIZATION OF PHYSIOTHERAPY IN THE CONTINUUM OF STROKE CARE AT A TERTIARY HOSPITAL IN BENIN CITY (UBTH), NIGERIA - A MIXED STUDY

BY

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CERTIFICATION

This dissertation by Muftau, Kafilat Opeyemi is accepted in its present form as satisfying the dissertation requirement of the degree of Bachelor of Physiotherapy of the School of Basic Medical Sciences, College of Medical Sciences of the University of Benin.

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DEDICATION

This dissertation is dedicated to Almighty Allah, my late father, Alh. Mufutau Akorede, my mother, Mrs Mufutau Tawakalit; and to everyone I call family. Thank you for believing in me.

ABSTRACT

Background: Stroke is a major public health problem and a leading cause of adult disability. The incidence, prevalence, and mortality rate of stroke have been increased worldwide, with most of the burden being in low and middle-income countries. A global survey reported that only 18% of low-income countries had stroke units, compared to 91% of high-income countries. Given the importance of stroke unit care to the prognosis of the disease in stroke patients, it is necessary to describe the current state of stroke units in the country, focusing on availability, capacity, and capability.

Methods: This research involved a mixed study design of a Cross-sectional and In-Depth interview. The instruments used were questionnaire administered to 45 stroke MDTs. The In-depth interview involved 10 selected stroke MDTs. The quantitative analysis data was summarized using descriptive statistics of frequency, percentage, mean and standard deviation. For the qualitative analysis, thematic analysis and visualization were carried out with the aid of Nvivo 14 Software.

Result: Participants (26 males and 19 females) in this study were aged 21-56 years. Referral rate for physiotherapy was relatively high. There was a good utilization of physiotherapy. There was a significant association between referral rate, utilization and relevance of physiotherapy among stroke multidisciplinary team.

Conclusion: Stroke care has advanced and more patients are surviving the acute-stage. In stroke care model, rehabilitation is now considered an integral component of all levels of stroke care.This research has identified a good utilization of physiotherapy and its relevance among multidisciplinary team. However, there is a need to improve the knowledge, awareness and education regarding physiotherapy and rehabilitation for all cadres of health care workers. Physiotherapist need to be proactive in this area and need the support of health services, training institutions and the government.

KEYWORDS: Stroke, Rehabilitation, Physiotherapy

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

According to Donkor (2018), stroke is the second leading cause of death globally. Persistence of the symptoms for a period less than 24-hour results In a mini stroke or Transient Ischemic attack (TIA) (Pandian *et al*., 2018) In recent times stroke has been defined by the American Heart Association (AHA) as any objective evidence of permanent brain, spinal cord, or retinal cell death attributed to a vascular etiology based on pathological or imaging evidence with or without the presence of clinical symptoms (Sacco *et al*., 2013).

Stroke is a major public health problem and a leading cause of adult disability and Disability adjusted Life Years (DALY) loss in low- and middle-income countries.

The incidence, prevalence, and mortality rate of stroke have been increased worldwide, with most of the burden being in low-and middle-income countries (Yan *et al*., 2016). Developing countries have a higher burden of non-communicable diseases than the rest of the world. More-than two-third (70%) of strokes occurs in low-and middle-income countries (WHO, 2019). Globally, stroke has covered about 16 million incidence and 9.7% deaths. Over 23 and 7.8 million new stroke cases and deaths are expected by 2030; respectively if there will not be intervention (Howard, 2018).

A global survey reported that only 18% of low-income countries had stroke units, compared to 91% of high-income countries (Owolabi *et al*., 2021). The first stroke unit in Nigeria was established in 2010 at the University of Benin Teaching Hospital (University of Benin, 2022). In

2012, a literature review found that most stroke patients in Nigeria who presented at the hospital were treated in the general medical wards (Bell-Gam *et al*., 2012). Given the importance of stroke unit care to the prognosis of the disease in stroke patients, it is necessary to describe the current state of stroke units in the country, focusing on availability, capacity, and capability.

Early initiation of rehabilitation procedures can enhance return of neurological function, reduce stroke-related disability, improve long term outcome and quality of life among stroke patients (Lindsay *et al*., 2008; Quinn *et al*., 2009; Clarke *et al*., 2015).

Immediate and intensive physiotherapy after a stroke has been associated with reduction in morbidity and mortality and improvement in performing activities of daily living (Langhorne *et al*., 2011; Fielder *et al*., 2013). (Bernhardt *et al*., 2004) identified physiotherapists as important drivers of mobility in the acute phase stroke care. In fact, early mobilization and functional training provided by the physiotherapists were considered the most important aspect of acute treatment in a stroke unit. Therefore, timely access to physiotherapy is valuable to the person concerned, their families and society as a whole (Fielder *et al*., 2013).

The important and utilization of physiotherapy in the continuum of stroke care has been studied in several countries (Tyson *et al*., 2000; Mckevitt *et al*., 2005; Lee HC *et al*., 2010). Most of these studies were conducted in high-income countries. It is inappropriate to generalize studies on utilization of physiotherapy from a high-income country to a low resourced country due to differences in socio-economic strata.

Different levels of Continuum of Stroke Care

1. **Stroke care at Emergency Unit: -**

Physiotherapy uses expert knowledge and skills to improve patient`s care flow, Early access to physiotherapy in Emergency Unit is associated with reduced disability. Physiotherapy play a critical role in screening for appropriateness of care, complete assessment, direct care of the patient and consultation with other practitioners. The main goal is stabilization of vital signs

2. **In-patient Stroke rehabilitation service**

With reduction in stroke mortality (Seminog *et al*., 2019) and more patients surviving the emergency unit, attention is now focused on reduction of morbidity and disability due to stroke. Revascularization with tPA or mechanical thrombectomy as well as protection of neural tissue by effective managements of complications, such as haemorrhagic transformation of infarct or brain oedema, is directed at limiting the extent of brain damage and thereby disabling effect of impairments. To support this effort, emphasis on recovery of function, feasibility of early mobilization and prevention of early complications should be considered as the main goal (Winstein *et al*., 2016).

In in-patient setting, the stroke care team ought to include at least a physician with expertise in stroke rehabilitation, speech and language pathologist/therapist with expertise in swallow and early communication techniques, physical therapist, occupational therapist and stroke care-trained nurse specialists (Boulanger *et al*., 2018). In this context the key domains of care are:

1. **Complete assessment of patient** with focus on the following impact of stroke with particular focus on presenting impairments and their severity (impairments mapping), comorbidities and their conditions and /or deformities, pre-existing disability(ies), family set-up and support, work and social status.
2. **Protection of the airway and swallow assessment and management.**

(a) Early swallow assessment by speech and language therapist, who is adequately trained in dysphagia management or by another professional (nurse or doctor), is recommended (Palli *et al*., 2017).

(b) The patient should not fed orally or given medications unless cleared by swallow screening (Duncan *et al*., 2005).

(c) The period within which this is to be conducted is difficult to specify as evidence in this respect does not support a standardize practice. However, currently, there is a consensus agreement that in patients who have signs of dysphagia, the assessment should be carried out within 24hrs (Ellis and Adams 2016).

(d) At present, there is no consensus on the instrument(s) for the assessment , and we recommend that this should be agreed upon local depending on resources, needs availability, expertise and training (Donovan *et al*., 2013).

(e) Enteral feeding should be initiated earl in patients with dysphagia to avoid malnourishment. Whilst this should be considered as early as it is clinically established that patients is not able to swallow, the delay in introducing the enteral feeding should not exceed 3 days (Yamada 2015; Ojo and Brooke 2016).

(f) Evidence indicates that early insertion of per-endoscopic gastrostomy tube should be avoided (George *et al*., 2017).

(g) In patients requiring enteral feeding, nasogastric tube feeding is recommended for as long as 3 weeks, beyond which insertion of PEG may be considered (George *et al*., 2017). Please note that nasogastric tube feeding can be associated with regurgitation and aspiration if the patient lies down immediately after a meal. Therefore, the

patient should remain seated for over 2hrs (gastric empting time) after each meal to avoid regurgitation and aspiration.

3. Very Early or Early Mobilization (VEM/EM)

(a) Currently, there is no evidence to support VEM (defined as out of bed activity within 24-48hr). Indeed, AVERT lll showed negative impact on mortality at 3 months (Langhorne *et al*., 2018; Bernhardt *et al*., 2019). In the light of lack of evidence for beneficial effect and evidence for negative impact at 3 months, we recommend that mobilization within 24hrs after stroke cannot be recommended (Langhorne *et al*., 2018). Mobilization within 48hrs may be considered acceptable in patients who meet key safety parameters. However, there is still no convincing evidence for efficacy of this practice (Xu *et al*., 2017).

(b) Early mobilization is recommended, currently there is no agreement on the definition of "EARLY". Mobilization within 72hrs may be considered as such (Bernhardt *et al*., 2015). On this basis of current evidence, mobilization after 24hrs, unless otherwise contraindicated, is recommended, there are no studies to indicate that this practice is likely to harm patient and indeed, there is some evidence that it may be of some benefit (Li *et al*., 2018). Dose, including intensity, frequency and duration should be commensurate to patient`s clinical status. Dose should be incrementally increased in line with patient`s tolerance and response (Yagi *et al*., 2017). Specific motor rehabilitation focuses are head and trunk control, arm function, stance, gait and balance and should be addressed as individually.

4. Communication and speech.

(a) Early assessment of communication by a speech therapist is recommended.

(b) Strategies for establishing communication early with stroke patients are recommended (National Institute for Health and Care Excellence (NICE) 2013).

(c) The evidence for active speech and language therapy in early period after stroke, before 48 h, is not available (Nouwens *et al*., 2013).

3. Out-patient Stroke Rehabilitation Services

Patients may be discharged for acute care and sub-acute facilities with arrangement to receive ongoing rehabilitation as out-patients. Indeed, there is evidence that early supported discharge directly from acute care to community- based rehabilitation as well as integrated out-patient rehabilitation delivers good outcome for stroke survivors (Rice *et al*., 2016; Langhorne *et al*., 2017).

The patient could be referred to an out-patient stroke rehabilitation service if:

(a) He / She is clinically stable and is able to tolerate transportation to and from out-patient rehabilitation facilities.

(b) He / She has sufficient effort tolerance level and does not fatigue so much that precludes effective participation in therapy sessions.

(c) He / She is able to engage cognitively in therapy sessions, re-engage in subsequent sessions with demonstrable carry over.

The out-patient stroke rehabilitation facility should be designed to offer multidisciplinary team rehabilitation. Patients should have access to all required therapies and interventions. The available services should include:

(a) Access to physician(s) with expertise in neurorehabilitation for continued management of residual effects of stroke including spasticity and pain

(b) Physiotherapy service with adequately designed treatment area with availability of most required equipment

(c) Occupational therapy service with capacity to attend to issues such as extended activities of daily living and vocational rehabilitation.

(d) Speech and language therapy for the treatment of cognitive, behavioral and emotional post-stroke disorders is recommended when available.

4. Community-Based Stroke Rehabilitation (CBR)

Over the last couple of decades, CBR has acquired a lot of interest. CBR programs improve, facilitate, stimulate and /or provide services to people with disabilities, such as stroke survivors, their families and caregivers within the locations of their families and communities through locally employed full or part time, paid or volunteer community rehabilitation workers, who are trained, followed up and managed within a certain organizational set up, that has rehabilitation philosophy as its core operational principle (Ru *et al*., 2017). Only a few studies are available on CBR and its advantages and disadvantages have not been critically studied (Stephenson and Wiles 2000). However, it is possible to list some advantages on the basis of experience and current practice. Advantages of CBR, compared to the institutional approach include:

(a) In time, and in theory, all the people living with disabilities in a community can be reached and their basic needs be met.

(b) “Tailor-made” rehabilitation program can be established, based on the individual`s capacities and needs, and focused directly on integration into the family / community.

"Disability is not a stable situation. CBR can evolve and adapt to changing needs of patients.

(c) Family members can witness and participate in the progress of a relative living with disability, thus enhancing their faith in that person`s abilities and potential and challenging their own prejudices.

(d) CBR services, apart from carrying out their core work in rehabilitation, can also contribute towards the prevention of secondary complications related to impairments and disabilities, through activities such as primary healthcare, vaccinations, nutrition and hygiene.

(e) CBR program can trace man people living with disabilities who would never have been found by institutions and, through referral, can make the work of other exiting specialized service more effective.

(f) CBR can be more effective in tackling issues such as return to work and community access, including leisure activities and extended activities of daily living.

(g) CBR could be cost-effective if well managed.

1.2 Statement of Problem

Several studies have been conducted in developed countries. To the best knowledge of the researcher, little studies have been conducted in developing countries. Even-though studies have been conducted to bring forth the utilization of physiotherapy services in South-Western Nigeria, no known study has been conducted in South-Southern Nigeria. Thus, this informed the impetus for this study. Cultural belief and affordability also play a role in the utilization of physiotherapy because some have the means to access the care but they don't believe in it, some believe in it

but they don't have the means to access the care, some believe in it but they are not convincing about it, while some are completely ignorance of it.

1.3 Aim of the Study

To investigate the utilization of physiotherapy in the continuum of stroke care at a tertiary hospital in Benin City – UBTH.

1.3.1 Specific Objectives

i. To evaluate the pattern of referral for physiotherapy after stroke.

ii. To evaluate the knowledge and awareness of physiotherapy among Stroke Multi-disciplinary Team.

iii. To know the relevance of physiotherapy among Stroke Multi-disciplinary Team.

iv. To determine if access to physiotherapy is equitable among stroke patients.

v. To know the determinants of equitable access to physiotherapy

1.4 Research Questions

i. What is the pattern of referral for physiotherapy after stroke.

ii. What is the level of knowledge and awareness of physiotherapy among Stroke Multi-disciplinary Team.

iii. What is the relevance of physiotherapy among Stroke Multi-disciplinary Team.

iv. Is physiotherapy access equitable among stroke survivors

iv. What are the determinants of access to physiotherapy services among stroke survivors.

1.5 Significance of Study

To Physiotherapists: The findings of this study may enable physiotherapist know the level of awareness and provide more information about utilization of physiotherapy among MDTs.

To Other health professions: The outcome of this study may add to the pre-existing expertise and knowledge, increase the level and awareness of the scope of physiotherapy, the services render and also identifying the extent to which physicians adhere to Clinical Practice Guidelines for the management of stroke patients.

1.6 Scope of the Study (Delimitation)

This study was delimited to

The Multi-disciplinary team which includes the following categories of staff

-Physician(s) with expertise in neurorehabilitation.

-Rehabilitation-trained Nurses.

-Neurological Physiotherapists

-Neurological Occupational Therapists.

-Speech and language therapist with expertise in dysphagia management and communication rehabilitation.

-Dietician.

-Social worker(s)

1.7 Limitation

The response of some participants were influenced by social desirability bias

1. 8 Definition of Terms

Stroke: It is defined by the American Heart Association (AHA) as any objective evidence of permanent brain, spinal cord, or retinal cell death attributed to a vascular etiology based on pathological or imaging evidence with or without the presence of clinical symptoms (Sacco *et al*., 2013).

Physiotherapy: Physiotherapy is a health care profession which assists people to restore, maintain and maximize their strength, function, movement, and overall well-being and have in-depth knowledge of how the body works and specialized hand-on clinical skills to assess, diagnose, and treat symptoms of illness, injury and disability.

Continuum of Stroke Care: It is a continuous process of stroke care starting from Emergency Unit (Hyperacute care) to Community-based rehabilitation. It starts at te time the patient first presents with impairments and may need to be provided throughout the rest of his/her living years. It is appropriately defined in terms of timing, service structures and resource requirements.

1.9 List of Abbreviations

CBR Community-Based Rehabilitation

tPA Tissue-type Plasminogen Activator

PEG Polyethylene glycol

AHA American Heart Association

MDT	Multidisciplinary Team
VEM	Very Early Mobilization
EM	Early Mobilization
ICA	Internal Cerebral Arteries
ACA	Anterior Cerebral Arteries
PCA	Posterior Cerebral Arteries
CoW	Circle of Willis
AVERT III	A Very Early Rehabilitation Trial after Stroke Phase III
PCOMs	Posterior Common Arteries

CHAPTER TWO

LITERATURE REVIEW

2.1 Stroke

According to Donkor (2018), stroke is the second leading cause of death globally. Persistence of the symptoms for a period less than 24-hour results In a mini stroke or Transient Ischemic attack (TIA) (Pandian *et al*., 2018). In recent times stroke has been defined by the American Heart Association (AHA) as any objective evidence of permanent brain, spinal cord, or retinal cell death attributed to a vascular etiology based on pathological or imaging evidence with or without the presence of clinical symptoms (Sacco *et al*., 2013)

There is a dearth of studies evaluating the pattern of referral for physiotherapy after stroke in Nigeria and the proportion of stroke patients who actually utilized this service is unclear.

Therefore this study was conducted to investigate the pattern of referral and utilization of physiotherapy in the continuum of stroke care in a tertiary teaching hospital in Nigeria- UBTH.

Investigating the pattern of referral for physiotherapy services maybe the first step identifying the extent to which physicians adhere to Clinical Practice Guidelines for the management of patients with stroke. Examining the level of utilization may help determine if access to physiotherapy is equitable among stroke patients.

Although stroke risk increases with age, strokes do and can occur at any age (Randolph, S.A., 2016). The risk of having a stroke increases with age (Solenski, 2004). Improved inter professional stroke care and awareness of possible individual risk factors remain a public health concern (Ezejimofor, *et al*., 2017).

2.1.1 Epidemiology

Globally, stroke is the second leading cause of death, the first leading cause of disability in an adult and the fourth leading cause of lost productivity with about 10 million novel strokes each year as measured by Disability Adjusted Life Years (DALY) (Pandian *et al*., 2018). Death from stroke has decreased over the past decade, with stroke now the fifth leading cause of death in the United States (Amy, 2017). Most strokes (88%) are ischemic events, while other etiologies include intracerebral hemorrhage (9%) and subarachnoid hemorrhage (3%) (AHA, 2004; NIND 2004).

Out of approximately 795,000 individuals that have stroke each year in the United States, about 610,000 of the are first or new strokes, and about 185,000 strokes (which is nearly one of four) are in people who have had a previous stroke (AHA, 2003). Of those who suffer a first stroke, approximately 20% die within 12 months of the incidence (Alpert, 2011). About 17.8% of those over 45 years of age have experienced stroke symptoms (AHA, 2003). Hispanics have a greater incidence hemorrhagic stroke at a younger age (AHA, 2003). Intracerebral hemorrhage occurs from rupture of cerebral vessels often as the result of hypertension (Lymaries *et al*, 2020).

Stroke is one of the leading causes ol long-term disability and death worldwide. Stroke reduces mobility in more than half of stroke survivors aged 65 and above, with about 85% of all strokes being ischemic (AHA, 2003). In the year 2005, 87% of the estimated 5.7 million stroke deaths were in low-income and middle-income countries with an estimated mortality of 126 per 100,000 in Nigeria

In Nigeria, the prevalence of stroke survivors is about 674/ 100,000 population. There was a reported prevalence trend among rural dwelling adults in the south-south region compared to

other regions in Nigeria (Adeloye *et al*, 2019). It was found to be more common in men and the elderly populace, and likely to be commonly predisposed by hypertension (Onwuchekwa *et al*., 2014). The evidence is found in a previous survey of stroke prevalence and positive association between cardiovascular diseases including stroke and environmental risk in the oil-producing Niger-Delta region of Nigeria.

Generally, the incidence of new and recurrent stroke has declined in recent decades as result of improved management of underlying risk factors and specific medications such as statins and anti-hypertensives (Guzik *et al*., 2017). Overall, the risk of having a stroke is higher in blacks than whites, as hypertension occurring earlier in life, is particularly prevalent in blacks (AHA, 2003). This explains the risk of stroke amongst this ethnic group as compared to the Whites.

While stroke is more common in men than women, when young and middle-aged, women have a higher lifetime risk of developing a stroke than men (Guzik *et al*, 2017).

2.1.2 Etiology/ Risk factors

The pathological background for stroke may either be ischemic or hemorrhagic disturbances of the cerebral blood circulation (Lymaries *et al*, 2020). Stroke is a manifestation of a wide range of pathologies, with different etiologies and prognoses. Stroke can be classified broadly into atherothrombotic brain infarctions (Ischemic stroke), haemorrhagic stroke and others. Ischemic stroke is produced by occlusion of a cerebral artery (thrombotic or atherosclerotic ,embolic, micro artery occlusion, lacunar stroke). Haemorrhagic stroke is caused mainly by spontaneous rupture of blood vessels or aneurysms or secondary to trauma (Lymaries *et al*, 2020).

Risk Factors

Through epidemiological studies, a wide range of stroke risk factors have been identified and are important for primary and secondary prevention of stroke (Pandian *et al*., 2018). The risk factors of stroke can be classified into two, which include risk factors that are modifiable and those that are non-modifiable. The modifiable risk factors of stroke include factors such as hypertension, diabetes mellitus, high blood cholesterol, cardiovascular diseases, atrial fibrillation, as well as lifestyle factors, such as obesity, sedentary lifestyle, poor diet/ nutrition and physical inactivity, tobacco smoking and alcohol consumption (Guzik *et al*., 2017). The non-modifiable risk factors are relatively few and include factors such as age, race, hereditary and gender. Many risk factors can be modified by medical or surgical intervention or lifestyle modification.

Modifiable risk factors

These are factors that one can take measure to change them. They include;

[a] Hypertension: Hypertension is known as the most significant modifiable risk factor for stroke, with a strong and direct relationship with blood pressure and stroke risk (Wahab *et al*., 2017). Chronically increased blood pressure exerts excessive pressure on cerebral vessels, which often resulting in lacunar infarctions or intracerebral haemorrhage (Pandian *et al*., 2018).

(b] Smoking: This is the most important modifiable risk factor for subarachnoid haemorrhage (Wahab *et al*., 2017). The nicotine and carbon monoxide in tobacco smoke reduces the amount of oxygen in the blood. Giving up smoking decreases but does not eliminate the excess risk

(Kawachi *et al*., 2003). Risk of stroke doubles with smoking (Bhat *et al*., 2008) by increasing the development of arteriosclerosis and coagulation factors in the blood (Etian, 2014)

(c) Diabetes mellitus: Diabetes mellitus is defined as fasting blood sugar > 119mg% or previous history of diabetes with or without therapy (Ruland *et al*., 2003). Hypertension and commonly occur together are both associated with hyperlipidemia. Patients with diabetes suffer from complications like myocardial infarctions and peripheral vascular disease which may eventually lead to stroke (Omotosho et at., 2009). The frequency of diabetes mellitus in stroke patients in Benin city, Nigeria was found to be close to 26.3% (Walker, 2004).

(d) Obesity: Excess body weight and obesity has been linked with an increased risk of high blood pressure, diabetes and stroke (Vincent *et al*., 2016). A physically inactive lifestyle is associated with increase in the level of obesity and has been implicated in the occurrence of strokes (Bhat *et al*., 2008).

(e) Blood lipids: Elevated serum cholesterol which has been strongly associated with increased mortality from ischaemic stroke in western countries (Peters *et al*., 2013) has not been a significant factor among Africans (Walker *et al*., 2004; Connor *et al*., 2005). Cholesterol is a soft waxy substance found among the lipids in the blood stream and all body cells (Peters *et al*., 2013). Cholesterol is transported around the body in two kinds of lipoprotein; low density lipoprotein (LLD) or high-density lipoprotein (HDL). High density lipoproteins can lead to clogging of the arteries, increasing the vision of the heart attacks, and ischaemic stroke (O'Regan *et al*., 2008). Since earlier meta-analyses of other lipid-lowering drugs did not show a decreased risk (Hebert *et al*., 2005). Statins might exert they're through mechanisms other than their lipid-lowering effects (O'Regan *et al*., 2008).

Non-modifiable Risk factors

[a] Age: According to American Heart Association computations, about 80% who die from cardiovascular diseases are 65 years and older; as age increases, the risk factor for stroke increases, the risk for stroke increases especially after age 65 (Bhat *et al* 2008). Stroke also affects younger people; approximately 28% of strokes occur in individuals younger than age 65 (Bhat *et al* 2008).

[b] Gender: Stroke has long been known to be men's disease, although women tend to develop stroke about 10 years later in life than men (Vincent *et al*, 2016).

[c] Hereditary: One's risk of stroke increases when the family has the history of stroke, mostly the paternal side (Bhat *et al* 2008). Genetic factors account for 7-20% of cases of subarachnoid haemorrhage (Locksley, National History of subarachnoid haemorrhage, intracranial aneurysms and arteriovenous malformation; based on 6368 cases in the cooperative, 2010)

[d] Race: Statistics show that African-American have a much higher risk of death from a stroke than Caucasians do (Peters *et al*., 2013). This is because blacks have higher risks of high

2.2 Classification

2.2.1 Ischaemic Stroke

Stroke due to ischaemia is usually due to the blockage of either large or smaller cranial arterioles of the brain which prevents adequate blood flow to the brain tissue (NIND, 2016; Lymaries *et al*, 2020). The common causes of ischemia are thrombosis and embolism and systemic

hypoperfusion (Randolph, 2016; Lymaries *et al*., 2020). Obstruction can occur in large vessels such as internal carotid arteries, vertebral arteries, or smaller deeper vessels and arteries that make up the circle of Willis. It is subdivided into the Embolic stroke, Lacunar stroke and Thrombotic Stroke.

i. Embolic stroke: Embolic Ischaemic stroke is more frequent in patients with atrial fibrillation (80%), myocardial infarction, prosthetic valves, rheumatic heart disease and larger artery atheroma (artery-artery embolus) results from dislodged emboli from a distant site other than the vascular supply to the brain. It is most commonly associated with CVD such myocardial infarction, dilated cardiomyopathy, atrial fibrillation, or valvular disease, sustained atrial flutter etc. When blood clot formed is dislodged from the tunica intima and carried to distant cerebral arteries where it blocks a large blood vessel (Martin & Kessler, 2007).

ii. Lacunae stroke results from occlusion of smaller deep penetrating branches of the cerebral vessels, it could be an occlusion of a branch of anterior cerebral artery, middle cerebral artery, posterior cerebral artery or vertebrobasilar artery, although they are commonly without symptoms but an accumulation of multiple infarcts can result in symptoms manifestations (Gore *et al.,* 2020).

iii. Thrombotic stroke is most commonly as a result of atherosclerosis forming an atheroma mostly on a large cerebral vessel. In the presence of risk factors like hypercholesterolemia there are fatty streaks deposit on the lumen of the cerebral vessel and progressively accumulates slowly narrowing the lumen reducing cerebral blood flow and creating a hypoxic condition for the tissues supplied. Eventually the atherosclerotic deposit completely occludes the blood vessel

shutting out blood supply to the brain tissue. When CBF goes below 10ml/100g/min cell death occurs. (Martin & Kessler, 2007).

2.2.2 Hemorrhagic Stroke

This type of stroke occurs as a result of rupture of blood vessels leading to bleeding and increased intracranial pressure and could cause the presentation of bleeding through orifices in an individual. Intracerebral hemorrhage, subarachnoid hemorrhage results in hemorrhagic stroke.

i. Intracerebral hemorrhage: Is the bleeding and hematoma formation in the brain parenchyma with or without the involvement of the ventricles and accounts 10-15% of all stroke morbidity (Rajashekar & Liang, 2022). It is most often caused by vascular malformation and changes that occurs to the blood vessels (e.g thin lining of vessels) as a result of hypertension and ageing (Martin & Kessler, 2007).

ii. Subarachnoid hemorrhage: Is the bleeding in the subarachnoid space between the pia mater and arachnoid mater. It most often presents with a thunderclap headache which is sometimes accompanied by vomiting, nausea and diplopia (Ziu *et al.,* 2017). It is caused by intracranial aneurysm (weaken blood vessel casing an outpouching of the vessel) and vascular malformation (Martin & Kessler, 2007). A less common cause of bleeding in the brain is arteriovenous malformation (AVM) (Warlow *et al*., 2003).

A Transient ischaemic stroke a few months before the stroke is considered an important warning sign (Easton *et al*., 2001). The pathophysiology is similar to that of ischaemic heart disease; an atherosclerotic plague in a cerebral artery ulcerates triggering the aggregation of platelets and

coagulation of fibrin to produce the thrombus that occludes the artery (Donnan *et al*., 2008). Fewer than 20% of cases do not evolve to ulceration, but progress to cause gradual obstruction of flow and may manifest as TIAs (Easton *et al*., 2001).

2.3 Relevant Anatomy

A. Introduction

The blood supply to the brain is divided into an anterior and posterior circulation. The anterior circulation derives blood from the bilateral internal carotid arteries (ICA) that supply blood to the frontal lobes, parietal lobes, lateral part of temporal lobes and the anterior part of the deep cerebral hemispheres (Ginsberg, 2017). The posterior circulation derives blood from the bilateral vertebral arteries (VA) that supplies the brainstem, cerebellum, occipital lobes, medial part of temporal lobes and posterior part of the deep hemisphere (mainly thalamus). The terminal branches of the ICAs and the VAs form the ring anastomosis called the Circle of Willis which lie within the subarachnoid space (Abe *et al*., 2003). A complete Circle of Willis is present in only a few populations with structural variants such as absence of some vessels in certain regions of the ring, duplication of vessels which is common in the anterior circulation (Anterior communication artery) and fenestrations (Menshawi *et al*., 2013). The Circle of Willis constantly perfuse the brain and protects the brain from ischemia especially in individuals with an almost complete or complete circle of vessels (Rosner *et al*., 2020).

B. Circle of Willis

The Circle of Willis is a ring anastomotic connection that provides important communications between the forebrain (anterior) and hindbrain (posterior) blood supply. This connection exists to provide concomitant flow to a region of the brain whose primary source of blood flow has been reduced or compromised by disease (Ginsberg, 2017). It is, however, one of the commonest locations for intracranial aneurysms. The Circle of Willis is of important clinical significance due to its location, function and structure (Rosner *et al*., 2020).

i. Structure of Circle of Willis

The Circle of Willis is arterial circle at the base of the brain, made up of vessels connecting the anteroposterior circulations of the brain (Ginsberg, 2017). The circle is composed of the left and right internal carotid arteries (ICA) which divides into the anterior cerebral arteries (ACAs) anteriorly, the posterior cerebral arteries (PCAs) which emerges from the basilar artery (formed by the merging of the vertebral arteries in the back of the neck posteriorly. The ring is completed by two (2) posterior communicating arteries (PCOMs) that connect the posterior and anterior cerebral arteries at the dorsal part of the ring; and one (1) short anterior communicating artery (ACOM) that connects the 2 anterior cerebral arteries and makes up the front of the Circle of Willis.

The left and right PCAs are the longest parts of the Circle of Willis and run along its sides, with a corresponding ICA in between the PCA and ACA on each side.

ii. Physiology

The internal carotid artery (ICA) begins at the bifurcation of the common carotid artery to the external and internal carotids. While the external carotid supplies the face, the ICA directly

penetrates the base of the skull through the carotid canal, (with no other branches till there), to supply the anterior part of the cerebrum (Ganong, 2005).

The first branch of the ICA is the ophthalmic artery (at the level of the cavernous sinus), which enters the orbit through the optic canal together with the optic nerve and supplies the retina and choroid via its terminal branches – the central retinal artery and the posterior ciliary arteries. Occlusion of the ophthalmic artery results in monocular blindness (Rosner *et al*., 2020).

The second branch of the ICA is the Posterior communicating artery (PCOM) which is a small artery that runs posteriorly to join the PCA of the posterior circulation forming an important connection between the anterior (carotid) and posterior (vertebro-basillar) circulation and part of the CoW.

The next branch is a small artery called the anterior choroidal artery which supplies, among others, the optic tract and the posterior limb of the internal capsule. Occlusion of the anterior choroidal may result in contralateral weakness or hemiplegia due to an infarct in the motor pathways of the internal capsule (Rosner *et al*., 2020).. After the branching of the anterior choroidal artery, the ICA bifurcates into its two main branches, i.e. the anterior and middle cerebral arteries which supply most of the cerebrum.

2.4 Mechanism (pathophysiology) of Stroke

The mechanism or pathophysiology of stroke is dependent on the type of stroke. Strokes are broadly classified as either ischemic or hemorrhagic (Alpert, 2011). The clinical manifestations of ischemic and hemorrhagic stroke are direct consequences of the region of the vessels affected.

2.4.1 Mechanism of Ischemic Stroke

This occurs when there is an obstruction or blockage in a cerebral blood vessel which leads to decreased or disrupted blood flow to the brain (Wallace, 2016). The obstruction can be a result of; the formation of a clot within a blood vessel of the brain or neck (thrombosis); the movement of an existing clot from a part of the body to the brain(embolism); or a severe narrowing (stenosis) of an artery in the brain or supplying the brain (Randolph, 2016).

Ischemia occurs when there is a decrease in blood flow to less than 20 mL/100 g of brain tissue per minute. Reduction of blood flow to less than 16 mL/100 g of brain tissue per minute leads to tissue death within one hour. In the absence of blood flow, death of brain tissue occurs within 4 to 10 minutes (Smith *et al*., 2005).

The most common etiology that results in cerebral ischemia or infarction is local damage to a vessel wall from atherosclerosis. This may occur in the aortic arch, carotid arteries, or cerebral vessels. The development of atherosclerosis begins with endothelial injury and inflammation, leading to plaque formation. The plaque becomes thick and fibrous and the sclerotic material partially fills and/or occludes the lumen of the vessel. Platelets adhere to this, releasing factors that initiate the coagulation-clotting cascade, forming a clot or thrombus. The clot may either break off as an embolus traveling to a distal vessel or remain in place, occluding the vessel (Messing, 2003). Lacunar infarcts occur with complete occlusion of end-arteries that supply a small area of brain tissue (Smith *et al*., 2005). Thrombotic events most often affect the internal carotids, middle cerebral, or basilar arteries (Messing, 2003; Frosch *et al*., 2005). However, emboli may also develop from the aortic arch or carotid arteries (Messing, 2003).

Symptoms from ischemic events occur fairly rapidly since the brain is very dependent upon adequate oxygen and circulation. Lack of adequate oxygenation to the cerebral cortex can produce unconsciousness in a little while (Ganong, 2005).

Since atherosclerotic occlusion of the vessel can occur gradually, symptoms are progressive. The symptoms or deficits increase over several hours to several days. There is a large area of tissue ischemia that increases over time.

At the onset of the cerebral ischemic event, there is a gradation in brain perfusion. Whereas the central area may become infarcted, the surrounding tissue exhibits zones of ischemia and injury, the ischemic penumbra. The normal cerebral auto-regulation of circulation is not operating and is unable to restore blood flow to the area. Unless treatment is begun immediately, that tissue will become necrotic as well. (Smith *et al*., 2005).

Survival of this ischemic tissue is dependent upon 2 major factors: (1) the availability of collateral circulation and (2) the duration of the ischemia (Frosch *et al*., 2005). If the blood flow is not restored, the ischemic tissue becomes necrotic and cell death occurs. As cerebral blood flow falls to zero, death of brain tissue can occur within 4 to 10 minutes.

Cerebral infarction is also associated with cerebral edema. About 5 to 10 stroke patients develop severe cerebral edema, increasing the risk of brain herniation (Smith *et al*., 2005).

When a part of the brain is deprived of blood's oxygen and vital nutrients, death of brain cells begins which leads to the compromise in the movements/ activities controlled by the affected part of the brain (Wallace, 2016).

2.4.2 Mechanism of Hemorrhagic stroke

Cerebral hemorrhage is the third most common cause of stroke and is associated with about a 50% mortality rate (Smith *et al*., 2005). In addition to intra-parenchymal hemorrhage, symptoms can occur from subdural or epidural hematomas. These are usually the result of some sort of trauma and may occur several hours after the initial injury. Subarachnoid hemorrhage can occur either because of trauma or from the rupture of an aneurysm. Intra-parenchymal hemorrhages usually occur from the rupture of small penetrating arteries.

Sustained hypertension induces proliferation of smooth muscle cells in the arterioles through a process called hyperplastic arteriolosclerosis (Sunderland & Auer, 2006). Overtime, smooth muscle cells die, and the tunica media of blood vessel is replaced by collagen, which results in poor compliance and decrease in tone of the vessel wall. These micro aneurysms called Charcot-Bouchard aneurysms (proposed by Charcot and Bouchard in 1868), ruptures leading to a hemorrhagic stroke (Sunderland & Auer, 2006; Woo *et al*., 2004).

They usually occur in the basal ganglia, thalamus, pons, and cerebellum. However, they can also occur from vascular malformations. Substance abuse of cocaine and amphetamines results in a rapid increase in blood pressure, leading to vessel rupture (Messing, 2003).

Ruptured cerebral arteries are the usual source of the bleed (Frosch *et al*., 2005). Extravasation of blood occurs in the brain and/or the subarachnoid space. The adjacent tissue may be displaced and compressed. Exposure to blood irritates and causes vasospasms of adjacent vessels. A clot will form that will eventually resolve and decrease in size. However, the brain tissue next to the clot can become swollen and necrotic (Messing, 2003)

Neurological deficits depend upon the site and severity of the hemorrhage. The clinical presentation can include complaints of: severe headache, vomiting, nuchal rigidity, stupor, coma, and convulsions. However, almost one half of the patients with hypertensive cerebral hemorrhage die (Smith *et al*., 2005).

2.5 Signs and Symptoms/ Clinical manifestations of stroke

According to the U.S National Institute of Neurological Disorders and stroke (1997), these are the five major signs of stroke;

1. Sudden numbness or weakness of the face, arm or leg, especially on one side of the body. The loss of voluntary movement and/or sensation may be complete or partial. There may also be an associated tingling sensation in the affected area.
2. Sudden confusion, difficulty in speaking or understanding speech. Sometimes weakness in the muscles of the face can cause drooling.
3. Sudden changes in vision, particularly in one eye.
4. Sudden trouble walking, dizziness, loss of balance or coordination
5. Sudden, severe headache with no apparent cause (Fauci *et al*., 2008).

Other symptoms include difficulty in swallowing (dysphagia), partial loss of hearing, urinary and faecal incontinence (Alpert, 2011).

Individuals experiencing any of these warning signs/symptoms should seek medical attention immediately.

2.5.1 Stroke warning signs

According to the U.S National Institute of Neurological Disorders and stroke, these are the five major signs of stroke;

1. Sudden numbness or weakness of the face, arm or leg, especially on one side of the body. The loss of voluntary movement and/or sensation may be complete or partial. There may also be an associated tingling sensation in the affected area.
2. Sudden confusion, trouble speaking or understanding. Sometimes weakness in the muscles of the face can cause drooling.
3. Sudden trouble seeing in one or both eyes
4. Sudden trouble walking, dizziness, loss of balance or coordination
5. Sudden, severe headache with no known cause (Fauci *et al*., 2008)

2.6 Method of Diagnosis

After the finding of a significant neurologic deficit(s) in a patient with stroke, identifying the cause and region of damage responsible for the stroke syndrome is important for assessing prognosis, formulating and guiding a treatment plan.

According to Powers *et al*., (2018), diagnostic testing is most cost-effective when it leads to not just a change in treatment but to a change that improves outcomes. Neuroimaging provides information on the physiologic basis of the patients' acute neurologic deficits including: the presence of hemorrhage; the site of arterial occlusion and the size of the infarct core (Gonzalez & Schwamm, 2016). Also, it has a central role in the differential diagnosis of patients with suspected stroke, differentiating ischemic from hemorrhagic stroke and aids in patient selection for intra-arterial thrombectomy (Kamalian & Lev, 2019).

Asides imaging, the medical history and neurologic examination of a patient are key elements in the diagnosis of stroke. Identifying the cause of stroke usually involves several types of diagnostic testing including;

(1) Imaging of infarct (Brain imaging)

(2) Vascular assessment (Wityk and Beauchamp, 2000).\

2.6.1 Brain Imaging

i. Computed Tomography (CT)

Computed tomography is a frequently used modality in stroke evaluation due to its available and high sensitivity for intracranial hemorrhage (Gonzalez & Schwamm, 2016). Whereas the normal attenuation of brain is approximately 35 Hounsfield units (HU), acute hemorrhage is easily detectable because of its 56-76 HU density (Wityk & Beauchamp, 2000). Subtle ischaemic changes can be seen on CT in some patients just a few hours after stroke onset. Although there have been reports of high sensitivity, in practice, the detection of the early changes of infarction is difficult as CT scan may be normal in the first few hours of ischemic stroke (Wityk & Beauchamp, 2000).

ii. Magnetic Resonance Imaging

Magnetic resonance (MR) imaging is becoming increasingly available and has a higher sensitivity for the detection of infarcts compared to CT scan (Wityk & Beauchamp, 2000). The

advantages of MR imaging are most evident in the posterior fossa, where CT is limited due to beam hardening artifact from the adjacent skull base. Lacunar infarcts and cortical strokes are more conspicuous with MR imaging (Wityk & Beauchamp, 2000).

2.6.2 Vascular Assessment

i. Cerebral Angiography

Cerebral angiography is the gold standard for the evaluation of the neurovasculature. It is useful in the diagnosis of subtle lesions, such as vasculitis, and in the precise quantitation of stenotic lesions (Kamalian & Lev, 2019). Many noninvasive techniques have been developed that are useful in screening patients and in identifying those who would benefit most from angiography.

ii. Ultrasound

Ultrasound provides a rapid, noninvasive means of assessing the cerebral arteries in the neck (carotid and vertebral artery duplex) and inside the skull (Transcranial Doppler) (Frosch *et al*., 2005). Duplex and transcranial Doppler can be performed at the bedside if necessary and are excellent screening tests, but both can suffer from operator error (Wityk & Beauchamp, 2000).

iii. Transcranial doppler

Pulsed-wave transcranial Doppler (TCD) studies intracranial vessels at various depths and locations by the way of several windows into the skull; such as the temple (distal ICA, MCA and ACA), orbit (ophthalmic artery), and the foramen magnum at the dorsal part of the neck (basilar and vertebral arteries). TCD provides a window into the vascular condition of patients presenting with acute cerebral ischemia (Kamalian & Lev, 2019).

iv. Magnetic Resonance Angiography

Magnetic resonance angiography (MRA) makes use of differential signal characteristics of flowing blood to evaluate cerebral vessels intracranially and in the neck as well. However, in certain instances such as in patients with metallic implants, claustrophobia, MRA is contraindicated (Kamalian & Lev, 2019).

2.7 Management

For stroke survivors, it is recommended that early management/ rehabilitation is provided in organized environments with efficient interprofessional stroke care and patients should receive treatment commensurate with patients' tolerance and treatment goals (Powers *et al*., 2018).

2.7.1 Medical Management

Medical management of stroke includes strategies to achieve the following:

• Improve cerebral perfusion by re-establishing circulation and oxygenation (Campbell *et al*., 2019).

• Maintain adequate blood pressure. Hypotension or extreme hypertension is treated; anti-hypertensive agents have the added risk of inducing hypotension and decreasing cerebral perfusion (Pandian *et al*., 2018)

• Maintain sufficient cardiac output.

• Restore/maintain fluid and electrolyte balance.

• Control seizures and infections.

•Control intracranial pressure. Ventriculostomy may be indicated to monitor and drain cerebrospinal fluid (Herpich and Rincon, 2020).

• Maintain bowel and bladder function, which may include urinary catheter. Catheterization is typically short-term but may be long-term with the patient in coma (Popat *et al*., 2018).

2.7.2 Surgical Management

Carotid endarterectomy is a surgical procedure used to eliminate fatty deposits from the carotid artery. It is important procedure to prevent recurrent strokes or the development of stroke in individuals with TIAs (Doberstein *et al*., 2017).

Neurosurgical interventions may include, surgery indicated to repair a superficial ruptured aneurysm in haemorrhagic stroke, prevent re-bleeding, and evacuate a clot (Herpich and Rincon, 2020). Surgery may also be indicated for resection of a superficial unruptured Arteriovenous malformations when there is high risk of rupture and stroke (Doberstein *et al*., 2017).

Optic chia

2.7.3 Pharmacological Management

Pharmacological therapy includes anticoagulants (e.g., warfarin, heparin) which are used to reduce the risk of blood clots and prevent existing clots from getting bigger by thinning the blood (Alberts *et al*., 2020). Thrombolytics dissolves clots and re-establishes blood flow (e.g., lysis of thrombi causing ischemic stroke (Kapil *et al*., 2017). Antiplatelet therapy in low-dose is used to decrease the risk of thrombosis and recurrent stroke (Kapil *et al*., 2017).

2.7.4 Physiotherapy Management

i. Examination

The components of a comprehensive physical therapy examination include patient/client history, systems review, and tests and measures (Verbeek *et al*., 2014). The selection of examination procedures will vary based on a number of factors including patient's age, location and severity of stroke, stage of recovery, phase of rehabilitation, as well as other factors (Langhorne *et al*., 2011).

The purposes of the examination are to monitor recovery from stroke and progress and develop a specific plan of care (POC), including anticipated goals, expected outcomes, prognosis, and interventions (Magwood *et al*., 2020). The comprehensive examination provides the main source of information for efficient clinical decision making. Examination findings should be coordinated with those of the interdisciplinary rehabilitation team in order to arrive at an integrated plan of care (Olaleye & Lawal, 2017).

ii. Physiotherapists Goals

Physiotherapy plays a positive role in enhancing physical function and independent living for stroke survivors (Olaleye & Lawal, 2017). Making general goals will provide the basis for development of more specific anticipated goals and expected outcomes for an individual patient (Olaleye & Lawal, 2017). It is important to point out that there is no one intervention optimal for all patients with stroke (Hamzat & Peters, 2009). Because patients with stroke are a diverse group with variable levels of function, interventions must be carefully selected based on individual abilities and needs (Winstein *et al*., 2016). Therapists need to select interventions that have the greatest chance of remediating existing impairments, promoting independency as much as possible and prevent reoccurrence of stroke (Hamzat *et al*., 2014).

Early emphasis on improving functional independence provides an important source of motivation for both the patient and family (Hamzat *et al*., 2014)

2.7.4.1 Physiotherapy Treatment

Therapists select interventions based on an accurate examination of existing impairments, activity limitations, and goals (Winstein *et al*., 2016). Functional, task-specific training is the mainstay of therapy and is designed to assist patients in regaining control of functional movement patterns (Olaleye & Lawal, 2017). Improved motor control and strength of the trunk and limbs, with an emphasis on the more involved side, is achieved through specific re-education strategies (Choi & Paik, 2018). Intense practice both during therapy sessions and outside of therapy is needed to effect meaningful change. The therapist needs to incorporate motor learning principles and behavioural shaping techniques to effectively support learning (Veerbeek *et al*., 2014).

A. Improving Upper Extremity Function

Patients may exhibit severe sensory, motor, and functional impairments of the upper extremity with limited recovery (French *et al*., 2016). These patients benefit from early mobilization, ROM, and positioning strategies. For patients who achieve some recovery of voluntary movement, training strategies should focus on task-specific practice, as repetitive task-specific training is the main focus of the rehabilitation program (French *et al*., 2016). Meaningful task-oriented practice involving grasp and use of UE for ADLs is important for stimulating recovery (Urton *et al*.,2007).

1. Upper Extremity Weight-Bearing as a Postural Support

Postural shift toward the more affected side with weight bearing on the extended arm and stabilized hand on a support surface is an important early activity to promote proximal stabilization and counteract the effects of excess flexor hyper-tonus and a dominant flexion

synergy (Ferrarello *et al*., 2011). Approximation can be used to increase activity of shoulder/scapular stabilizers. Weight-bearing activities are performed in sitting. (Smith, 2012)

2. Constraint-Induced Movement Therapy

Constraint-induced movement therapy (CIMT) is a multifaceted intervention which involves the forced use and massed practice of the affected upper limb by restraining the unaffected arm (Corbetta *et al*., 2015). It is designed to promote increased use of the more affected UE.

3. Electrical Stimulation

Neuromuscular electrical stimulation (NMES) has been used with patients recovering from stroke to reduce spasticity, improve sensory awareness, prevent or reduce shoulder subluxation, and stimulate volitional movements (Stein *et al*., 2015; Lee *et al*., 2017).

4. Simultaneous Bilateral Training

Simultaneous bilateral training involves using both arms simultaneously alone or in combination with augmented sensory feedback (Coupar *et al*., 2010)

5. Management of Shoulder Pain

In the flaccid stage, the arm should be supported at all times. Proper positioning and handling of the arm are essential as patients should be positioned so they do not roll onto the more affected upper limb, compressing it (Gaitan *et al*., 2019). During transfers and standing supportive devices should be considered to prevent traction injury (Smith, 2012). Interventions aimed at reducing pain and stiffness include appropriate PROM and mobilization techniques (Pollock *et al*., 2014; Gaitan *et al*., 2019).

. Strategies to Improve Lower Extremity Function

Lower limb training activities essentially prepare the patient for gait. This requires breaking up the synergy patterns (Letombe *et al*., 2010). Activities that can be used to promote knee flexion

with hip extension include bridging (Song & Heo, 2015). Bridging activities help develop trunk and hip extensor control, pressure relief on the buttocks, initial bed mobility and sit-to-stand transfers (Song & Heo, 2015).

1. Functional Electrical Stimulation

Functional Electrical Stimulation (FES) can be used to stimulate dorsiflexor function, help correct foot drop and improve the gait pattern of patients (Embrey *et al*., 2010).

2. Orthotics and Assistive Devices

An ankle-foot orthosis (AFO) is commonly prescribed to control impaired ankle/ foot function and wheelchairs may be required by most patients for mobility at some point during their recovery and correct positioning and sitting posture is ensured (Ferreira *et al*., 2013). An orthosis may be required when persistent problems prevent safe ambulation (e.g., inadequate ankle dorsiflexion, ankle instability) (Mulroy *et al*., 2010).

C. Improving Postural Control and Balance

The therapist emphasises symmetrical weight-bearing, as well as activities that promote shifting toward the more affected side. Weight-bearing on the more affected hip (sitting) and foot (standing) is encouraged while unnecessary activity of the less affected limbs (grabbing for support) is discouraged (Langstaff *et al*., 2014).

1. Sitting

Early training in sitting should focus on achieving a symmetrical posture with proper spine and pelvic alignment (Pollock *et al*., 2014). The pelvis should be neutral, spine straight. Feet should be flat on the support surface. Upper trunk mobility with reciprocal flexion/extension, lateral flexion, and rotation movements should therefore be practiced (Pollock *et al*., 2014).

2. Standing

Early standing posture is ideal to develop postural and extremity control (Letombe *et al*., 2010). As soon as possible, the patients are be encouraged to practice standing with unilateral upper limb support (more affected side) (Pollock *et al*., 2014; Letombe *et al*., 2010).

D. Interventions to Improve Aerobic Capacity and Endurance

Patients with stroke demonstrate decreased levels of physical conditioning following periods of prolonged immobility and reduced activity (Letombe *et al*., 2010). Patients with stroke require careful determination of cardiopulmonary responses during exercise and appropriate monitoring (Saunders *et al*., 2020). Individuals recovering from stroke benefit from endurance (aerobic) training to improve cardiovascular function. More traditional exercise training modes include treadmill walking or cycle ergometry (Aguiar *et al*., 2018). Patients with balance impairments will benefit from treadmill training (Lee *et al*., 2018).

E. Improving Motor Learning.

An effective stroke care plan capitalizes on this potential and encourages active participation (Ekechukwu *et al*., 2020). Motor skill learning is based on the brain's capacity for recovery through mechanisms of reorganization and adaptation (Hamzat & Peters, 2009). Activities are selected that are meaningful and tailored to the needs of the patient. Active participation is essential, as there is no learning with passive movements (Ekechukwu *et al*., 2020).

1. Mental Practice

Mental practice is the systematic application of imagery techniques for improving performance and learning (Barclay *et al*., 2020). The patient visualizes the movement and have an imaginary representation of himself or herself functionally using the affected limb or performing a motor action/ skill in order to perfect the action (Garcia and Aboitiz, 2016). Herpich and Rincon, (2020) found out that mental practice, when successfully combined with physical practice has been seen

to enhance Upper Extremity recovery and Lower Extremity recovery and walking ability (gait speed) in patients with stroke.

2. Mirror Therapy

Mirror therapy (MT) is a therapeutic strategy that focuses on moving/exercising the less impaired limb while watching a mirror reflection presenting the patient with the mirror image of his or her less affected limb as if it were the hemiparetic limb (Thieme *et al*., 2020). The use of a mirror can be an effective adjunct for some patients to improve motor function using visual feedback (Thieme *et al*., 2020).

3. Practice

More practice is essential for motor skill learning and recovery (Herpich & Rincon, 2020). The therapist organizes the patient's therapy session to ensure optimal practice or instruct the patient to self-monitor practice sessions (French *et al*. 2016). Variable practice improves performance and results in better retention of learned skills and improved ability to adapt to changing task demands. Consistent practice is continued during off-therapy times. (Veerbeek *et al*., 2014).

F. Improving Sensory Function

Patients who have significant sensory impairments may demonstrate impaired or absent spontaneous movement. The more the patient can be encouraged to use the affected side, the greater the chance of increased awareness and function (Schabrun & Hillier, 2009). Multiple interventions for UE sensory impairment can be categorized into sensory retraining or sensory stimulation approaches (Brown *et al*., 2018). Sensory retraining programs include use of mirror therapy, repetitive sensory discrimination activities, bilateral simultaneous movements, and repetitive task practice (e.g., sensorimotor integrative treatment with its focus on normalizing

tone and practice of functional activity) (Okonkwo *et al*., 2018). Sensory stimulation intervention includes compression techniques such as weight-bearing, manual compression, mobilizations, electrical stimulation, thermal stimulation, or magnetic stimulation (Schabrun & Hillier, 2009).

G. Improving Hemianopia and Unilateral Neglect

Training strategies that encourage awareness and use of the environment on the hemiparetic side and use of the hemiparetic extremities are performed (Hamzat & Peters, 2009). Stimulation and active voluntary movements of the neglected limb, UE exercises that involve crossing the midline toward the hemiparetic side (e.g., reaching activities or PNF chop or lift patterns) and functional activities that encourage bilateral interaction are also valuable (French *et al*., 2016).

H. Improving Flexibility and Joint Integrity

Soft tissue/joint mobilization and ROM exercises are initiated early to maintain joint integrity and mobility and prevent contractures (Rose *et al*., 2017). Passive range of movement (PROM), and AROM when possible, with terminal stretch should be performed daily in all motions. Full extension of the elbow is important to address excess flexor spasticity (Salazar *et al*., 2019). Normal length of plantar-flexors, wrist and finger extensors should also be maintained as muscle tightness is typical in flexion. This can be achieved functionally through sitting, weight-bearing on the paretic Lower Extremity and extended paretic Upper Extremity with the wrist extended and fingers open and extended (Hamzat & Peters, 2009).

I. Interventions to Improve Strength

Muscle weakness is a major impairment after stroke and contributes to significant activity limitations (e.g., walking, sit-to-stand transfers, stair climbing, Upper Extremity activities). Progressive resistive strength training has been shown to improve muscle strength in individuals with stroke (Hamzat & Peters, 2009). Exercise modalities for strengthening include free weights

and elastic bands (Rose *et al*., 2017). Combining resistance training with task-oriented functional activities promotes better function (e.g., sit-to-stand transfers, step-ups, stair climbing while wearing weighted cuffs (Rose *et al*., 2017).

J. Interventions to Manage Spasticity

Patients who demonstrate spasticity can benefit from interventions designed to manage the effects of spasticity (immobility, soft-tissue contracture, and deformity) (Stockley *et al*. 2019). These include early mobilization and daily stretching to maintain the length of spastic muscles and soft tissues and promote optimal positioning. Modalities can be used to treat spasticity, these include the application of cold, joint and soft tissue mobilisation, and electrical stimulation (Ferrarello *et al*., 2011).

2.8 Physiotherapy Practice in Stroke Management

Physiotherapists are medical professionals who are trained to use a range of evidence-based treatment interventions to improve overall function of stroke patients as physiotherapy is an important segment in stroke rehabilitation (Ontario Health, 2020). Physiotherapy is delivered in acute care, inpatient, and outpatient settings, as well as in home and community care settings (Langstaff *et al*., 2014). Interventions may include, for example, joint mobilization protocol, progressive resistive exercises, aerobic training, mirror therapy, weight bearing exercises and task-oriented training for balance, walking, upper and lower limb function (Corbetta *et al*., 2015). Maximizing upper limb recovery after stroke requires significant time and effort by the patient and the physiotherapy team (Corbetta *et al*., 2015). After a stroke, physiotherapy typically begins in acute care with a focus on comprehensive assessment, and early mobilization to optimize safe and independent capacity for bed mobility, transfers, and walking (Langstaff *et al*., 2014). Patients transferred to inpatient rehabilitation will receive multiple physiotherapy, which

promote the use of effective treatments for strengthening, balance retraining, aerobic training, and task-oriented training of mobility before transition to outpatient care (Ferrarello *et al*., 2011). Evidence-based practice (EBP) is an important factor in determining the quality of healthcare. It promotes the use of current best research evidence along with individual clinical expertise in order to reach informed decisions about patient care (Alketbi *et al*., 2021). EBP allows physiotherapists to identify the best (most effective) techniques and to take responsibility for evaluating their practice on an on-going basis (Bernhardsson & Larsson, 2013). The implementation of evidence-based practice in physiotherapy will help minimize disability after a stroke. Since some people present with persisting disabilities, long-term (i.e., maintenance) physiotherapy may reduce the risk of progressive worsening, as well as promote recovery of patients (Alketbi *et al*., 2021). Continual assessment and tracking of functional status over time is important when determining the need for continual therapy (Ontario Health, 2020).

2.9 Utilization of Physiotherapy

2.9.1 Stroke and Physiotherapy

In recent decades, there has been a controversy about what physiotherapist should be doing by the way neurological rehabilitation to enhance the optimal performance and well-being of people who have suffered from stroke. The development of different stroke physiotherapy concepts and their commercialization has sometimes given rise to heated debates between the philosophical beliefs of practitioners on one side and academia on the other. But physiotherapist is just one part of the multidisciplinary, or rather interdisciplinary, team necessary to handle the rehabilitation process of some of who had stroke. For some, they may be the only therapists available in the immediate aftermath of stroke. This introduces the theme that physiotherapy services need to

adjust so as to be able to deal with the disability in each of its stages: hyper-acute and acute, post-acute rehabilitation and post-rehabilitation community services.

Time has come to move on, and stroke physiotherapy should change its focus from the elementary concepts to the delivery of complex services at the various stages after stroke seen from the patient`s perspective. Physiotherapy services are related to the health care service provided in each country. So where does stroke physiotherapy stand and where should it go? Through the different stages of life after stroke, it should deal with motor function, control and learning, both at an individual level and as part of a complex intervention.

The rehabilitation process is a period of intensive treatment where physiotherapy should be focused on both building up capacities (body functions) and repeating task-oriented activities. For most patients, this needs to be an interactive process, that is: task-oriented exercises need to be built up as exercises foe capacity so that by repetition, intensity and varying the same tasks, the patient`s maximum level is reached. Treadmill walking, virtual reality and games related to balance, arm and hand function, intensive treatment with bilateral hand exercises and robot-assisted training seem to be effective. (Kim *et al*., 2009; Ada *et al*., 2010; Saposnik *et al*., 2010; Whitall *et al*., 2011; Gjellesvik *et al*., 2012; Mehrholz *et al*., 2012).

Stroke physiotherapy remains a complex phenomenon, and trials evaluating stroke physiotherapy are now needed. Craig & colleagues (2008) reported on the new Medical Research Council guidance. The process of developing and evaluating a complex intervention (development, feasibility and piloting, evaluation, and implementation) may not always follow a linear or cyclical sequence; indeed, research trials of stroke physiotherapy should start with the therapies

that have already been implemented. Furthermore, a sound theoretical understanding of how the intervention causes change in such complex interventions as physiotherapy is essential.

There are several different approaches to physiotherapy treatment after stroke, these can be broadly divided into approaches that are based on neurophysiological, motor learning, or orthopaedic principles. Some physiotherapists base their treatment on a single approach, whereas others use a mixture of components from a number of different approaches. The practical application of these approaches can result in substantial differences in patient treatment. At present, the Bobath approach, based on neurophysiological principles, probably remains the most widely used approach in the Western world (Nilsson *et al*., 1992; Carr *et al*., 1994; Sackley *et al*., 1996; Davidson *et al*., 2000; Lennon *et al*., 2001)

2.9.2 Utilization of physiotherapy service following stroke

1. Stroke care at Emergency Unit: -

Physiotherapy uses expert knowledge and skills to improve patient`s care flow, early access to physiotherapy in Emergency Unit is associated with reduced disability. Physiotherapy play a critical role in screening for appropriateness of care, complete assessment, direct care of the patient and consultation with other practitioners. The main goal is stabilization of vital signs

2. In-patient Stroke rehabilitation service

With reduction in stroke mortality (Seminog et al., 2019) and more patients surviving the emergency unit, attention is now focused on reduction of morbidity and disability due to stroke. Revascularization with tPA or mechanical thrombectomy as well as protection of neural tissue by effective managements of complications, such as haemorrhagic transformation of infarct or

brain oedema, is directed at limiting the extent of brain damage and thereby disabling effect of impairments. To support this effort, emphasis on recovery of function, feasibility of early mobilization and prevention of early complications should be considered as the main goal (Winstein *et al*. 2016).

In in-patient setting, the stroke care team ought to include at least a physician with expertise in stroke rehabilitation, speech and language pathologist/therapist with expertise in swallow and early communication techniques, physical therapist, occupational therapist and stroke care–trained nurse specialists (Boulanger *et al*. 2018). . In this context the key domains of care are:

1. Complete assessment of patient with focus on the following: Impact of stroke with particular focus on presenting impairments and their severity (impairment mapping), Co-morbidities and their premorbid impact on function, Pre-existing musculoskeletal conditions and/or deformities, Pre-existing disability(ies), Family setup and support, Work and social status.

2. Protection of the airway and swallow assessment and management.

(a)Early swallow assessment by speech and language therapist, who is adequately trained in dysphagia management or by another professional (nurse or doctor), is recommended (Palli *et al*. 2017).

(b)The patient should not be fed orally or given medications unless cleared by swallow screening (Duncan *et al*. 2005).

(c)The period within which this is to be conducted is difficult to specify as evidence in this respect does not support a standardized practice. However, currently, there is a consensus agreement that in patients who have signs of dysphagia, the assessment should be carried out within 24 h (Ellis and Adams 2016).

(d) At present, there is no consensus on the instrument or instruments for the assessment, and we recommend that this should be agreed upon locally depending on resources, needs, availability, expertise and training (Donovan *et al*. 2013).

(e) Enteral feeding should be initiated early in patients with dysphagia to avoid malnourishment. Whilst this should be considered as early as it is clinically established that patient is not able to swallow, the delay in introducing the enteral feeding should not exceed 3 days (Yamada 2015; Ojo and Brooke 2016).

(f) Evidence indicate that early insertion of per-endoscopic gastrostomy tube should be avoided (George *et al*. 2017).

(g) In patients requiring enteral feeding, nasogastric tube feeding is recommended for as long as 3 weeks, beyond which insertion of PEG may be considered (George *et al*. 2017). Please note that nasogastric tube feeding can be associated with regurgitation and aspiration if the patient lies down immediately after a meal. Therefore, the patient should remain seated for over 2 h (gastric emptying time) after each meal to avoid regurgitation and aspiration.

3.Very Early or Early Mobilization (VEM/EM):

(a) Currently, there is no evidence to support VEM (defined as out of bed activity within 24–48 h). Indeed, AVERT III showed negative impact on mortality at 3 months (Langhorne *et al*. 2018; Bernhardt *et al*. 2019). In the light of lack of evidence for beneficial effect and evidence for negative impact at 3 months, we recommend that mobilization within 24 h after stroke cannot be recommended (Langhorne *et al*. 2018).

Mobilization within 48 h may be considered acceptable in patients who meet key safety parameters. However, there is still no convincing evidence for efficacy of this practice (Xu *et al*. 2017).

(b) Early mobilization is recommended. Currently there is no agreement on the definition of "EARLY". Mobilization within 72 h may be considered as such (Bernhardt *et al*. 2015).

On the basis of current evidence, mobilization after 24 h, unless otherwise contraindicated, is recommended. There are no studies to indicate that this practice is likely to harm patient and indeed, there is some evidence that it may be of some benefit (Li *et al*. 2018). Dose, including intensity, frequency and duration should be commensurate to patient's clinical status. Dose should be incrementally increased in line with patient's tolerance and response (Yagi *et al*. 2017). Specific motor rehabilitation focuses are head and trunk control, arm function, stance, gait and balance and should be addressed as individually indicated early after stroke.

Change, progress and outcome should be analytically recorded daily.

4. Communication and speech.

(a) Early assessment of communication by a speech therapist is recommended.

(b) Strategies for establishing communication early with stroke patients are recommended (National Institute for Health and Care Excellence (NICE) 2013).

(c) The evidence for active speech and language therapy in early period after stroke, before 48 h, is not available (Nouwens *et al*. 2013).

3. Outpatient Stroke Rehabilitation Services

Patients may be discharged from acute care and sub-acute facilities with arrangement to receive ongoing rehabilitation as outpatients. Indeed, there is evidence that early supported discharge

directly from acute care to community-based rehabilitation as well as integrated outpatient rehabilitation delivers good outcome for stroke survivors (Rice *et al*. 2016; Langhorne *et al*. 2017). Teasell *et al*. (2018) found level 1A evidence that stroke patients with mild-to-moderate disability, discharged early from an acute hospital unit, can be rehabilitated in the community by an interdisciplinary stroke rehabilitation team and attain similar or superior functional outcomes when compared to patients receiving inpatient rehabilitation (high-quality evidence).

The patient could be referred to an outpatient stroke rehabilitation service if:

(a) He/she is clinically stable and is able to tolerate transportation to and from outpatient rehabilitation facility.

(b) He/she has sufficient effort tolerance level and does not fatigue so much that precludes effective participation in therapy sessions.

(c) He/she is able to engage cognitively in therapy sessions, re-engage in subsequent sessions with demonstrable carry over.

The outpatient stroke rehabilitation facility should be designed to offer multidisciplinary team rehabilitation. Patients should have access to all required therapies and interventions. The available services should include:

(a) Access to physician(s) with expertise in neurorehabilitation for continued management of residual effects of stroke including spasticity and pain.

(b) Physiotherapy service with adequately designed treatment areas with availability of most required equipment.

(c) Occupational therapy service with capacity to attend to issues such as extended activities of daily living and vocational rehabilitation.

(d) Speech and language therapy services with capacity to work on issues related to dysphagia and communication.

Neuropsychological therapy for the treatment of cognitive, behavioural and emotional post-stroke disorders is recommended when available.

4.Community-Based Stroke Rehabilitation (CBR)

Over the last couple of decades, CBR has acquired a lot of interest. CBR programmes improve, facilitate, stimulate and/or provide services to people with disabilities (PWDs), such as stroke survivors, their families and caregivers within the locations of their families and communities through locally employed full or part time, paid or volunteer community rehabilitation workers, who are trained, followed up and managed within a certain organizational set up, that has rehabilitation philosophy as its core operational principle (Ru *et al*. 2017). Only few studies are available on CBR and its advantages and disadvantages have not been critically studied (Stephenson and Wiles 2000). However, it is possible to list some advantages on the basis of experience and current practice.

Advantages of CBR, compared to the institutional approach include:

(a) In time, and in theory, all the people living with disabilities in a community can be reached and their basic needs be met.

(b) "Tailor-made" rehabilitation programmes can be established, based on the individual's capacities and needs, and focused directly on integration into the family/community. "Disability" is not a stable situation. CBR can evolve and adapt to changing needs of patients.

(c) Family members can witness and participate in the progress of a relative living with disability, thus enhancing their faith in that person's abilities and potential and challenging their own prejudices.

(d) CBR services, apart from carrying out their core work in rehabilitation, can also contribute towards the prevention of secondary complications related to impairments and disabilities, through activities such as primary healthcare, vaccinations, nutrition and hygiene.

(e) CBR programmes can trace many people living with disabilities who would never have been found by institutions and, through referral, can make the work of other existing specialized services more effective.

(f) CBR can be more effective in tackling issues such as return to work and community access, including leisure activities and extended activities of daily living.

(g) CBR could be cost-effective (if well managed!

2.10 Empirical Review of Literatures

Study	Title of Study	Study Objectives	Method	Conclusion

Priya *et al*., 2015	Knowledge of Physiotherapy service among hospital-based health care professionals in Papua New Guinea	Aimed at assessing the level of knowledge and perception of physiotherapy by hospital-based health professionals	A descriptive cross-sectional study was conducted using a self-administered survey questionnaire focusing on the perception of physiotherapy among health care professional. 5 hospitals were purposely selected as they are the major highest number of referral from rural health facilities. All healthcare professionals including doctors, health extension officers, nursing officers, and community health workers and the residents from respective above professions were invited to participate in this study	The Study identified a lack of knowledge of physiotherapy and its role among the health professionals surveyed which is likely to reflect the situation in the wider health professional community. There was therefore an urgent need to improve education regarding physiotherapy and rehabilitation service for all health care workers.
Sheila *et al*., 2001	Physiotherapy based on the Bobath concept in stroke rehabilitation	Aimed to provide an expert consensus view of the theoretical beliefs underlying current Bobath practice in the UK	Questionnaires (with sections related to therapist background, physiotherapy management, theoretical belief and gait re-education strategies used) were posted to all senior level physiotherapist working in stroke care (n=1022).	This survey has raised several issues for debate within physiotherapist such as the automatic translation of movement into function, carry over outside therapy, and the way in which tasks should be practiced. The dominance of the Bobath concept needs to be justified by establishing that it is both effective and efficient at achieving its treatment aims of: normalizing tone, improving intrinsic

				recover of the affected side and function within everyday tasks
Olaleye *et al*., 2017	Utilization of physiotherapy in the continuum of stroke care	To investigate the pattern of referral and utilization of physiotherapy in the continuum of stroke care	Referral note and medical records of patient admitted in the University of Teaching hospital, Ibadan with a clinical diagnosis of stroke between January 2009 to December 2013 were retrospectively reviewed. Information on age, sex, type of stroke, length of hospital stay, referral for patient and utilization of physiotherapy were retrieved. Data were summarized using descriptive statistics and analysed using Chi-square test.	The referral rate of stroke patient for physiotherapy was relatively high. Utilization of in-patient physiotherapy reduced the length of hospital stay among patient with stroke. Utilization of out-patient physiotherapy was low. Strategies to enhance out-patient utilization should be explored.
Sheila Lennon, 2009	Physiotherapy practice in stroke rehabilitation	This survey aimed to provide an expert consensus view of the theoretical beliefs underlying physiotherapy practice in stroke rehabilitation in the UK	Questionnaires (with sections related to therapist background, physiotherapy management, theoretical belief and gait re-education strategies used) were posted to all senior level physiotherapist working in stroke care (n=1022).	A consensus was obtained on 16 theoretical beliefs; however the evidence base underlying these beliefs remains sparse. Man of these beliefs require further debate within the physiotherapy profession such as the amount of time spent on preparation for function, the automatic translation of movement into function, carry over outside therapy, and the way in which tasks should be

				practiced.
Oke *et al*.,2012	Cost burden of Post stroke condition in Nigeria: a pilot Study	This stud y aimed to report the result of a prospective cross-sectional study on stroke in Nigeria.	Patients diagnosed and admitted for management for stroke in the selected health care facilities formed the subject of this study. medical records (case files) of 240 stroke patients managed within the last six ears (2005-2011) were randomly selected from the medical record departments of the study centers. Files of the patients who were admitted during acute care period (without discharge against medical advice) and were followed on out-patient basis without default within the study period were purposely utilized. The files were then assessed for the various investigations and treatment interventions of acute and long term care and the cost thereof.	The outcome of this study suggests that managing stroke constitutes a huge direct cost burden unaffordable b an average Nigerian stroke sufferer. The implication is that lack of means for rehabilitative care may result in disability adjusted life years which further compounds burdens in terms of indirect cost on the suffers` and care givers` productivity. It is therefore recommended that awareness of this disorder is created b policy makers and implementers where it does not exist and increased where it does with health promotion and preventive measures

CHAPTER THREE

MATERIALS AND METHODOLOGY

This chapter described the methodology for the study, including the research design, participant information, participant selection, as well as the collection, analysis and synthesis of data.

3.1 Selection Criteria

3.1.1 Inclusion criteria

The Stroke Multi-disciplinary team which included:

-Physician(s) with expertise in neuro-rehabilitation.

-Rehabilitation nurses.

-Physiotherapists

-Occupational therapists.

-Speech and language therapist with expertise in dysphagia management and communication rehabilitation.

-Dietician

-Social workers

3.1.2 Exclusion criteria

Multi-disciplinary team of another unit other than Stroke unit

Stroke survivor patient

3.2 Materials

3.2.1 Research Instruments

The instrument that was used was a self-administered questionnaire that was designed in English, a modification of the one used by Priya *et al*; 2015 and Mattew *et al*; 2015 in a related study. It has three main parts, the socio-demographic data part, knowledge and awareness of physiotherapy part and relevance of physiotherapy in each level of continuum of stroke care part.

3.3 Methods

3.3.1 Sampling Technique

A purposive sampling technique was used in this study. The participants were Stroke multi-disciplinary Team at UBTH.

3.3.2 Research Design

This study was a mixed study design that was comprised of

1. Cross- sectional design (Quantitative research)

2. In-depth Interview (Qualitative research)

3.3.3 Procedure of data collection

Ethical approval for this study was sought and obtained from University of Benin Teaching Hospital (UBTH). **(ADM/E 22/A/VOL.VII/148301165) I**nformed Consent was sought and obtained from the participants before the commencement of the Study. The participants for the study were selected using the purposive sampling method. Questionnaire was administered to the

participants. The in-depth interview was conducted among the participants. Before the commencement of this study, the procedure and purpose of the Study was explained to participants and their informed consent was sought and obtained, and they would be guaranteed anonymity. The discussion was audio taped. A list of open-ended questions was asked and participants were encouraged to talk freely and spontaneously as the discussion was held at the point of saturation.

3.3.4 Sample Size

The sample size for this study will be n= 45 which was calculated using the TARO YAMANE Formula

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

Where,

n= sample size

N= population size

e= margin error $(0.05)^2$

$$\frac{50}{1+50(0.05)^2}$$

Sample size = 45

3.3.5 Ethical Consideration

Ethical approval was obtained from the Ethical Research Committee of the University of Benin Teaching Hospital (UBTH).

3.3.6 Data analysis

The data obtained was summarized using descriptive statistics of frequency, percentage, mean and standard deviation. Statistical Package for Social Sciences version SPSS 22 was used for the analysis and data visualization was done via Excel. Level of significance was set at 0.05. For the qualitative data, thematic analysis and visualization were carried out with the aid of Nvivo14 Software.

CHAPTER FOUR

RESULTS

SECTION A: QUANTITATIVE

4.1.1 Socio-demographic characteristics of Participants

45 respondents were recruited for this study. In age, 21-25 years (6.7%), 26-35 years (60%), 36-45 years (24.4%), 46-55 years (6.7%), >56 years (2.2%). On gender basis, majority were male 26 (57. 8%) and 19 (42.2%) were female. Most were single 22 (48.9%), married 19 (42.2%), widowed 3 (6.7%%), separated 1 (2.2 %). On tribe basis, Benin 12 (26.7%), Esan 9 (20.0%), Yoruba 10 (22.2%), Igbo 12 (26.7%), Hausa 2 (4.4%). Majority were Christian 38 (84.4%), Islam 7(15.6%). BSc was the most level of education (66.7%), clinical doctorate 7 (15.6%) masters 7(15.6%), PhD 1(2.2%). On basis of health field, physician 10 (22.2%) physiotherapy 14 (31.1%), nurse 9 (20.0%), occupational therapy 6 (13.3%), speech therapy 2 (4.4%), dietitian 3 ((6.7%), social worker 1 (2.2%). On primary stroke environment, emergency unit 9 (20.0%), in-patient unit 15 (33.3%), out-patient unit 10 (22.2%), community based 11 (24.4%). Work experience 7.1+/- 4.65.

Table 1: Socio-demographic characteristics of Participants

Variables	Categories	Frequency (n=45)	Percentage (%)
Age	21-25	3	6.7
	26-35	27	60.0
	36-45	11	24.4
	46-55	3	6.7
	>56	1	2.2
Gender	Male	26	57.8
	Female	19	42.2
Marital Status	Single	22	48.9
	Married	19	42.2
	Widowed	3	6.7
	Separated	1	2.2
Tribe	Benin	12	26.7
	Esan	9	20.0
	Yoruba	10	22.2
	Igbo	12	26.7
	Hausa	2	4.4
Religion	Christianity	38	84.4
	Islam	7	15.6
Level of Education	PhD	1	2.2
	Clinical doctorate	7	15.6
	Masters	7	15.6
	BSc.	30	66.7
Health Field	Physician	10	22.2
	PT	14	31.1
	Nurse	9	20.0
	OT	6	13.3
	ST	2	4.4
	Dietician	3	6.7
	Social worker	1	2.2
Primary Stroke Environ.	Emergency	9	20.0
	In-patient	15	33.3
	Out-patient	10	22.2
	Community-based	11	24.4
Work experience	**Σ±SD**	**Min-Max**	
	7.16±4.65	2-28	

PT, Physiotherapy; OT, Occupational therapy; ST, Speech therapy; Environ., Environment; min, minimum; max, maximum

4.2 Awareness and knowledge of Physiotherapy among Stroke Multi-disciplinary team

A good number of participants were aware of the role of physiotherapy services in this hospital and were informed during their training period, and were interested to learn more. Majority agreed that physiotherapy have therapeutics benefits and are typically of both gender male and female. A good number knew what physiotherapy is all about in terms of maximizing health, optimizing movement efficiency, identification and management of impairment but not treatment and rehabilitation. Majority knew about the job and area of specialization of physiotherapist like neuro-physiotherapy, orthopedics, I.C.U, women`s health, sport geriatrics but they have no knowledge about ergonomics. A good number knew about physiotherapy equipment, knew about rehabilitation service for stroke patient and worked with a team, referred people for physiotherapy, discussed the need for physiotherapy and believed physiotherapist create awareness of physiotherapy but not enough. A good number think the need training to have good knowledge and understand it more.

Table 2a: Awareness and Knowledge of Physiotherapy among Stroke MDT

Variables	Categories	Frequency	Percentage
Aware of Physiotherapy?	Yes	45	100
Informed during training?	Yes	27	60
	No	18	40
Interested to learn more about PT?	Yes	39	86.7
	No	6	13.3
Does PT have therapeutic benefits?	Yes	41	91.1
	No	4	8.9
PT's are typically of which gender?	Male	4	8.9
	Male & Female	41	91.1
PT is about: - Maximizing health	Yes	31	68.9
	No	14	31.1
- Optimizing movement efficiency	Yes	35	77.8
	No	10	22.2
- Identification and management of Impairments	Yes	29	64.4
	No	16	35.6
- Treatment and rehabilitation	Yes	21	46.7
	No	24	53.3
PT job areas include: - Orthopaedics	Yes	40	88.9
	No	5	11.1
- Neuro-rehabilitation	Yes	45	100
	No	0	0
- ICU	Yes	28	62.2
	No	17	37.8
- Women's health	Yes	27	60
	No	18	40
- Geriatrics	Yes	31	68.9
	No	14	31.1
- Sports	Yes	32	71.1
	No	13	28.9
- Burns	Yes	20	44.4
	No	25	55.6
Knowledge of PT specialization:	Yes	45	100
-Neuro-physiotherapy	No	0	0
- Orthopaedics	Yes	40	88.9
	No	5	11.1
- Cardiorespiratory	Yes	27	60
	No	18	40
- Women's health	Yes	28	62.2
	No	17	37.8
- Geriatrics	Yes	33	73.3
	No	12	26.7
- Community based	Yes	36	80
	No	9	20
- Sport	Yes	31	68.9
	No	14	31.1
- Ergonomics	Yes	21	46.7
	No	24	53.3

Table 2b: Awareness and Knowledge of Physiotherapy among Stroke MDT

Variables	Categories	Frequency	Percentage
Equipment / tools used by Physiotherapists are:			
- Ice	Yes	33	73.3
	No	12	26.7
- Exercise machine	Yes	41	91.1
	No	4	8.9
- Electrical machines	Yes	31	68.9
	No	14	31.1
- Bandages	Yes	39	86.7
	No	6	13.3
- Walking aids	Yes	38	84.4
	No	7	15.6
- Plints	Yes	33	73.3
	No	12	26.7
PHT treatments include:			
- Massage	Yes	43	95.6
	No	2	4.4
- Operations	Yes	3	6.7
	No	42	93.3
- Exercise	Yes	44	97.8
	No	1	2.2
- Medications	Yes	6	13.3
	No	39	86.7
- Education	Yes	29	64.4
	No	16	35.6
Worked with a rehabilitation team?	Yes	42	93.3
	No	3	6.7
Are there rehabilitation services for stroke patients?	Yes	45	100
	No	0	0
Ever referred a patient for PT?	Yes	37	82.2
	No	8	17.8
Ever discussed the need for PT with colleagues?	Yes	37	82.2
	No	8	17.8
Do physiotherapists create awareness of PT?	Yes	29	64.4
	No	16	35.6
Do you have enough information about PT?	Yes	24	53.3
	No	21	46.7
Do you think you need training to understand PT?	Yes	25	55.6
	No	20	44.4

PT, Physiotherapy; ICU, Intensive Care Unit

4.3 Stroke Multi-disciplinary Perceived Physiotherapy Relevance

Perceived physiotherapy relevance was scored 70% as High, 50%-69% as Good and < 50% as Poor. At the emergency stroke care level, 4 (44.4%) perceived relevance of physiotherapy to be good, while 5 (55.6%) perceived physiotherapy relevance to be high. At In-patient rehabilitation stroke care level, 15 (100%) perceived relevance of physiotherapy to be high. At out-patient rehabilitation stroke care level, 10 (100%) perceived relevance of physiotherapy to be high. At community-based rehabilitation stroke care level, 2 (18.2%) perceived relevance of physiotherapy to be good while 9 (81. 8%) perceived relevance of physiotherapy to be high.

Table 3: Stroke Multidisciplinary Team's Perceived Physiotherapy Relevance

Units	Categories	Frequency (N=45)	Percentage (%)
Emergency (n=9)	Poor	0	0
	Good	4	44.4
	High	5	55.6
In-patient (n=15)	Poor	0	0
	Good	0	0
	High	15	100
Out-patient (n=10)	Poor	0	0
	Good	0	0
	High	10	100
Community-based (n=11)	Poor	0	0
	Good	2	18.2
	High	9	81.8

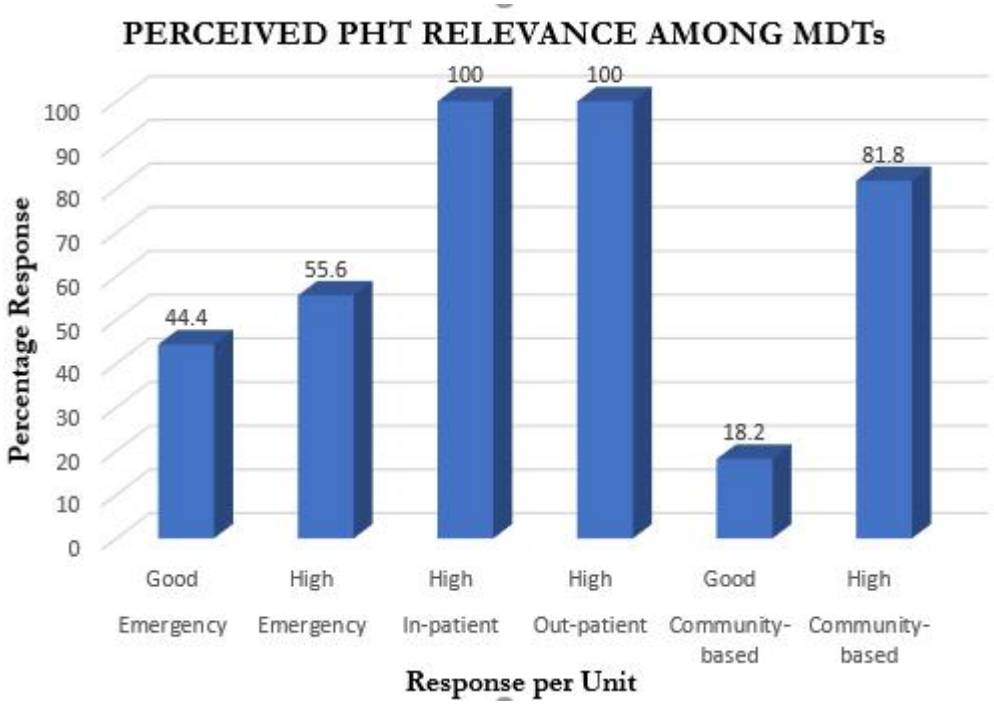

Figure 3.1: Column chart showing perceived physiotherapy relevance among MDTs

SECTION B: QUALITATIVE

This chapter presented the findings from the conventional content analysis of In-depth Interviews carried out among 10 stroke multi-disciplinary team. Five themes emerged from the analysis and they include; pattern of referral for physiotherapy after stroke, knowledge and awareness of physiotherapy among stroke MDTs, relevance of physiotherapy among stroke MDTs, equitable access to physiotherapy after stroke and its determinants.

Table 4: Demographic Characteristics of the participants (N= 10)

ID	Age	Gender	Occupation	Marital Status
P1	36-45	M	Physician	Single
P2	36-45	F	Nurse	Widowed
P3	36-45	M	Occupational Therapist	Married
P4	21-25	F	Physiotherapist	Single
P5	26-35	F	Dietitian	Single
P6	26-35	M	Physiotherapist	Married
P7	36-45	M	Physiotherapist	Married
P8	46-55	F	Nurse	Separated
P9	26-35	M	Speech Therapist	Single
P10	26-35	M	Social Worker	Single

4.4 Thematic Analysis

1. In the pattern of referral for physiotherapy after stroke, 1 theme was generated by 8 out of 10 participants.

   Based on knowledge and awareness of physiotherapy among stroke MDTs, 4 themes were generated which were;

   Theme 1:- Increased knowledge and awareness level generated by 8 out of 10 participants

   Theme 2:- Low knowledge and awareness level by 3 out of 10 participants

   Theme 3:- Considerable knowledge and awareness level by 5 out of 10 participants

   Theme 4:- Expert knowledge and awareness level by 2 out of 10 participants
2. Relevance of physiotherapy among stroke MDTs, 1 theme was generated high level of perceived relevance 10 out of 10 participants
3. Equitable access to physiotherapy, generated 1 theme, 3 reported equitable, while 7 reported not equitable.
4. Determinants of equitable access to physiotherapy generated 2 themes

   Theme 1:- Demand factor which was affordability reported 4 out of 10 participant

   Theme 2:- Supply factors which were;

   Code 1:- Geographical service location reported 5 out of 10 participants

   Code 2:- Availability of personnel reported 3 out of 10 participants

   Code 3:- Work schedule reported 2 out of 10 participants

   Code 4:- Health care integration reported 1 out of 10 participants

Table 5: Thematic Analysis of Participant's Responses According to the Research Objectives

The Pattern of Referral for Physiotherapy after Stroke.			
		No (N=10)	**Some References**
Theme 1	Blanket Referral Policy	8	"*Blanket referral policy for stroke survivors. We don't have to wait for any neurologist to refer a patient to us. The patient is ours right from A&E*" …. **P6** "*I know that patients must receive physiotherapy service so far they are admitted into the ward, and It has to be as soon as possible*" …. **P5**
Knowledge and Awareness of Physiotherapy among Stroke Multidisciplinary Team.			
Theme 1	Increased knowledge and Awareness Level	8	"*I have worked in a rehabilitation team with physiotherapists"* …. **P1**
Theme 2	Low Knowledge level	3	"*I don't have enough knowledge about physiotherapy, but I have little knowledge*" …. **P4**
Theme 3	Considerable Knowledge	5	"*Well…. hmmmm I can say I have some knowledge. I know they promote health, maximize health, optimize movement and manage impairments. I know some of the tools and treatments they use on patients*" …. **P1**
Theme 4	Expert Knowledge	2	"*I am knowledgeable, well informed and aware of physiotherapy and clinically inclined about physiotherapy and a good representation of the profession*" …. **P6**
Physiotherapy Relevance among Stroke Multidisciplinary Team			
Theme 1	High Level of Perceived Relevance	10	"*It is unlikely to achieve optimal recovery from stroke without physiotherapy. They improve early mobilization, physical activity, quality of life, functional capability*" …. **P1** **"***Relevance of physiotherapy can never be looked down on, they provide assessment, diagnosis, treatment and support across the life span with impairments…. Physiotherapy makes other people`s work easier like they are*

			connected with every other person in the MDTs team, like collaboration with other professionals in the delivery of services" …. **P9**
Equitable Access to Physiotherapy among Stroke Patients.			
Theme 1 Code 1 Code 2	Equitable Access - Yes - No	 3 7	
Determinants of Equitable Access to Physiotherapy among Stroke Patients.			
Theme 1 Code 1	Demand Factors - Affordability	 4	"*Physiotherapy service is readily available but not affordable to some people*" …. **P8**
Theme 2 Code 1	Supply Factors - Geographical Service Location	 5	"*The service of physiotherapy is more concentrated in the urban areas in terms of accessibility*" … **P8**
Code 2	- Availability of Personnel	3	"*We are short-staffed ... workload ... looking at the number of patients we have to attend to*" …. **P6**
Code 3	- Work Schedule	2	"*It is readily more available during the weekdays but not during weekends except patient needs it more I mean critically ill*" … **P9**
Code 4	- Health-Care Integration	1	"*There are problems with health care integration into the health care service and health care delivery in Nigeria*" …. **P3**

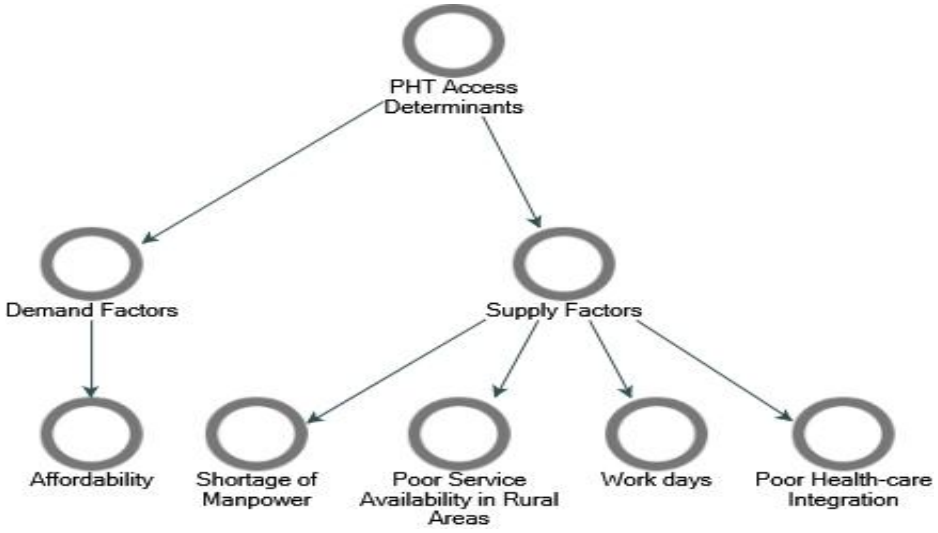

Figure 3.2: A tree map illustrating the determinants of equitable accessibility of physiotherapy services

Figure 3.3: Word cloud of participant's responses to physiotherapy relevance

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Discussion

This study was aimed at investigating the utilization of physiotherapy in the continuum of stroke care at different level of stroke care; emergency, in-patient, out-patient, and community based. The findings of this study showed that there was a high proportion of referral of stroke survivors for physiotherapy which was because the physicians were aware of the utilization of physiotherapy and also the referral pattern policy adopted in this hospital similar to the work done by Olaleye *et al*.,2017. Also the physicians were aware of the important of physiotherapy in improving functional independence post stroke. It could be a reflection of the level of adherence physicians in this hospital recommended clinical practice guidelines that stroke patient be referred for physiotherapy as soon as life-threatening problems are under control. (Mckevitt et al., 2005 & Leemrijse *et al*., 2007) reported utilization rate of 70.7% and 69% respectively for physiotherapy. However (Lee *et al*., 2010) reported a utilization rate of 33% for physiotherapy in acute-stroke. This is low in contrary to findings of this study. The findings of Lee and colleagues may be related to the reported dearth of physiotherapist and consequence rationing of rehabilitation service in Taiwan.

This finding also showed that 86.7% of stroke MDTs would like to learn more information about physiotherapy. This is a similar to the work done by (Priya el al., 2015) on the knowledge of physiotherapy services among hospital-based health care professional which showed that 97% of

healthcare would like more information regarding physiotherapy. Physiotherapist has to take a lead in this area. It is the responsibilities of Physiotherapist, physiotherapy educational programs, physiotherapy associations to promote the profession and its status among the Stroke MDTs, health professionals and the general public.

The relevance of Physiotherapy in stroke care was high among MDTs can never be underrated at each stroke care level, without physiotherapy, rehabilitation is nothing. There is no way a patient can get back to normal or near normal function. It is unlikely to achieve optimal recover from stroke without physiotherapy, which is similar to other studies (Emberson *et al*., 2014; Campbell *et al*., 2015 and Lee *et al*., 2016). The result of this study showed that there has been a reduction in the individual level of disability in health care system due to timely intervention and reduction of the disability impairment because of appropriate and relevance of physiotherapy rehabilitative care. Access to physiotherapy is not equitable in relation to people opinion and perception, there is no even distribution of physiotherapy services. The service is tend to be more for critically ill patient. Availability, Affordability, Accessibility, the cost burden on patients and caregivers are determinants for equitability, in a similar study in respect to affordability (Oke *et al*., 2012). The result of this study suggested that managing stroke constitutes a huge direct cost burden unaffordable b an average Nigerian stroke sufferer. On Availability, shortage of manpower the service is available to patients that are critically ill, that are in stroke ward.

5.2 Conclusion

Stroke care has advanced and more patients are surviving the acute-stage. In stroke care model, rehabilitation is now considered an integral component of all levels of stroke care. This research has identified a good utilization of physiotherapy and its relevance among multidisciplinary team. However, there is a need to improve the knowledge, awareness and education regarding physiotherapy and rehabilitation for all cadres of health care workers. Physiotherapist need to be proactive in this area and need the support of health services, training institutions and the government. It is of opinion that health care system must make stroke a priority and consider investing in continuum of care for stroke as doing so will lessen the burden of care in the long-term and may indeed deliver net cost savings.

5.3 Recommendations

Since utilization of physiotherapy in the continuum of stroke care can never be underestimated, the level of awareness has to be made. Physiotherapist has to be proactive in this area. Some challenges were encountered during the study, one of which was responses of some of the participants were influenced by social desirability bias.

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APPENDIX 1

PARTICIPANT`S SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Age: 21-25( ) 26-35 ( ) 36-45( ) 46-55( ) 56 and above ( )
2. Sex : Male ( ) Female ( )
3. Marital Status: Single ( ) Married ( ) Widowed ( ) Separated ( ) Divorced( ) Co-habiting( )
4. Tribe: Benin ( ) Esan ( ) Yoruba ( ) Igbo ( ) Hausa ( ) Others_____
5. Religion: Christianity ( ) Islam ( ) Others _____
6. Level of Education: Ph.D ( ) Clinical doctorate ( ) Masters ( ) B.Sc ( )
7. Type of health work: Physician ( ) Physiotherapy ( ) Nurse ( ) Occupational therapy ( ) Speech therapy ( ) Dietitian ( ) Social worker( )
8. Primary Stroke environment: Emergency unit ( ) In-patient unit ( ) Out-patient( ) Community-based Rehabilitation( )
9. Work Experience (in years) _____

APPENDIX 2

KNOWLEDGE AND AWARENESS OF PHYSIOTHERAPY AMONG STROKE INTERDISCIPLINARY TEAM QUESTIONNAIRE

1. Are you aware of Physiotherapy? Yes ( ) No ( )
2. Were you infirmed about physiotherapy during your training period? Yes ( ) No ( )
3. Are you interested to learn more about Physiotherapy? Yes ( ) No ( )
4. Does physiotherapy have therapeutic benefits? Yes ( ) No ( )
5. Physiotherapy are typically of which gender? Male ( )Female ( ) Both ( )
6. Physiotherapy is about: Maximizing health ( ) Optimizing movement efficiency ( ) Identification and management of Impairments ( )Treatment and rehabilitation of impairments ( ) Others specify_____
7. Job of Physiotherapist: Orthopaedics rehabilitation ( ) Neuro rehabilitation ( ) intensive care rehabilitation ( ) Women`s health ( )Geriatrics rehabilitation ( ) Sport injuries ( ) Burns ( )Prescribing Orthosis and Prosthesis( ) Others specify_____

8. Knowledge of various specialization: Neuro-physiotherapy ( ) Cardiorespiratory( ) Women`s health ( ) Geriatrics( ) Community based( ) Sport ( ) Musculoskeletal ( ) Ergonomics( ) others specify_____
9. Equipment / Tools used by Physiotherapy includes: Ice ( ) Exercise machine ( ) Electrical machine ( ) bandages ( ) Walking aids ( ) Plints ( ) others specify_____
10. Physiotherapy Treatments includes: Massage ( ) Operations ( ) Exercises ( ) Medication ( ) Education ( ) others specify_____
11. Have you worked with a rehabilitation team? Yes ( ) No ( )
12. Are there any rehabilitation services for people with Stroke? Yes ( ) No ( )
13. Have you referred any patient for physiotherapy? Yes ( ) No ( )
14. Have you discussed the need for physiotherapy intervention with your colleagues? Yes ( ) No ( )
15. Do you think physiotherapy professionals creates awareness of physiotherapy? Yes ( ) No ( )
16. Do you have enough information about physiotherapy ? Yes ( ) No ( )
17. Do you think you need training to understand physiotherapy? Yes ( ) No ( )

APPENDIX 3

RELEVANCE OF PHYSIOTHERAPY IN EMERGENCY UNIT

S/N	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	Physiotherapy use expert knowledge and skills to improve patient`s care flow					
2.	Stabilization of Vital Signs					
3.	Physiotherapy play a critical role in screening for appropriateness of care					
4.	Complete assessment of patient					
5	Direct care of patient					
6	Consultation with other practitioners					
7	Early access to physiotherapy in Emergency Unit is associated with reduced dis ability					

RELEVANCE OF PHYSIOTHERAPY IN IN-PATIENT UNIT

S/ N	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

1	Assessment of the patient to determine impairments and activity limitations					
2.	Feasibility of early mobilization					
3.	Physiotherapy improves quality of life by restoring function and enabling independent living					
4.	Respiratory function maintenance					
5.	Organizing therapeutic physical exercises					
6.	Emphasize on recovery of function, positioning and prevention of further complications					
7.	Re-training patient to stand and walk					
8.	Provision of advise and activity modification					
9.	Rehabilitation of patient back to near normal without medicine by the use of exercises, manual therapy rehabilitation techniques and physical activity					

RELEVANCE OF PHYSIOTHERAPY IN OUT-PATIENT UNIT

S/ N	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	Improvement on motor function, muscle strength					
2.	Improve walking through proper Gait and mobility training					
3.	Balance, coordination and posture training					

4.	Engagement of patient cognitively in therapy sessions					
5.	Education of the patient to prevent further complications, spasm, contracture e.t.c					
6.	Cardiorespiratory training					
7.	Fatigue management and optimize the patient`s quality of life					
8.	Maximize patient`s functional abilities and level of independence					

RELEVANCE OF PHYSIOTHERAPY IN COMMUNITY-BASED REHABILITATION

S/ N	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1.	Integration of prevention, promotion treatment and rehabilitation					
2.	Provision of functional rehabilitation services					
3.	Physiotherapy improves the holistic approach encompassing physical, social, educational and other needs.					
4.	Prevention of causes of disabilities and creating a positive attitude towards people with disabilities					
5.	Reduces hospital stay and rate of re-hospitalization					
6.	It ensures continuity of care and facilitate a transition of hospital to home					
7.	Increases independence , teaches self-management and					

	promote empowerment					
8.	Reduces mortality and improve physical/ social function					
9.	Educating the patient and their families and consultation with other health care professionals					

IN- DEPTH INTERVIEW QUESTIONS

i. What is the pattern of referral for physiotherapy after stroke.

ii. What is the level of knowledge and awareness of physiotherapy among Stroke Multi-disciplinary Team.

iii. What is the relevance of physiotherapy among Stroke Multi-disciplinary Team.

iv. Is physiotherapy access equitable among stroke survivors

iv. What are the determinants of access to physiotherapy services among stroke survivors

APPENDIX 4

INFORMED CONSENT FORM

TITLE OF STUDY: Utilization of Physiotherapy in the Continuum of stroke care at a Tertiary hospital in Benin City (UBTH). Nigeria

INVESTIGATOR: MUFTAU KAFILAT OPEYEMI

SUPERVISORS: DR. E.N.D EKECHUKWU

FINANCIAL SPONSORSHIP: This research project is self-sponsored

PURPOSE OF THE RESEARCH: The purpose of the research is to Investigate the Utilization of Physiotherapy in the Continuum of stroke care at a Tertiary hospital in Benin City (UBTH), Nigeria

PROCEDURES AND PROTOCOL INVOLVED IN THE STUDY

You are politely approached to respond to an interviewer-administered questionnaire interview. This questionnaire would be only used for research purpose and will Investigate the Utilization

of Physiotherapy in the Continuum of stroke care at a Tertiary hospital in Benin City (UBTH), Nigeria

COMPENSATION: - There will be no financial compensation for participating in this study.

VOLUNTARY PARTICIPATION

Please note that your participation in this research is entirely voluntary. No form of discrimination will be meted to you, should you decide not to participate in this study. You are entirely free to change your mind and stop participating even if you agreed earlier.

SIDE EFFECTS

There is no anticipated adverse effect associated with participating in this study.

BENEFITS

The purpose of the research is to Investigate the Utilization of Physiotherapy in the Continuum of stroke care at a Tertiary hospital in Benin City (UBTH), Nigeria

CONFIDENTIALITY

All information and data obtained in the course of this study will be treated confidentially. The names of the participants will not be written on the questionnaire, and all information collected will be encoded in a file in my personal computer and passworded. Thereafter the questionnaires will be shelved and locked in my personal document cabinet.

CONTACT INFORMATION

MUFTAU KAFILAT OPEYEMI

PROJECT STUDENT.

Email: kafilatmuftau@gmail.com

Tel: 07037435687

Ethics and Research Committee

University of Benin Teaching Hospital

Benin City.

Phone Number: 07063331337

CERTIFICATE OF CONSENT

I have read the above information (or it has been read to me). I had the opportunity to ask questions about it and the questions were answered to my satisfaction.

I consent voluntarily to take part as a participant in this study

I do not consent to participate in this study.

Name of Participant: ----------

Signature of participant: ----------

Date: ----------

APPENDIX 5

ETHICAL APPROVAL

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA

Telephone: 052-600418
Telex: 41120 NG
Website: ubth.org

CHAIRMAN, BOARD OF MANAGEMENT: CHIEF ADEDOJA ADEWOLU, MFR

CHIEF MEDICAL DIRECTOR: PROF. DARLINGTON E. OBASEKI
MBBS (Benin), FMCPath
E-mail: dueboseki@gmail.com

DIRECTOR OF ADMINISTRATION: M.O. JIMOH-KADIRI
B. Sc, (Hons)FIPMD, Dip. Theo. AIHAN

HEALTH RESEARCH ETHICS COMMITTEE APPROVAL

PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/148301165

PROPOSAL TITLE: "UTILIZATION OF PHYSIOTHERAPY IN THE CONTINUUM OF STROKE CARE AT A TERTIARY HOSPITAL IN BENIN CITY(UBTH), NIGERIA—A MIXED STUDY"

PRINCIPAL INVESTIGATOR(S): MUFTAU KAFILAT OPEYEMI

DEPARTMENT/INSTITUTION: DEPARTMENT OF PHYSIOTHERAPY, SCHOOL OF BASIC MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA

CONSIDERED AUGUST 15TH, 2023

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 15/08/2023 TO 14/08/2024. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI PP SIGNATURE & DATE 16-08-23

SUPERVISOR (S): DR. NELSON EKECHUKWU

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signature & Date 16/8/2023